A. Overview


(2) a. definitions
b. learning
c. Canadian raising

B. Definitions

(3) Explanatory adequacy: typological restrictiveness or solve the problem of acquisition?

(4) Cyclic application

Given a linguistic expression $e$ with a phonological input representation $I$, the phonological function $P$ applies recursively from the inside out within a nested hierarchy of phonological domains associated with (but not necessarily isomorphic with) the morphosyntactic constituent structure of $e$:

$$\text{if } I = [[x]][[y]z]], \text{ then } P(I) = P(P(x), P(P(y), z))$$

(5) Level segregation

The phonology of a language does not consist of a single function $P$, but of a set of distinct functions of ‘cophonologies’ $\{P_1, P_2, \ldots, P_n\}$, such that the specific function $P_i$ applying to domains of type $\delta_i$ is determined by the type of morphosyntactic construction associated with $\delta_i$ (e.g. stem, word, or phrase).

(6) Cycle-internal transparency

Each cycle involves a single pass through $Gen$ and $Eval$:

$$P_i(\delta_i) = Eval_i(\text{Gen}(\delta_i))$$

C. Stratal OT exemplified

(8) [b,g] can follow a nasal only in onset position:
  bomb [bɒm]  bombard [bɒmˈbɔːrd]
  thumb [θʌm]  thimble [θʌmˈblɪ]
  crumb [kʌm]  crumble [kʌmˈblʌm]
  long [lɒŋ]  elongate [iˈlɒŋˌɡeɪt]

(9) They fail to surface before certain affixes:
  bomb-ing [bɔmˈɪŋ]  *bɒmˈbɪŋ
  thumb-ing [θʌmˈɪŋ]  *θʌmˈbɪŋ
  crumb-y [kʌmˈɪ]  *kʌmˈbɪ
  long-ish [lɒŋˈɪʃ]  *lɒŋˈbɪ]

(10) Cycles:

(11) Belfast dentalization before /(:r)/:
  train [tɹʌn]  drain [dɹʌn]
  true [tɹuː]  drew [dɹuː]
  matter [mætər]  rudder [ˈrʌdər]  spanner [ˈspænər]

(12) Dentalization doesn’t apply with agentives or comparatives:
  hea[t]er  lou[dr]er  di[n]er  ki[l]er
  wa[t]er  ru[n]er
  shou[t]er
  lou[dr]er  coo[l]er  la[t]er

(13) But not with exceptional forms:
  better [bætər] ’good.CMPR’
  better [bætər] ‘one who bets’

(14) [[train]]  [[Peter]]  [[heat]er]
    [[fat]er]  [[bett-er]]  [[bet]er]

(15) Levels in Axininca Campa (McCarthy & Prince, 1993):

(16) Fill ≫ Parse in prefixal allomorphy:
/ɪɾ-sai-k-i/  →  i<ɾ>saiki  [isaiki]  ‘will sit’
/no-an-ana-ni/  →  n<o>anani  [nanani]  ‘my black dye’

(17) At the suffix level, Parse ≫ Fill:
/ɪŋ-koma-i/  →  .ɪŋ.ko.ma.Ti.
(18) Prefixes are visible to suffixes for minimality:
   /na/ na_TA-piro-∼ ‘truly carry on shoulder…’
   /no-na/ no-na-piro-∼ ‘I truly carry on shoulder…’

D. Learning

(19) Opacity can only arise across multiple strata.

(20) Learning assumptions:
   Markedness ≫ Faithfulness
   identity map: input = output

(21) Inputs are the same as outputs, unless some alternation says otherwise.

(22) Hale’s heuristic
   Prefer inputs that are well-formed outputs.

(23) Heuristic for asymmetric paradigms
   In an asymmetric paradigm, prefer those inputs which generate the central member of the paradigm most efficiently.

(24) Archiphonemic string
   If α and β are distinct input elements at level n that are distinct in environment e, but neutralize to γ in environment f, i.e. [α]_e ∼ [γ]_f and [β]_e ∼ [γ]_f, then any instance of [γ]_f in the output of n is an archiphonemic string.

(25) Archiphonemic Prudence
   If a learner should come across an archiphonemic string in a non-alternating item i at level n, both possible inputs are formed. Once the ranking of constraints at level n − 1 is known, choose the input for i that is a well-formed output of level n − 1.

