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]

- 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/ → [**m**ili]
  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*

- Different solutions to *NC̥ (Pater 1999; Pater 2001).
  - /mp/ → ...
    - [mb]
    - [bp]
    - [m]
    - [p]

- Different ways to handle *{ɪ,ʊ} in Romance metaphony when raising /ɛ,ɔ/ (Walker 2005)
  - In a raising environment, /ɛ,ɔ/...
    - raise to [i,u]
    - fail to raise at all
    - raise to [e,o]
    - raise to [ie,uo] or [iɛ, uɛ]

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 $*\begin{bmatrix}-\text{son}\\+\text{voice}\end{bmatrix}\#$, but none delete, epenthesize, etc. (Lombardi 2001).

3. Loan adaptation: Shibatani on Japanese

- URs can end in consonants. Here are some verbs:[1]

UR	*present*	*pres. polite*	*negative*	*past*	
/ma**t**/	mats-u	ma͡ʧ-imasu	mat-anai	ma**t**-ta	‘wait’
/ka**k**/	kak-u	kak-imasu	kak-anai	kai-ta	‘write’
/aru**k**/	aruk-u	aruk-imasu	aruk-anai	arui-ta	‘walk’
/jo**b**/	job-u	job-imasu	job-anai	jo**n**-da	‘call’
/aso**b**/	asob-u	asob-imasu	asob-anai	aso**n**-da	‘play’
/iso**g**/	isog-u	isog-imasu	isog-anai	isoi-da	‘hurry’
/hana**s**/	hanas-u	hanaʃ-imasu	hanas-anai	hanaʃ-ita	‘speak’
/no**m**/	nom-u	nom-imasu	nom-anai	no**n**-da	‘drink’
/kae**r**/	kaer-u	kaer-imasu	kaer-anai	kae**t**-ta	‘return’
/gamba**r**/	gambar-u	gambar-imasu	gambar-anai	gamba**t**-ta	‘hang in there’
/tabe/	tabe-ru	tabe-masu	tabe-nai	tabe-ta	‘eat’
/mise/	mise-ru	mise-masu	mise-nai	mise-ta	‘show’
/mi/	mi-ru	mi-masu	mi-nai	mi-ta	‘see’
/deki/	deki-ru	deki-masu	deki-nai	deki-ta	‘can’

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

[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]
  - '**d**re**ss**' doresu
  - '**scr**i**pt**' sukuriputo
  - 'pe**n**' peɴ (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/

[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?):

nok-	'green' < Ch. lok
nam-	'blue' < Ch. lam
namp^{h}u	'lamp' < Jp. rampu (*archaic*?[3])

  - ⍰ 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].

jʌn-kɨm 年金	'pension' year+money	nɛ-njʌn 來年	'next year' coming+year
jʌn-sɨp 練習	'practice' practice+practice	kjo-ljʌn 敎鍊	'military drill' teach+practice
jʌn-ki 演技	'performance' perform+skill	t͡ɕo-jʌn 助演	'supporting role' assist+perform
no-in 老人	'old person old +person	t͡ɕo-lo 早老	'premature old age' early+old
nak-wʌn 樂園	'paradise' pleasant+park	k^{h}wɛ-lak 快樂	'enjoyment' refreshing+pleasant
nam-p^{h}ʌn 男便	'husband' man+side	mi-nam 美男	'good-looking man' beautiful+man

  - ⍰ 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?

[3] Naver online dictionary (krdic.naver.com) instead has direct-from-English [ɾɛmp^{h}ɨ].

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., Δ(d/V__#, Ø/V__#) > Δ(d/V__#, t/V__#) [Δ for difference]

b. Faithfulness constraints can refer to details of their target and their surface context:
   - not just DEP-V, but DEP-i, DEP-a, DEP-ə
   - 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.

Zoom poll

? MAX-d/V__# >> IDENT(voice)/V__# or IDENT(voice)/V__# >> 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)

I → O	faith. violated	perceptual comparison	distance between comparanda (arbitrary units, fake values)
/rad/ → [rat]	IDENT(voice)/V__#	d/V__#, t/V__#	4
/rad/ → [ra]	MAX-C	d/V__#, Ø/V__#	8
/rad/ → [ran]	IDENT(nasal)	d/V__#, n/V__#	6
/rad/ → [ratə]	DEP-ə	Ø/C__#, ə/C__#	9

? What default constraint ranking does this imply?

? Fill in tableau to see winner under the following ranking

	/rad/	*[−son, +voice]#	DEP-ə	MAX-C	IDENT(nasal)	IDENT(voice)/V__#
a	[rad]					
b	[rat]					
c	[ra]					
d	[ran]					
e	[ratə]					

Zoom poll

? 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(^{V}d$^{\#}$, ^{V}t$^{\#}$)
  - 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 Δ(d/V__V,t/V__#)?
- How well connected is the P-map?
  - Can Δ(X,Y) be measured for absolutely any X,Y? Or only for close-enough pairs?

8. Answer #2: targeted constraints (Wilson 2000; Wilson 2001 Baković & Wilson 2000)

- 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.)

9. Answer #3: Evolutionary Phonology (Blevins 2003)

- 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] ~ [radə] 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.

Pohnpeian	*ppek	>	mpek	IDENT(nasal)
Marshallese—Ratak	*kkan	>	kekan	DEP-V/C__C
Marshallese—Ralik	*kkan	>	yekkan	DEP-V/#__C
Pingelapese	*ttil	>	iitil	IDENT(syllabic)
Woleaian	*kkaše	>	kkaše	
	*kaše	>	xaše	IDENT(continuant)

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?

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