Classes 8 & 9: Issues in process application: multiple targets, directionality, iterativity

<table>
<thead>
<tr>
<th>To do</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Bibliographic exercise due this Thurs., Oct. 21</td>
</tr>
<tr>
<td>• Anderson ch. 10 study questions due Tues., Oct. 26</td>
</tr>
<tr>
<td>• Online quiz on CCLE page to go with Anderson; closes 9 AM, Tues. Oct. 26</td>
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<tr>
<td>• I’m still working on a process application assignment—it’ll be due Fri., Oct. 29</td>
</tr>
<tr>
<td>• By the end of next week (i.e., by Oct. 29), meet with me about a term-paper topic</td>
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Overview: Multiple application

The basic problem to be dealt with this week is what to do with a form that, for some rule $A \rightarrow B /X__Y$, contains multiple instances of $XAY$, either because $XAY$ straightforwardly occurs twice in the form, or because there are multiple ways of interpreting $XAY$ (in a rule schema). And, what if the output of the rule create or destroys instances of $XAY$?

There’s a whole can of worms here that’s only barely been re-opened in the OT era.

Great sources for term-paper topics, which I also relied on to get many of this handout’s examples: Howard 1972, Johnson 1970, and Anderson 1984 (which you’ve been reading). I’d stay away from the stress cases, though, since their rule-application issues tend to go away under metrical stress theory.

1. Multiple matches: a simple case

SPE p. 344: “To apply a rule, the entire string is first scanned for segments that satisfy the environmental constraints of the rule. After all such segments have been identified in the string, the changes required by the rule are applied simultaneously.”

Example: Palauan again: recall vowel reduction:

$X$ his/her/its $X$

- rákt rakt-él ‘sickness’
- sésáb sasáb-él ‘fire’
- bótk bakt-él ‘operation’
- ríŋəl rŋəl-él ‘pain’

○ How would your rules apply to an underlying representation like /ðiloba?+el/ ‘his injury’?

(real outcome is [ðəlabəʔel] )

○ Any problems for an OT analysis?

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2. Klamath (self-bleeding)
(Penutian language of Oregon, very endangered. Data and description taken from Kisseberth 1972; originally from Barker 1963, which I didn’t have a chance to consult)

- glottalized stops: \( \hat{p} \hat{i} \hat{c} \hat{k} \hat{q} \)
- glottalized sonorants: \( \hat{m} \hat{n} \hat{y} \hat{w} \hat{l} \)
- regular sonorants: \( m n w y l \)
- voiceless sonorants: \( M N W Y L \)

Deglottalization rules, informally:
- glottalized stop \( \rightarrow \) deglottalized / \( \_C \)-other-than\{m,n,w,y,l\}
- other glottalized \( \rightarrow \) deglottalized / \( \_C \)

- \( \hat{q} \rightarrow q / \_n \) \( \rightarrow \) n\( \ddot{c} \)q-‘is deaf’ \( \rightarrow n\( \ddot{c} \)q-napg-‘is almost deaf’
- \( \hat{p} \rightarrow p / \_t \) \( \rightarrow \) pe-t-a ‘a hole enlarges’ \( \rightarrow pe-p-t-a ‘dist. holes tear out’
- \( t \rightarrow t / \_k \) \( \rightarrow m-p-e-t-a ‘enlarges hole’ \( \rightarrow m-p-e-t-ky-o:l-a ‘chips open a hole’
- \( \hat{q} \rightarrow q / \_\hat{c} \) \( \rightarrow \hat{q}\hat{o}-\hat{c}-a ‘bends’ \( \rightarrow \hat{q}\hat{o}-\hat{c}-a ‘dist. bend’
- \( \hat{p} \rightarrow p / \_W \) \( \rightarrow n\ddot{t}o-p-a ‘rots, spoils’ \( \rightarrow n\ddot{t}o-W:yi:a ‘almost rotted’

\( \hat{p} \rightarrow p / \_y \) \( \rightarrow n\ddot{t}o-p-y:e:g-a ‘starts to spoil’
- \( t \rightarrow t / \_w \) \( \rightarrow w\ddot{L}e-t-wal ‘lies spread eagled on top of’ \( \rightarrow w\ddot{L}e-p-ga ‘is lying flat on back’
- \( n \rightarrow n / \_\hat{k} \) \( \rightarrow \hat{n}\hat{o}-\hat{k}a ‘little head’ \( \rightarrow n-o-n-k a ‘dist. little heads’
- \( w \rightarrow w / \_\hat{c} \) \( \rightarrow w\hat{i}-c-a ‘is breathless’ \( \rightarrow w-i-w\hat{c}-a ‘dist. are breathless’
- \( \hat{y} \rightarrow y / \_\hat{c} \) \( \rightarrow ?-i-w\hat{y}a-qi ‘put in pl. obj.’ \( \rightarrow ?i-\hat{y}o-\hat{y}ga ‘dist. put pl. obj. into’
- \( l \rightarrow l / \_l \) \( \rightarrow k-bol-l-a ‘hits in stomach’ \( \rightarrow w-bol-lg-a ‘falls on stomach’
- \( w \rightarrow w / \_l \) \( \rightarrow gaw\hat{a}-\hat{l} ‘finds’ \( \rightarrow gawl-i:ya ‘finds for someone’

