Modeling L1 acquisition

What happens if we try to put together some of the models and proposals related to the phonetics/phonology interface and L1 acquisition that we have been looking at?

I. Ideas we have discussed in the course that relate to L1 acquisition

• *(Not discussed in this course in detail, but widely assumed in OT acquisition work:)*
  Initial State ranking is \( M >> F \); an \( M >> F \) "bias" persists in the course of reranking (following work by Tesar/Smolensky/Prince; Demuth 1995, Gnanadesikan 1995, etc.)

• (Some) rankings among \( F \) constraints are determined by the P-map (Steriade 2001)
  < *Alternative:* Phonetic grounding may be diachronic in origin (Hyman 2001, Blevins & Garrett 2004), so there may be no need to impose universal rankings on the \( F \) constraints internal to the phonological grammar

• The P-map (and therefore \( F \) rankings) may change over time as the learner's perceptual abilities change under the influence of the language being acquired (Hallé et al 1998; Moreton & Amano 1999; Maye and colleagues)

• The constraints in CON are constructed by the learner (Hayes 1999)

• The learner can identify the phonetic categories (surface segments) of the language, and the distinctive features, through stochastic learning (Maye and colleagues)

• The perception grammar and the production grammar are subject to different rankings, and acquisition of perception precedes acquisition of production (Pater 2004)

II. Some questions

• Relating Hayes to Maye: Does the identification of a relevant phonetic feature lead to the creation of \( M \) and/or \( F \) constraints related to that feature?

• Relating Pater to Maye: Does the identification of a phonetic category (segment) represent a demotion of \( M \) below \( F_{AS} \)?

• Relating Hayes, Pater, Maye: What occurs during the first time an infant "perceives" a segment, if no category has yet been formed and no relevant \( M \) or \( F \) constraints exist?
III. Working with a "toy phonology"

(1) Segments that appear in the surface phonetic representation:
    p  t  k  i  a  u
    b  d  g
    m  n  η
    f  s  x
    j

(2) Allophonic alternations:
    • [b d g] appear after nasals. [p t k] appear elsewhere.
    • [j] appears before [i]. [s] appears elsewhere.

(3) Syllable structure:
    • (C)V(C) — optional onsets; codas permitted; no clusters
(4) Features needed to distinguish the consonant categories

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(5) Some relevant constraints

(a) **F**: MAX-SEG; DEP-SEG; IDENT-\(f\)(for all features \(f\))

(b) **M**: Context-free \(*f\) constraints for all features? (Gouskova 2003: maybe not)

(c) Featural **M** constraints: — simplification: C only; ignore V feature violations

(i) Feature co-occurrence within one segment

*[-son, +cont] (NOFRICATIVES)
*[−son, +voi] (NOVOICEDOBSTRUENTS)
*[−ant] (NOPOSTALVEOLARS)
*Lab (NOLABIALS) \ combined effect:
*Dors (NODORSALS) / no non-Cor place

(ii) Sequential constraints

*+[nas][−son,−voi] (*NT)
*+[nas][−son,+voi] (*ND)
*+[cont,+ant][i] (PAL-[i])

(d) Syllable-structure constraints: Ignore for now