Class 18 (or more likely, 19): The too-many-solutions problem

1. Heterogeneity of process (McCarthy 2001)
   - There can be impressive cross-linguistic exuberance in solving markedness problems.

   Write down some candidates for the input /pumili/ that satisfy the constraint *[labial](V)[labial]

2. Some actual Western Austronesian solutions to this problem (Zuraw & Lu 2009)
   a. change place of stem: /p-um-ili/ → [k-um-ili]
   b. change place of infix: /p-m-ili/ → [k-n-ili]
   c. change consonantality of infix: /d-m-iim/ → [d-w-iim] or [d-u-iim]
   d. fuse stem and infix consonants: /p-um-ili/ → [mili]
   e. move infix out of constraint’s domain of application: /p-um-ili/ → [mu-pili]
   f. delete the infix: /p-m-ili/ → [pili]
   g. paradigm gap: /p-m-ili/ → unpronounceable

   - /mp/ → ...
     - [mb]
     - [bp]
     - [m]
     - [p]

4. Different ways to handle *{i,u} in Romance metaphony when raising /e,o/ (Walker 2005)
   - In a raising environment, /e,o/ ...
     - raise to [i,u]
     - fail to raise at all
     - raise to [e,o]
     - raise to [ie,uo] or [iæ, uæ]
2. Limits on heterogeneity

- Two prominent examples of non-exuberance:
  - No language consistently deletes \( C_2 \) in \( VC_1C_2V \) sequences to solve a NOCODA or *CC problem (Wilson 2000; Wilson 2001).
  - Many languages devoice to obey \( \left[ \begin{array}{c}
-\text{son} \\
\text{+voice}
\end{array} \right] \), but none delete, epenthesize, etc. (Lombardi 2001).

3. Loan adaptation: Shibatani on Japanese

- URs can end in consonants. Here are some verbs:

<table>
<thead>
<tr>
<th>UR</th>
<th>present</th>
<th>pres. polite</th>
<th>negative</th>
<th>past</th>
</tr>
</thead>
<tbody>
<tr>
<td>/mat/</td>
<td>mats-u</td>
<td>mats-i-masu</td>
<td>mat-anai</td>
<td>mat-ta</td>
</tr>
<tr>
<td>/kak/</td>
<td>kak-u</td>
<td>kak-imasu</td>
<td>kak-anai</td>
<td>kai-ta</td>
</tr>
<tr>
<td>/aruk/</td>
<td>aruk-u</td>
<td>aruk-imasu</td>
<td>aruk-anai</td>
<td>arui-ta</td>
</tr>
<tr>
<td>/job/</td>
<td>job-u</td>
<td>job-imasu</td>
<td>job-anai</td>
<td>jōn-da</td>
</tr>
<tr>
<td>/asob/</td>
<td>asob-u</td>
<td>asob-imasu</td>
<td>asob-anai</td>
<td>ason-da</td>
</tr>
<tr>
<td>/isog/</td>
<td>isog-u</td>
<td>isog-imasu</td>
<td>isog-anai</td>
<td>isoi-da</td>
</tr>
<tr>
<td>/hanas/</td>
<td>hanas-u</td>
<td>hanas-i-masu</td>
<td>hanas-anai</td>
<td>hanas-ita</td>
</tr>
<tr>
<td>/nom/</td>
<td>nom-u</td>
<td>nom-imasu</td>
<td>nom-anai</td>
<td>non-da</td>
</tr>
<tr>
<td>/kaer/</td>
<td>kaer-u</td>
<td>kaer-imasu</td>
<td>kaer-anai</td>
<td>kae-ta</td>
</tr>
<tr>
<td>/gambar/</td>
<td>gambar-u</td>
<td>gambar-i-masu</td>
<td>gambar-anai</td>
<td>gambat-ta</td>
</tr>
<tr>
<td>/tabe/</td>
<td>tabe-ru</td>
<td>tabe-masu</td>
<td>tabe-nai</td>
<td>tabe-ta</td>
</tr>
<tr>
<td>/mise/</td>
<td>mise-ru</td>
<td>mise-masu</td>
<td>mise-nai</td>
<td>mise-ta</td>
</tr>
<tr>
<td>/mi/</td>
<td>mi-ru</td>
<td>mi-masu</td>
<td>mi-nai</td>
<td>mi-ta</td>
</tr>
<tr>
<td>/deki/</td>
<td>deki-ru</td>
<td>deki-masu</td>
<td>deki-nai</td>
<td>deki-ta</td>
</tr>
</tbody>
</table>

What generalizations can we make about allowable non-prevocalic (i.e., syllable-final) Cs (bold) on the surface?