- Can we collapse this into a single rule schema?

- How do we expect the schema to apply to these sequences: \( \hat{q}\hat{l}q, \hat{p}\hat{l}q \)?

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6 Kisseberth has \( g \) with a dot below, but dot won’t show under the \( g \) in my font.
Here are the data: /q̉l̉aq/: nčoq̉-l̉aq- Wi:y-a ‘ears are stopped up’
nčoq̉-l̉g-a ‘ears are almost stopped up’
hos-taq̉-l̉aq ‘make him stop!’
hos-taq̉-l̉g-a ‘makes someone stop an action’
toq̉-l̉g-a ‘stops an action’

/p̉l̉aq/: sno-nt̉ap̉-l̉aq-s ‘rotted wokas’
sno-nt̉ap̉-l̉g-a ‘causes to rot down’

○ How about an OT analysis? Can we easily rule out *q̉l̉ → ql̉?

3. Southern Kikuyu (self-counterbleeding)
(Gikuyu/Kikuyu is a Niger-Congo language of Kenya with 7.2 million speakers; datum from Johnson 1970, originally from Bennett 1967, which I also didn’t have a chance to consult)

k → y / _V₀[voiceless stop]

○ What should happen to /nekakaakeroma/ ‘he will bite him’ in SPE? OT?

Here’s the datum: [ne[y]kakaakeroma] (*[ne[y]kakaakeroma]) [Is it reduplicated, though?]

4. Tshiluba (self-feeding)
(Lua-Kasai/Tshiluba is a Niger-Congo language of D.R. of Congo with 6.3 million speakers; original consultant work from Johnson 1970)

l → n / [+nasal] V₀

u-kwač-ile ‘he took’
ku-kwač-il-a ‘to take (ben.)’
u-kwač-id³-ile ‘he took (ben.)’
(l→d³/ᵢ)

u-d⁵im-ine ‘he cultivated’
ku-d⁵im-in-a ‘to cultivate (ben.)’
u-d⁵im-in²-ine ‘he cultivated (ben.)’

○ In an OT analysis, can we easily rule out *u-d⁵-im-î³-ile? *u-d⁵-im-il²-ile?

5. Self-counterfeeding?
Howard 1972 presents some possible cases but reanalyzes them. Kaplan 2008, as you read, reanalyzes many purported cases of self-counterfeeding.

Kavistskaya & Staroverov 2008⁹ present a case from Tundra Nenets (Nenets is a Uralic language of Siberia and Arctic Russia with 31,300 speakers):

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⁷ some kind of aquatic plant gathered for food
/ʌ/ deletes in even-numbered syllables (from left edge) and final syllable, subject to consonant-cluster constraints (seems like no complex onsets, and complex codas must have falling sonority)

\[
\begin{align*}
/\text{xɑtə}/ & \rightarrow \text{xɑr} \quad \text{‘knife-nom.sg.abs.’} \\
/\text{xɑtə-tə}/ & \rightarrow \text{xɑ.ɡə-ɹ} \quad \text{‘knife-2sg.poss’} \quad \text{I assume [rr] is a bad coda.} \\
/\text{xɑtə-ta}/ & \rightarrow \text{xɑ.ɹ-da} \quad \text{‘knife-3sg.poss’} \\
/\text{xarətə}/ & \rightarrow \text{xar.ɹəd} \quad \text{‘house-nom.sg.abs.’} \quad \text{[see below]} \\
/\text{xarətə-tə}/ & \rightarrow \text{xar.ɹə-də} \quad \text{‘house-2sg.poss’} \\
/\text{xarətə-ta}/ & \rightarrow \text{xar.ɹə-da} \quad \text{‘house-3sg.poss’} \\
/\text{nultənə-ʃə}/ & \rightarrow \text{nult.ənə-ʃi} \quad \text{‘house-3sg.poss’}
\end{align*}
\]

But note that surface forms do have [ʌ]s in even-numbered and final syllables:

\[
/\text{xarətə-ta}/ \rightarrow \text{xar.ɹə-da} \ ; \quad \text{xar.ɹə-da} \leftrightarrow \text{xar.ɹəd} \quad \text{(though rdd is apparently legal)}
\]

- Can we capture this with rules? OT?


