

**Class 14: Lexical Phonology part III; Too-many-solutions problem****To do**

- **HW** due Thursday *or up until Tuesday in class*: lexical phonology in Malayalam
- **Project**: meet with me again by the end of next week (syllabus says this week). Be reading up on the original data and writing out how OT and SPE analyses succeed or fail

**0. Administrative matters**

- Proposed HW schedule for rest of quarter

<i>week</i>	<i>dates</i>	<i>topic</i>	<i>HW due</i>
6	Nov 1	Interaction between phonological and morphological processes: the cycle; Lexical Phonology and Morphology	Fri: HW on Week 5 material was due (Hakha Lai)
	Nov 3		
7	Nov 8	Conspiracies revisited: the too-many-solutions problem	
	Nov 10	Autosegmental representations I	
8	Nov 15	Autosegmental representations II	Tues: HW on Week 6 material due (Malayalam)
	Nov 17	Metrical stress theory: the grid	
9	Nov 22	Metrical stress theory: feet	Tues: HW on Week 7-8 material due (autosegmentalism)
	Nov 24	<i>Thanksgiving holiday—no class</i>	
10	Nov 29	Metrical stress theory: weight	Fri: HW on Week 9 material due (stress)
	Dec. 1	Synthesis and prospect	

- Let's talk about having mini-conference in exam week. Or maybe, just think about your travel and exam schedule and be ready to discuss on Thursday.

**Overview of today:** As you read in Steriade, for many markedness constraints Classic OT seems to over-predict the typology of repairs.

**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/ → [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*
- Frivolous question: which one reminds you of something? A, B, C, D?
- Different solutions to \*NC̥ (Pater 1999; Pater 2001).
  - /mp/ → ...
    - [mb]
    - [bp]
    - [m]
    - [p]
- Different ways to handle \*{I,U} in Romance metaphony when raising /ε,ɔ/ (Walker 2005)
  - In a raising environment, /ε,ɔ/...
    - raise to [i,u]
    - fail to raise at all
    - raise to [e,o]
    - raise to [ie,uo] or [ie, ue]

## 2. Limits on heterogeneity

- Two prominent examples of non-exuberance:
  - No language consistently deletes C<sub>2</sub> in VC<sub>1</sub>C<sub>2</sub>V 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:<sup>1</sup>

<i>UR</i>	<i>present</i>	<i>pres. polite</i>	<i>negative</i>	<i>past</i>	
/mat/	mats-u	mat̃-imasu	mat-anai	mat-ta	'wait'
/kak/	kak-u	kak-imasu	kak-anai	kai-ta	'write'
/aruk/	aruk-u	aruk-imasu	aruk-anai	arui-ta	'walk'
/job/	job-u	job-imasu	job-anai	job-da	'call'

<sup>1</sup> 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](http://www.japaneseverbconjugator.com).

/asob/	asob-u	asob-imasu	asob-anai	ason-da	‘play’
/isog/	isog-u	isog-imasu	isog-anai	isoi-da	‘hurry’
/hanas/	hanas-u	hanaʃ-imasu	hanas-anai	hanaʃ-ita	‘speak’
/nom/	nom-u	nom-imasu	nom-anai	non-da	‘drink’
/kaer/	kaer-u	kaer-imasu	kaer-anai	kaet-ta	‘return’
/gambar/	gambar-u	gambar-imasu	gambar-anai	gambat-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?

- Some loanwords of the past century:<sup>2</sup>

‘**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, what would Steriade say?

---

<sup>2</sup> We could also look at old loans from Chinese, maybe with a different result for final Cs.

#### 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.
- 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 [r])
- But also no morpheme-initial liquids underlyingly → could just as well have MSCs \*#l
- These loans don’t tell us if it’s a surface constraint or an MSC (why not?):

nok-	‘green’ < Ch. lok
nam-	‘blue’ < Ch. lam
namp <sup>h</sup> u	‘lamp’ < Jp. rampu <sup>3</sup>

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

jʌn-kim 年金	‘pension’ year+money	nɛ-njʌn 來年	‘next year’ coming+year
jʌn-sip 練習	‘practice’ practice+practice	kjo-ljʌn 教練	‘military drill’ teach+practice
jʌn-ki 演技	‘performance’ perform+skill	tɕo-jʌn 助演	‘supporting role’ assist+perform
no-in 老人	‘old person’ old +person	tɕo-lo 早老	‘premature old age’ early+old
nak-wʌn 樂園	‘paradise’ pleasant+park	k <sup>h</sup> wɛ-lak 快樂	‘enjoyment’ refreshing+pleasant
nam-p <sup>h</sup> ʌn 男便	‘husband’ man+side	mi-nam 美男	‘good-looking man’ beautiful+man

<sup>3</sup> must be somewhat archaic—Naver online dictionary (krdic.naver.com) instead has direct-from-English [rɛmp<sup>h</sup>i].

- Based on your solution, does the constraint \*#l apply to (A) surface forms or (B) underlying forms?
- Like Japanese, Korean is displaying an ‘extra’ rule here that wasn’t previously needed/attested.
- OT explanation for where this came from?

