Overview: A bit more on inducing features. Then some Evolutionary Phonology. Then course wrap-up.

1. Flemming (2005): putting features into the grammar
   - Discuss: In OT, there is no phoneme inventory. What work was the phoneme inventory supposed to do in rule theories, and how does an OT grammar accomplish that work?

   - In a similar move, Flemming proposes getting rid of the feature set, and shifting its responsibilities to the constraint inventory.

   - An issue Flemming raises for natural classes: Suppose you have a vowel inventory /i,e,a,o,u/ and you want a rule-based grammar that deletes /i,a,u/ before V. What could you do? (no curly brackets allowed)

     - Then if there are no such rule-based languages, how do we rule them out?

     - How would we analyze the language in OT?
Flemming’s proposal: if we want to rule out this language, it has to by disallowing the constraints needed to capture it.

- It won’t suffice to just say that constraints can only refer to natural classes (why not?)
- For example, “[i]f labials and coronals never pattern together as a natural class [e.g., in post-nasal voicing], it must be because there are no constraints that render them [but not, say, velars] marked in the same context.” (p. 12 of ms. version)

Suppose you have approximants, fricatives, and nasals looking like a class:

- Can we capture this with features? E.g., can we write a single n-deletion rule?
• If there are good reasons for three separate constraints to exist, *NAS-APPROX, *NAS-FRIC, *GEMINATE_NASAL, then it will seem as though \{approximants, fricatives, nasals\} is acting as a class
  ▪ Flemming goes through typological data to justify the three constraints (plus *NAS-[h])
  ▪ i.e., there are languages with one of the constraints high-ranked, but not the others
  ▪ General principle: “sounds can pattern together as a natural class if they violate markedness constraints in the same environment, so given constraints *XA and *XB, A and B can form a natural class” (p. 2)

• “Classhood” is contingent
  ▪ \{approximants, fricatives, nasals\} can pattern together—after nasals—because of the constraint set
  ▪ But we don’t expect them to pattern together in any other environment necessarily
    ○ Compare this to how features are supposed to work, including, I think, in Mielke’s system where the learner induces the features from the observed pattern.

• How to get “subtraction”
  ○ First, recall what subtraction is (e.g., as used by Mielke)

  ▪ Pharyngealization ([+RetractedTongueRoot]) spread in Palestinian Arabic
  ▪ Spreads in both directions
  ▪ But rightward spread is blocked by a high front vowel, a front glide, or a palato-alveolar C
    ▪ all of those are [+high, -back] (well, in some feature systems)

  ![Example words in Palestinian Arabic]

  ○ What’s the class of sounds that pharyngealization spreads to?
  ○ How could we capture that in OT? Like Flemming, let’s use McCarthy’s idea that the constraint responsible for stopping pharyngeal spread is *[+RTR, +hi, -back].
In sum, we get subtraction when Markedness1 >> Markedness2

2. Evolutionary phonology (Blevins 2003 and others)
   • Of all the topics we didn’t cover in this course, this is probably the #1 one that we should at least have a look at so you know what the issues are
   • When we say that, e.g., complex onsets are marked, what does that mean?
     ■ The idea predates generative linguistics, and seems to have varying interpretations:
       1. a structure is marked if it’s rare cross-linguistically, or if its presence in a language implies the presence of an (unmarked) alternative
          ■ e.g., if a language allows complex onsets, it also allows simple onsets
       2. and/or a structure is marked if children acquire it later
          ■ e.g., children acquire simple onsets first, then complex
       3. and/or language learners and users actually disprefer the structure
          ■ not something we can observe directly
   • Controversies
     ■ Do 1 & 2 go together? If so, does 2 cause 1?
     ■ Is 3 responsible for 1 and/or 2? How can we test 3?
   • Blevins’s main point is that typological evidence (1) doesn’t imply learner preference (3)
   • Relatedly, Moreton (2008) talks about analytic bias (learner preferences) vs. channel bias (mind-external effects on what learning data children end up being exposed to)

3. Articulatory example: *NČ
   ((Pater 1996; Pater 1999; Pater 2001); cf. (Archangeli, Moll & Ohno 1998))
   • Some languages don’t allow a sequence like *[ampa], though they do allow [amba] and [apa].
   • Phonetic basis: (Hayes & Stivers 1996) (aerodynamic model simulations and experiments with English speakers): velar pumping and nasal leak
     ■ To have voicing, you need higher air pressure below the glottis than above (so that air flows), and the vocal folds in the right position.
     ■ What range counts as “the right position” depends on the pressure difference.
     ■ Schematically, with apologies to phoneticians:

\[\begin{array}{c}
\text{glottis open} \\
\text{glottis closed} \\
\text{no airflow} \\
\text{lots of airflow}
\end{array}\]

To stop voicing, you must move out of the zone.
In a transition from [m] to [p], velum raises.
The percept of nasality ends before velum actually makes closure → air is leaking out the nose, maintaining air pressure difference across the glottis → voicing is encouraged
After velum does make closure, it tends to keep rising → “velar pumping”: further encourages airflow across glottis by expanding oral cavity
- **Analytic bias theory**: humans are predisposed towards grammar that includes *NČ
- **Channel bias theory** (following Blevins 2003 Evolutionary Phonology): Output of parents’ phonology is [ampa], but often sounds a bit like [amba], so children may mistakenly induce *NČ.