E. Flapping & Raising

(26) Counterbleeding:

<table>
<thead>
<tr>
<th></th>
<th>writing</th>
<th>riding</th>
<th>mitre</th>
<th>powder</th>
</tr>
</thead>
<tbody>
<tr>
<td>UR</td>
<td>/ræt-st/</td>
<td>/rad-st/</td>
<td>/mart/</td>
<td>/paut/</td>
</tr>
<tr>
<td>Raising</td>
<td>rætʃ</td>
<td>—</td>
<td>mætʃ</td>
<td>—</td>
</tr>
<tr>
<td>Flapping</td>
<td>rætʃ</td>
<td>rætʃ</td>
<td>mætʃ</td>
<td>pautʃ</td>
</tr>
</tbody>
</table>

(27) RBO treats flapping as applying at the phrase level, when non-initial in a (trochaic) foot, preceded by [r] or a vowel, and followed by a vowel:

- [fætʃ] fatter [fæt] fat
- [mætʃ] madder [med] mad
- [hɪtʃæn] he hit Ann [hɪt] hit
- [hɪtʃæn] he hid Ann [hɪd] hid
The diphthongs /ai, au/ undergo Raising to [ai, au] when followed by a voiceless obstruent in the same foot:

<table>
<thead>
<tr>
<th>Word</th>
<th>Pronunciation</th>
</tr>
</thead>
<tbody>
<tr>
<td>naïf</td>
<td>knife</td>
</tr>
<tr>
<td>haus</td>
<td>house</td>
</tr>
<tr>
<td>sain</td>
<td>syphon</td>
</tr>
<tr>
<td>sait</td>
<td>cite</td>
</tr>
<tr>
<td>naive</td>
<td>knives</td>
</tr>
<tr>
<td>houz</td>
<td>houses</td>
</tr>
<tr>
<td>saink</td>
<td>syphonic</td>
</tr>
<tr>
<td>saitn</td>
<td>citation</td>
</tr>
</tbody>
</table>

(29) ClearDiph (≫ Ident(mid))

* [ai, au]

(30) ClipDiph (≫ Ident(low))

* [ai, au]

(31) ClipDiph ≫ ClearDiph

Raising does not apply at the phrasal level:

<table>
<thead>
<tr>
<th>Word</th>
<th>Pronunciation</th>
</tr>
</thead>
<tbody>
<tr>
<td>làform</td>
<td>lie for me</td>
</tr>
<tr>
<td>làfor</td>
<td>lifer</td>
</tr>
</tbody>
</table>

Raising does not apply at the word level:

<table>
<thead>
<tr>
<th>Word</th>
<th>Pronunciation</th>
</tr>
</thead>
<tbody>
<tr>
<td>afoi</td>
<td>eyeful</td>
</tr>
<tr>
<td>ãioi</td>
<td>Eiffel (Tower)</td>
</tr>
<tr>
<td>frãofip</td>
<td>Frau-ship (nonce)</td>
</tr>
</tbody>
</table>

Lexical exceptions (apparently) argue for stem level:

<table>
<thead>
<tr>
<th>Word</th>
<th>Pronunciation</th>
</tr>
</thead>
<tbody>
<tr>
<td>sáiklaps</td>
<td>Cyclops</td>
</tr>
<tr>
<td>mákron</td>
<td>micron</td>
</tr>
</tbody>
</table>

(35) Process | Level
Raising | stem
Flapping | phrase

Acquiring phrase-level (co)phonology:

- Flapping surface-true, hence directly acquirable from phonotactics
- Raising not surface-true and must wait for an earlier level

militaristic vs. capitalistic (Withgott, 1982)

Phrase-level deductions:

a. Phrasal combinations decomposable at the phrasal level.
b. Hence Flapping in hid vs. hid Ann can be successfully analyzed.
c. Items like mitre and writing cannot be analyzed at the phrasal level and must be quarantined.

(38) Phrase-level facts:

a. All non-quarantined instances of [ai, au] are followed by voiceless obstruents.
b. There still remain instances of underapplication, e.g. [afoi].

(39) Word-level facts:
(40) Word-level deductions:
  IDENT(low) ≫ CLIPDIPH ≫ CLEARDIPH ≫ IDENT(mid)

(41) Quarantine lifted for mitre and writing
    Since Raising doesn’t overapply at the word level, these must be /məɪtər/ and /rəɪtɪŋ/.

(42) Quarantine not lifted for powder and riding
    Since underapplication of Raising is tolerated at the word level, the input forms cannot be resolved, e.g. /pɔʊtər/ or /pɔʊdər/.

(43) Stem-level facts:
    a. Word-level suffixes like -ful and -ship now removable, so no more Raising misapplications.

(44) Stem-level deductions:
    a. Correct constraint ranking can now be derived.
    b. Quarantine on powder and riding can now be lifted.
    c. Counterbleeding relationship across levels now available.

(45) Issues:
    a. What’s the evidence for cyclicity?
    b. Can opacity arise from cyclicity?
    c. Intersecting alternations at the same level?