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1 Not the only analysis out there, but I think it’s close to what Shibatani has in mind. I don’t remember where I originally got these data, but I checked them at www.japaneseverbconjugator.com.
• Some loanwords of the past century:\(^2\)
  ‘dress’ doresu
  ‘script’ sukuriputo
  ‘pen’ pen (uvular-ish is the default place of articulation for a final nasal)

 ❔ How can we explain this in rule terms?

• Shibatani argues that there was no prior basis for a V-insertion rule in Japanese—but there was a basis for a surface constraint on non-prevocalic Cs.

 ❔ In OT terms, I think we can explain why learners (even without seeing the loans) would arrive at a grammar that rules out *[dres], *[skript]. But how do they choose between MAX-C and DEP-V? How do they choose which vowel to insert? Looking ahead [if this is happening after the Steriade reading], what would Steriade say?

4. Loan adaptation remarks

• Not only must we explain why languages often agree on a repair; we also have to explain how speakers of the same language often agree on a repair when new items enter the language.

• Recall Shibatani 1973, writing in favor of surface constraints (as opposed to constraints on underlying forms, or no role for constraints at all):
  ▪ “It is the SPCs [surface phonetic constraints] of his language which intrude into the pronunciation of a foreign language when an adult learner speaks. The SPCs are acquired in an early stage of mother-tongue acquisition, and they are deeply rooted in the competence of a native speaker.” (p. 99)

5. Loan adaptation: Shibatani on Korean

• Before Chinese (≠ modern Mandarin!) loans came in:
• On the surface, no word-initial liquids → surface constraint *[#l ] (and its allophone [ɾ])
• But also no morpheme-initial liquids underlyingly → could just as well have a constraint on underlying forms, */#/l/

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\(^2\) We could also look at old loans from Chinese, maybe with a different result for final Cs.
• These loans don’t tell us if it’s a constraint on underlying or surface forms (why not?):

<table>
<thead>
<tr>
<th>Morpheme</th>
<th>Meaning</th>
<th>Chinese</th>
</tr>
</thead>
<tbody>
<tr>
<td>nok-</td>
<td>‘green’</td>
<td>&lt; Ch. lok</td>
</tr>
<tr>
<td>nam-</td>
<td>‘blue’</td>
<td>&lt; Ch. lam</td>
</tr>
<tr>
<td>nampʰu</td>
<td>‘lamp’</td>
<td>&lt; Jp. rampu</td>
</tr>
</tbody>
</table>

❔ Solve the following miniature phonology problem. These morphemes are all loans from (Middle?) Chinese. It is significant that only the first three rows have [j].

<table>
<thead>
<tr>
<th>Morpheme</th>
<th>Meaning</th>
<th>Chinese</th>
</tr>
</thead>
<tbody>
<tr>
<td>jan-kim</td>
<td>‘pension’</td>
<td>年金 year+money</td>
</tr>
<tr>
<td>ne-njan</td>
<td>‘next year’</td>
<td>來年 coming+year</td>
</tr>
<tr>
<td>jan-sip</td>
<td>‘practice’</td>
<td>練習 practice+practice</td>
</tr>
<tr>
<td>kjo-ljan</td>
<td>‘military drill’</td>
<td>敎鍊 teach+practice</td>
</tr>
<tr>
<td>jan-ki</td>
<td>‘performance’</td>
<td>演技 perform+skill</td>
</tr>
<tr>
<td>teo-jan</td>
<td>‘supporting role’</td>
<td>助演 assist+perform</td>
</tr>
<tr>
<td>no-in</td>
<td>‘old person’</td>
<td>老人 old +person</td>
</tr>
<tr>
<td>t eo-lo</td>
<td>‘premature old age’</td>
<td>早老 early+old</td>
</tr>
<tr>
<td>nak-wan</td>
<td>‘paradise’</td>
<td>楽園 pleasant+park</td>
</tr>
<tr>
<td>kʰwe-lak</td>
<td>‘enjoyment’</td>
<td>快樂 refreshing+pleasant</td>
</tr>
<tr>
<td>nam-pʰan</td>
<td>‘husband’</td>
<td>男便 man+side</td>
</tr>
<tr>
<td>mi-nam</td>
<td>‘good-looking man’</td>
<td>美男 beautiful+man</td>
</tr>
</tbody>
</table>

❔ Based on your solution, does the constraint *#l apply to (A) surface forms or (B) underlying forms? (Or does it depend?)