- K&S make the generalization that two /ʌ/’s never delete in a row. Does that help?

[K&S’s analysis involves advanced OT machinery.]

There’s also morphological truncation, as in Lardil (which you read about in P&S), and Tohono O’odham (Fitzgerald 1997\(^\text{10}\)).

6. **Interim conclusions**

As we’d expect, OT has trouble handling self-counterbleeding and self-counterfeeding, and predicts self-feeding and self-bleeding straightforwardly.

- But what about rule theories? It’s not as simply as choosing two different order for rules. What additional flexibility could we give the rule theory to allow all four types of self-interaction?

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Now some directionality issues...

7. **Tricky case from Latvian; from SPE, pp. 365-366**, which uses different features

- **glide formation:**  
  \[
  \left[ \begin{array}{c} \text{cons} \\ \text{high} \end{array} \right] \rightarrow \text{[syll]} / \_ \_ [\text{syll}]
  \]
- **truncation:**  
  \[
  \text{V} \rightarrow \emptyset / \_ \#
  \]

  - First, remember the special convention about the + boundary: / _ Y is really / _ (+)Y. That means that every rule is really a schema (can you see how?)!

  - Apply the rules to these cases and discuss:
    - /#iäi+a#/  ‘rides’
    - /#kuru+iäi#/  ‘basket (gen. sg.)’
    - /#au+ia#/  ‘puts on (footgear)’

  - Here are the actual outcomes, apparently: [jaj], [kurwja], [auj]. Are these problematic for any of the rule approaches we’ve seen?

  - How about an OT analysis? What problems do we run in to?

8. **Possible solution: directional application**

   Left-to-right: Scan the string for the leftmost eligible segment and apply the rule to it. Then scan the resulting form for the leftmost eligible segment, etc.

   Right-to-left: Same thing but start with the rightmost eligible segment.

   - Does one of these work for Latvian?

9. **Tianjin tone sandhi**

   A northern dialect of Mandarin.


   **the tones**

<table>
<thead>
<tr>
<th>tone</th>
<th>21 or 11</th>
<th>L</th>
<th>[descriptions disagree]</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>21 or 11</td>
<td>L</td>
<td>[descriptions disagree]</td>
</tr>
<tr>
<td>B</td>
<td>45 or 55</td>
<td>H</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>13, 213, or 24</td>
<td>LH</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>53</td>
<td>HL</td>
<td></td>
</tr>
</tbody>
</table>

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11 Originally from Halle & Zeps 1966. A survey of Latvian morphophonemics. *Quarterly Progress Report of the Research Laboratory of Electronics, MIT* 85: 267-270. But see Christina Skelton’s paper from last year: the data are uncertain and the underlying forms are open to question.


14 Kuang, Jianjing. 2008. Tone sandhi in Tianjin dialect. Ms., UCLA.
Why these rules? Who knows! Tone sandhi tends to be pretty arbitrary synchronically. See Mortensen 2006\(^{15}\) for a framework in which to analyze tone sandhi.

- You see the problem: what about /AAA/? /DDD/? /DDA/? /CCC/? /CAA/? /ADD/? /DAA/?

For /DDD/ it depends on the syntactic structure (say Milliken et al.; Chen says always BAD):

```
[[su\textsuperscript{HL} liao\textsuperscript{HL}] bu\textsuperscript{HL}] \rightarrow AAD (L.L.HL) ‘plastic cloth’ (how to prevent *CAD?)
[shang\textsuperscript{HL} [yi\textsuperscript{HL} yuan\textsuperscript{HL}]] \rightarrow DAD (HL.L.HL) ‘House of Lords’ (*BAD?)
```

/AAA/:
```
[[ Xi\textsuperscript{L} guan\textsuperscript{L}] Jie\textsuperscript{L}] \rightarrow ACA (L.LH.L) ‘Xiguan Street’, not *CCA or *BCA
[kai\textsuperscript{L} [fei\textsuperscript{L} ji\textsuperscript{L}]] \rightarrow ACA (L.LH.L) ‘fly an airplane’
```

/DDA/:
```
[[si\textsuperscript{HL} ji\textsuperscript{HL}] qing\textsuperscript{L}] \rightarrow ABA (L.HL) ‘evergreen’
[zuo\textsuperscript{HL} [dian\textsuperscript{HL} che\textsuperscript{L}]] \rightarrow ABA (L.HL), not *DBA ‘take a tram’
```