### 6. Answer #1: P-map (Steriade 2008)

- As you read, 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-a, DEP- $\emptyset$
    - 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.
    - (A)  $\text{MAX-d/V\_ \#} \gg \text{IDENT(voice)/V\_ \#}$  or (B)  $\text{IDENT(voice)/V\_ \#} \gg \text{MAX-d/V\_ \#}$ ?
- 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)

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__#, $\emptyset$ /V__#	8
/rad/ → [ran]	IDENT(nasal)	d/V__#, n/V__#	6
/rad/ → [rat $\emptyset$ ]	DEP- $\emptyset$	$\emptyset$ /C__#, $\emptyset$ /C__#	9

- What default constraint ranking does this imply?

- Fill in tableau to see winner under the following ranking

	/rad/	* $\begin{bmatrix} -\text{son} \\ +\text{voice} \end{bmatrix}$ #	DEP- $\emptyset$	MAX-C	IDENT(nasal)	IDENT(voice)/V__#
<i>a</i>	[rad]					
<i>b</i>	[rat]					
<i>c</i>	[ra]					
<i>d</i>	[ran]					
<i>e</i>	[rat $\emptyset$ ]					

- 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 constraints that directly penalize mappings, which you can then look up in the P-map:
  - e.g., \*MAP(  $\vee$ d#,  $\vee$ 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  $\Delta(d/V\_V, t/V\_ \#)$ ?
- How well connected is the P-map?
  - Can  $\Delta(X, Y)$  be measured for absolutely any X, Y? Or only for close-enough pairs?

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

- We won't have time to cover this fully, but the idea relies on relaxing some assumptions about the ordering relation that a constraint imposes on candidates. *See discussion on next handout!*

**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).

**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	IDENT(continuant)
	*kaše	>	xaše	

## 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?

**Next time:** Rethinking how features are represented—what if they’re entities instead of properties?

## References

- Baković, Eric & Colin Wilson. 2000. Transparency, strict locality, and targeted constraints. In Roger Billerey & Brook Danielle Lillehaugen (eds.), *Proceedings of the 19th West Coast Conference on Formal Linguistics*, 43–56. Somerville, Mass.: Cascadia Press.
- Blevins, Juliette. 2003. *Evolutionary phonology. The emergence of sound patterns*. Cambridge: Cambridge University Press.
- Hayes, Bruce, Kie Zuraw, Zsuzsa Czirák Londe & Peter Siptár. 2009. Natural and unnatural constraints in Hungarian vowel harmony. *Language* 85. 822–863.
- Kennedy, Bob. 2005. Reflexes of initial gemination in Western Micronesian languages. *Austronesian Formal Linguistics Association*. UCLA, Los Angeles, CA.
- Löfstedt, Ingvar. 2010. *Phonetic Effects in Swedish Phonology: Allomorphy and Paradigms*. UCLA Ph.D. Dissertation.
- Lombardi, Linda. 2001. Why Place and Voice are Different: Constraint-Specific Alternations and Optimality Theory. In Linda Lombardi (ed.), *Segmental Phonology in Optimality Theory: Constraints and Representations*, 13–45. Cambridge: Cambridge University Press.
- McCarthy, John J. 2001. *A Thematic Guide to Optimality Theory*. Cambridge: Cambridge University Press.
- Moreton, Elliott. 2008. Analytic bias and phonological typology. *Phonology* 25(1). 83–127.
- Moreton, Elliott & Joe Pater. 2012. Structure and substance in artificial-phonology learning. *Language and Linguistics Compass* 6(11). 686–701, 702–718.

- Pater, Joe. 1999. Austronesian Nasal Substitution and Other \*N̄ Effects. In René Kager, Harry van der Hulst & Wim Zonneveld (eds.), *The Prosody–Morphology Interface*. Cambridge: Cambridge University Press.
- Pater, Joe. 2001. Austronesian nasal substitution revisited: What’s wrong with \*N̄ (and what’s not). In Linda Lombardi (ed.), *Segmental Phonology in Optimality Theory: Constraints and Representations*, 159–182. Cambridge: Cambridge University Press.
- Shibatani, Masayoshi. 1973. The role of surface phonetic constraints in generative phonology. *Language* 49. 87–106.
- Steriade, Donca. 2008. The phonology of perceptibility effects: the P-map and its consequences for constraint organization. In Kristin Hanson & Sharon Inkelas (eds.), *The nature of the word: studies in honor of Paul Kiparsky*, 151–180. MIT Press.
- Walker, Rachel. 2005. Weak Triggers in Vowel Harmony. *Natural Language & Linguistic Theory* 23(4). 917–989.
- White, James. 2013. Bias in phonological learning: evidence from saltation. UCLA PhD dissertation.
- Wilson, Colin. 2000. Targeted Constraints: An Approach to Contextual Neutralization in Optimality Theory. Johns Hopkins University.
- Wilson, Colin. 2001. Consonant Cluster Neutralisation and Targeted Constraints. *Phonology* 18(1). 147–197.
- Zuraw, Kie. 2007. The role of phonetic knowledge in phonological patterning: Corpus and survey evidence from Tagalog. *Language* 83. 277–316.
- Zuraw, Kie. 2013. \*MAP constraints. Manuscript. UCLA, ms. [http://www.linguistics.ucla.edu/people/zuraw/dnldpprs/star\\_map.pdf](http://www.linguistics.ucla.edu/people/zuraw/dnldpprs/star_map.pdf).
- Zuraw, Kie & Yu-An Lu. 2009. Diverse repairs for multiple labial consonants. *Natural Language and Linguistic Theory* 27. 197–224.