

Transient constraints and phonological development

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1 Puzzle

Certain patterns that are common in child phonology violate generalizations from adult phonological typology.

Example: Positional velar fronting (PVF; Inkelas & Rose, 2007).

a. Velar place becomes alveolar in prosodically strong contexts

cup	[tʰʌp]	1;09.23
again	[ə'dɪn]	1;10.25

b. Velar place is preserved in prosodically weak contexts

bagel	['bejgu]	1;09.23
back	['bæk]	1;10.02

PVF reverses a strong bias in adult phonological typology: Featural contrasts are realized preferentially in strong contexts.
Example: Manner contrasts in Korean (Ahn, 1998)

Can we posit a constraint *#k to capture this pattern?

This would correctly describe the child pattern. However, it would incorrectly predict that effects of *#k should be observed in adult typology.

2 Phonetic basis

Children and adults experience different articulatory pressures.

Child's tongue has more anterior position, larger relative size (Crelin, 1987); speech gestures are less precise (Fletcher, 1992).

Many common child phonological processes can be analyzed in terms of children's motor limitations. For PVF: anterior position of tongue predisposes child to fronting of velar consonants.

An account that incorporates these phonetic differences has the potential to explain the transient nature of child patterns: As motor control matures, patterns driven by early limitations will fade.

3 A slippery slope?

Does this reasoning amount to a claim that child patterns are essentially performance errors (Hale & Reiss, 1998, 2008), "somehow outside the realm of theoretical claims about language" (Dinnsen, Green, Morissette, & Gierut, 2011)?

No. We reject the "pure performance" account for several reasons:

1. Performance errors are variable and unpredictable; the child patterns in question are highly systematic.
2. Child patterns are conditioned by phonologically defined factors (e.g. syllables, feet).
3. Children's physical production abilities often exceed what they demonstrate in habitual speech.

Child patterns like velar fronting are a reflection of competence; they require a grammatical analysis. We follow a well-established precedent by proposing a phonological model that incorporates phonetic pressures (e.g. Flemming, 2001; Kirchner, 2001; Steriade, 2001).

Our model is analogous to Steriade's P-map, which holds that

- a. Speakers have knowledge of the relative perceptibility of sound contrasts in different contexts;
- b. This knowledge is encoded in the phonological grammar.

5 Conclusion

Through the influence of the A-map, children's phonetically-motivated performance errors take on grammatical status.

This eliminates need for constraints like *#k, which are problematic due to lack of reflex in adult typology.

4 The A-map

Children's performance errors can be the seeds of their phonological patterns.

It is well known that children show conservative tendencies favoring continued production of their own error forms (Becker & Tessier, 2011; Ferguson & Farwell, 1975; Tessier, 2012).

A child who experiences frequent performance errors due to articulatory limitations has a choice: keep attempting something that is motorically too challenging for him to execute reliably, or revert to a simpler target that can be attained consistently.

Our contention: This balance between faithfulness to the adult target and avoidance of performance failure is negotiated within the grammar.

Proposal: Speakers possess an A(rticularity)-map, a tacit body of knowledge that certain sequences are more likely than others to result in performance error.

Font size reflects likelihood of performance error.

A-map (fragment):	ɾ _L [V]	V _̃	V _]
Dorsal place			
k	Ʒ	k	k

P-map (fragment):	V _̃ V	C _] V	V _]
Obstruent voicing			
k/g	k/g	k/g	k/g

Font size reflects perceptibility of contrast (following Steriade 2001).

The A-map and the P-map are referenced by the grammar. Their effects (reproduction of stored previous form versus perceptual matching of adult acoustic target) are in tension with one another.

The A-map will shift substantially over development as motor abilities mature.

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