• Like Japanese, Korean is displaying an ‘extra’ rule here that wasn’t previously needed/attested.

❔ OT explanation for where this came from?

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3 Naver online dictionary (krdic.naver.com) instead has direct-from-English [rəmpʰi].
6. Answer #1: P-map (Steriade 2008)
- As you read (or will have read, if we get this far on Thursday), Steriade proposes that...

a. Speakers have a “P-map”, implicit knowledge of perceptual distance between pairs of sounds (potentially tagged for their contexts): e.g., \( \Delta(d/V\_\#, \emptyset/V\_\#) > \Delta(d/V\_\#, t/V\_\#) \) [\( \Delta \) for difference]

b. Faithfulness constraints can refer to details of their target and their surface context:
   - not just DEP-V, but DEP-i, DEP-\( \emptyset \), DEP-\( \epsilon \)
   - not just DEP-V, but DEP-V/s\_t, DEP-V/t\_r

c. Faithfulness constraints get their default rankings from the P-map: constraints penalizing big changes should outrank constraints penalizing small changes.

\(? \) \( \text{MAX-d/V\_\#} \gg IDENT(\text{voice})/V\_\# \) or \( IDENT(\text{voice})/V\_\# \gg \text{MAX-d/V\_\#} \)?

- Presumably these default rankings can be overturned by the learner in response to contradictory data, but they will be a persistent influence on language change.

- Let’s review how this plays out in final devoicing (simplest cases)

<table>
<thead>
<tr>
<th>I ( \rightarrow ) O</th>
<th>faith. violated</th>
<th>perceptual comparison</th>
<th>distance between comparanda (arbitrary units, fake values)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(/\text{rad/} \rightarrow [\text{rat}])</td>
<td>IDENT(voice)/V_#</td>
<td>d/V_#, t/V_#</td>
<td>4</td>
</tr>
<tr>
<td>(/\text{rad/} \rightarrow [\text{ra}])</td>
<td>MAX-C</td>
<td>d/V_#, \emptyset/V_#</td>
<td>8</td>
</tr>
<tr>
<td>(/\text{rad/} \rightarrow [\text{ran}])</td>
<td>IDENT(nasal)</td>
<td>d/V_#, n/V_#</td>
<td>6</td>
</tr>
<tr>
<td>(/\text{rad/} \rightarrow [\text{rat}\epsilon])</td>
<td>DEP-( \epsilon )</td>
<td>\emptyset/C_#, \epsilon/C_#</td>
<td>9</td>
</tr>
</tbody>
</table>

\(? \) What default constraint ranking does this imply?

\(? \) Fill in tableau to see winner under the following ranking

<table>
<thead>
<tr>
<th>(/\text{rad/})</th>
<th>( ^{+\text{voice}} )</th>
<th>DEP-( \epsilon )</th>
<th>MAX-C</th>
<th>IDENT(nasal)</th>
<th>IDENT(voice)/V_#</th>
</tr>
</thead>
<tbody>
<tr>
<td>( a )</td>
<td>[\text{rad}]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( b )</td>
<td>[\text{rat}]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( c )</td>
<td>[\text{ra}]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( d )</td>
<td>[\text{ran}]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( e )</td>
<td>[\text{rat}\epsilon]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Keeping the default ranking fixed, possible winners in some language are:

A: any of the six candidates
B: a, b, or c
C: a or b
D: other

- Personally, I find the traditional faithfulness constraints unwieldy in a P-map theory.
- I prefer (Zuraw 2007, Zuraw 2013) to use a constraint format that directly penalizes mappings, which you can then look up in the P-map:
  - e.g., *MAP( Vd#, Vt# )
  - See Löfstedt 2010 for application to paradigm gaps; White 2013 for application to “saltation”, a type of underapplication opacity.