4. **Perceptual example**: IDENT(place)/__V ((Steriade 2001))
- Why do so many languages have /an+pa/ → [ampa] but not /an+pa/ → [anta], /ap+na/ → [apma]?
- Steriadean approach: in /an+pa/, /p/’s place is well cued (release burst, outgoing formant transition), while /n/’s isn’t.
  - Learners apprehend this, and prefer to be faithful to the better-cued contrast (i.e., learners prefer rankings that respect the ____________).

  - Let’s sketch how a channel-bias explanation would work instead. (See (Hayes & Steriade 2004) for a formulation and counter-argument)

5. **The “too-many-solutions” problem**
- Some markedness constraints have a variety of “solutions”
  - *NČ (see references above)
  - OCP-labial in various Western Austronesian languages ((Zuraw & Lu 2009))
  - {*i,u} in Romance metaphony ((Walker 2005))
  - *INITIAL.GEMINATE (Kennedy 2005)

  ⇒ This is what we expect in general in OT

  - But some don’t—the fact that these cases exist is the too-many-solutions problem for OT:
    - *CC deletes C₁, not C₂ in VC₁C₂V ((Wilson 2000; Wilson 2001))
    - \[\underline{-son}\] +voice \# causes final devoicing, but not deletion, epenthesis, etc.

  ⇒ predicted, if P-map imposes difficult-to-overturn ranking: MAX-C, DEP-V >> IDENT(voice)/__#

  - I think a channel-bias account helps here too—discuss.
Also to discuss (or just ponder, if we’re running out of time): how does channel bias work in the many-solutions cases below?

- **OCP-labial**: suppose having similar consonants nearby causes difficulties for motor planning (see (Frisch 1996; Frisch, Pierrehumbert & Broe 2004), (Walker, Nacopian & Taki 2002)).

  **Attested changes**:
  a. change place of stem: /p-um-.../ → [k-um...]; violates IDENT(place)/stem
  b. change place of infix: /p-m-.../ → [k-n...]; violates IDENT(place)/affix
  c. change consonantality of infix: /C-m-...p.../ → [C-w...p...]; violates IDENT(cons)
  d. fuse stem and infix consonants: /p-um-.../ → [m...]; violates UNIFORMITY
  e. move infix out of constraint’s domain of application: /p-um-.../ → [mu-p...]; LINEARITY
  f. delete the infix: /p-m-.../ → [p...]; violates MAX, REALIZE, MORPH
  g. paradigm gap: /p-m-.../ → unpronounceable; violates MPARSE (“pronounce the input”)

- **{*ɪ,ʊ}**: perhaps motivation is insufficient perceptual distance from [e,o], [i,u] (see (Flemming 1996))
  **Attested ways to handle {*ɪ,ʊ} in Romance metaphony when raising /ɛ,ɔ/ ((Walker 2005))**:
  h. /ɛ,ɔ/ raise to [i,u] (rather than expect [ɪ,ʊ]); violates IDENT(tense)
  i. /ɛ,ɔ/ fail to raise; violates LICENSE(high)
  j. /ɛ,ɔ/ raise to [e,o]; violates LICENSE(high)
  k. /ɛ,ɔ/ raise to [ie,uo] or [iɛ, uɛ]; violates INTEGRITY (no splitting)

- **{ɪ-initial Geminate}: This one’s harder...
  Kennedy 2005**:
  - In various Micronesian languages, initial geminate Cs were created by reduplication followed by vowel deletion (pek > pepek > ppek).
  - Word-initial position is a tough place to maintain a C-length distinction, especially for stops, because you need to perceive when the consonant begins ([pa] vs. [ppa], as opposed to [apa] vs. [appa])

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- The roles of channel and analytic bias remain controversial and under investigation.
  - You’ll read many papers arguing that their data bear on the debate.
### 6. Course wrap-up
- Since I have a feeling we won’t have much time left, I thought it would be fun to see how interrelated the readings ended up being.
  - Any other themes, ideas, tools, you can think of that kept coming up?

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7. Where can you go from here?

- PhonoFest next Tuesday: see what the 200A class has been up to.
- Phonology seminar—feel free to drop in even if not enrolled.
- Keep eye out for proseminars; currently I don’t think there are any more ph ones this year
- Intonation in the spring—a very phonological area of phonetics

References


Hayes, Bruce & Tanya Stivers. 1996. The phonetics of post-nasal voicing.


Moore-Cantwell, Claire & Joe Pater. submitted. Gradient exceptionality in Maximum Entropy Grammar with lexically specific constraints.