[ran out of time to type full data]

/CCC/ \rightarrow BBC (LH.LHL.HL \rightarrow H.H.LH)
/CAA/ \rightarrow BCA (L.H.L.L \rightarrow H.L.L)
/ADD/ \rightarrow CAD (L.H.L.HL \rightarrow LH.L.HL)
/DAA/ \rightarrow DCA (HL.L.LL \rightarrow HL.L.HL)

We’ll leave some of this as a paradox—there’s an extensive literature you can google, though. For a simpler but still tough case, see Hyman & VanBik 2004 on Hakha Lai.\(^{16}\)

Now some optionality issues when there are multiple targets...
Cases taken from Kaplan 2009,\(^{17}\) Riggle & Wilson 2005,\(^{18}\) Vaux 2008.\(^{19}\)
See those papers for various approaches to optionality.

10. Warao: global optionality
Language isolate of Venezuela, Guyana, and Suriname; 28,100 speakers. From Osborn 1966.\(^{20}\)

Little raw data, but Osborn is very definite about the generalization:

\(^{17}\) Kaplan, Aaron. 2009 Variation through markedness suppression. UCSC ms.
“/p/ has allophones [p b]. The voiced allophone [b] is heard more frequently than the voiceless [p] in most words. In every word, except for a few words noted below, alternation between [b] and [p] is presumably possible, since many alternations of this order have been heard. Thus in /paro+parera/ weak, both the initial and medial phoneme /p/ is heard as [b] generally, and as [p] infrequently. In words like the one cited, with two or more occurrences of /p/, the allophones are consistently [b] or [p] for each utterance of the word. If the first occurrence of /p/ in the word is [b], the following occurrence(s) will be [b]. If the first occurrence is [p], the following occurrence(s) will be [p]. The following are examples of words with two occurrences of /p/: poto+poto soft, apaupute he will put them, kapa+kapa kind of banana.” (p. 109)

I.e., [paro-parera] ~ [baro-barera], but not *[paro-barera] or *[baro-parera].
Also, for a non-reduplicative case, [hapisapa] ~ [habisaba] ‘other side’

- We haven’t talked at all about how to get optionality in either SPE or OT, so let’s brainstorm...

As discussed by Riggle & Wilson, Kaplan, it would be nice to have more than two non-reduplicated words, or another language where this happens!

11. Local optionality—also hard to find good cases (besides French; see below)

Vaux says that he can produce, for English marketability:

\[
[\text{m} \text{a} \text{u} \text{k} \text{a} \text{t} \text{a} \text{b} \text{i} \text{a} \text{t} ^h \text{i}] \sim [\text{m} \text{a} \text{u} \text{k} \text{a} \text{r} \text{a} \text{b} \text{i} \text{a} \text{r} \text{i}] \sim [\text{m} \text{a} \text{u} \text{k} \text{a} \text{t} \text{a} \text{b} \text{i} \text{a} \text{r} \text{i}] \sim [\text{m} \text{a} \text{u} \text{k} \text{a} \text{r} \text{a} \text{b} \text{i} \text{a} \text{r} \text{i}]\]
\]

- Can any of our ideas for SPE+optionality get this? Our OT+optionality ideas?

12. Vata: iterative optionality

Ethnologue classifies as dialect of Lakota Dida, a Niger-Congo language of Côte d’Ivoire with 98,8000 speakers. Data taken from Kaplan 2009; originally from Kaye 1982,\(^{21}\) which I didn’t get a chance to consult.

\([+\text{ATR}]\): [i, u, e, o, Λ] \quad \text{[–ATR]}\): [i, o, e, o, a]

[+ATR] optionally to the final syllable of a preceding word:

\[
/\text{d} \text{n} \text{s} \text{a} \text{k} \text{a} \text{p} \text{l}/ \rightarrow /\text{d} \text{n} \text{s} \text{a} \text{k} \text{a} \text{p} \text{l} \sim /\text{d} \text{n} \text{s} \text{a} \text{k} \text{a} \text{p} \text{l}/ \quad \text{‘he didn’t cook rice’}\]

If all the words are monosyllabic...

\[
/\text{d} \text{k} \text{a} \text{z} \text{a} \text{p} \text{l}/ \rightarrow /\text{d} \text{k} \text{a} \text{z} \text{a} \text{p} \text{l} \sim /\text{d} \text{k} \text{a} \text{z} \text{a} \text{p} \text{l} \sim /\text{k} \text{a} \text{k} \text{a} \text{z} \text{a} \text{p} \text{l}/ \sim /\text{k} \text{a} \text{k} \text{a} \text{z} \text{a} \text{p} \text{l}/ \quad \text{‘he will cook food’}\]

- Can we get this one?