7. Some things to ponder about the P-map
- Exactly what is being compared when a faithfulness constraint gets its default ranking?
  - Output vs. input?
    - That’s kind of funny because the input isn’t a pronounced form, so its perceptual properties are hypothetical.
  - Output vs. faithful output (candidate a in the above)?
  - Output vs. related output? E.g., [rat] vs. plural [rad-im].
    - Those are both real, pronounced forms, but it’s tricky because the target segments are in different contexts. Do we measure \( \Delta(d/V\_V,t/V\_#) \)?
- How well connected is the P-map?
  - Can \( \Delta(X,Y) \) be measured for absolutely any X,Y? Or only for close-enough pairs?

- We won’t cover this, but the idea relies on relaxing some assumptions about the ordering relation that a constraint imposes on candidates.
  - (Though see McCarthy 2002 for issues with targeted constraints and final devoicing specifically.)

- Blevins gives a very important caution about using typological data:
  - Does final devoicing prevail because learners prefer it?
  - Or simply because it tends to arise diachronically?
- Moreton 2008 refers to this distinction as analytic bias vs. channel bias.
Assume the same perception facts that Steriade does, except assume that speakers don’t internalize perceptual facts, and instead simply misperceive.

- Suppose there is a language that tolerates final voiced obstruents: /rad/ → [rad].
- Suppose that the most common misperception of [rad] is as [rat].
- Then learners will think they’re hearing a certain amount of alternation like [rad-im] ~ [rat], and not much, e.g., [rad-im] ~ [rado] or [rad-im] ~ [ran].
- If this happens enough and catches hold, the language will eventually acquire final devoicing (rather than epenthesis after final voiced obstruents), but not because learners prefer it.

What can we do then to understand what analytic bias, if any, exists?

- A popular approach is to put speakers in a position where their behavior is not constrained by their language-specific learning (see lit reviews in Moreton 2008, Zuraw 2007, Hayes et al. 2009, Moreton & Pater 2012 for examples).
  - Artificial Grammar Learning experiments
  - The “Bach test” (Lise Menn): see how loans with novel structures are treated
  - Corpora of poetry, puns

10. Another example of heterogeneity of process (if time)

- Kennedy 2005:
  - In various Micronesian languages, initial geminate consonants were created by CV-reduplication followed by deletion of the reduplicant’s V.
  - 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])
  - If a diachronic change were to happen, we’d expect it to just be degemination.
  - But the changes turn out to be diverse.

<table>
<thead>
<tr>
<th>Language</th>
<th>Change</th>
<th></th>
<th>Markedness Constraint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pohnpeian</td>
<td>*ppek &gt; mpek</td>
<td>IDENT(nasal)</td>
<td></td>
</tr>
<tr>
<td>Marshallese—Ratak</td>
<td>*kkan &gt; kekan</td>
<td>DEP-V/C</td>
<td></td>
</tr>
<tr>
<td>Marshallese—Ralik</td>
<td>*kkan &gt; yekkan</td>
<td>DEP-V/#</td>
<td></td>
</tr>
<tr>
<td>Pingelapese</td>
<td>*tt’il &gt; iit’il</td>
<td>IDENT(syllabic)</td>
<td></td>
</tr>
<tr>
<td>Woleaian</td>
<td>*kkaše &gt; kkaše</td>
<td>IDENT(continuant)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*kaše &gt; xaše</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11. So what makes some repairs homogeneous and others heterogeneous?

- Who knows, but here are some speculations (from Zuraw & Lu 2009):

  - The origin of the markedness constraint
    - Is it driven by articulatory considerations?
    - by perceptual difficulties?
    - by motor planning difficulties?
• The formal complexity of the markedness constraint:
  ▪ How long a string must be inspected to determine if there is a violation?
  ▪ Is the constraint sensitive to morphological information or other hidden structure?
  ▪ How many features are involved?

• The nature of the changes available—is there one that can count as “smallest change”?
  ▪ Is one change perceptually closer to the original than the others?
    ▪ If so, does it achieve the status of “only solution” by falling below some threshold of perceptual distance?
    ▪ Or must the difference between the closest change and the next-closest fall above some threshold?
  ▪ Does one change affect fewer segments, fewer features, or less-important features?
  ▪ If each change is formulated as a rule, does one change have a simpler structural description?

References