13. **Hypercorrection in Dominican Spanish: unique-target optionality**

(Vaux 2003 calls this “Basic Optionality”)

Dialect of the Indo-European language from Spain with 328 million speakers worldwide. Data from Bradley 2006. See there for original data sources, esp. Núñez-Cedeño 1994, which I didn’t get a chance to consult.

/s/ typically deletes in a syllable coda:

<table>
<thead>
<tr>
<th><strong>Dominican Spanish</strong></th>
<th><strong>Conservative Spanish</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>se.co</td>
<td>se.co</td>
</tr>
<tr>
<td>ca.so</td>
<td>ca.so</td>
</tr>
<tr>
<td>e.tú.pi.do</td>
<td>es.tú.pi.do</td>
</tr>
<tr>
<td>do</td>
<td>dos</td>
</tr>
</tbody>
</table>

‘dry’
‘case’
‘stupid’
‘two’ (p. 3)

Hypercorrection can insert a coda /s/ (in the “hablar fisno” speech style).

<table>
<thead>
<tr>
<th><strong>Dominican fisno</strong></th>
<th><strong>Conservative</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>e.tús.pi.do</td>
<td>es.tú.pi.do</td>
</tr>
<tr>
<td>de.des</td>
<td>des.de</td>
</tr>
<tr>
<td>in.vis.tado</td>
<td>in.vi.ta.do</td>
</tr>
<tr>
<td>co.mos</td>
<td>co.mo</td>
</tr>
</tbody>
</table>

‘stupid’
‘since’
‘guest’
‘like’ (p. 4)

And there can be variation:

<table>
<thead>
<tr>
<th><strong>Dominican fisno</strong></th>
<th><strong>Conservative</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.s.b.o.g.a.do ~ a.b.o.g.a.do ~ a.b.o.gasdo ~ a.b.o.ga.dos</td>
<td>a.b.o.g.a.do</td>
</tr>
</tbody>
</table>

‘lawyer’ (p. 4)

But, apparently there can only be one inserted /s/:

*a.s.b.o.g.a.dos*, etc.

○ Any ideas, for each theory?


Indo-European language from France and surroundings with 67.8 million speakers worldwide.

There’s a big literature on this; Dell 1970 is a good place to start.

/s/ optionally deletes, except when it would create a bad consonant cluster.

/suvəνiɾ/ → [suvəɾiɾ] ~ [suvniɾ] ‘to remember’
/paɾvəɾa/ → [paɾɾaɾa] ~ [pasra] ‘will pass’
/suɾəɾa/ → [suɾəɾa] *[suɾɾa] ‘will blow’ ([VfɾV] unsyllabifiable)

---

24 though not before an otherwise intervocalic tap or trill, which would be phonotactically illegal
25 See p. 24 for discussion of an apparent counterexample given by Harris.
/ã/ → [ã] ‘Henri had to go’
/ak dargv/ → [ak dargv] * [ak dargv] ‘Jacques had to go’ ([kdv])

- What does basic SPE predict for this form (pretend the rule is obligatory): /ty dargv/ ‘you
  were becoming’
- Actual result is (supposedly) [ty dargv] ~ [ty dargv]27 ~ [ty dargv], but * [ty dargv]—discuss.

15. **Anderson’s (1974)28 solution**

   • Find all segments eligible for the rule and circle them.
   • For each circled segment, underline the smallest environment that lets the segment meet the
     rule’s structural description.
   • If the rule is optional, you may uncircle some of the eligible segments and de-underline their
     environments.
   • If any circled segment is contained in some other circled segment’s underlined environment,
     uncircle (and de-underline the environments of) as few segments as possible to get rid of these
     overlaps.
   • Now apply the rule simultaneously to the remaining circled segments.

   (Of course, circling and underlining themselves have no theoretical status—this is just a
   convenient way to say “identify targets and environments”)

- What does Anderson’s proposal predict for French /ty vudre ks ek labo/29 ‘you would
  like that what the beadle…’?

- Does Anderson’s proposal help with Klamath? Kikuyu? Latvian? Tianjin?

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27 Some speakers have said they don’t like this one...
29 I got this from an online appendix to David Odden’s *Introducing Phonology* (2005: Cambridge UP):
   http://www.ling.ohio-state.edu/~odden/IntroducingPhonology/Theory%20Discussion.html