

## Class 11: Issues in process application: multiple targets, directionality, iterativity

**Overview:** How to deal with multiple application sites?

### 1. Multiple application

- What to do with a form that, for some rule  $A \rightarrow B / X\_Y$  or constraint  $*XAY$ , contains multiple instances of  $XAY$ 
  - either because  $XAY$  straightforwardly occurs twice in the form...
    - $C \rightarrow \emptyset / C\_$
    - What is  $XAY$ ?
    - /abtokpe/ has  $XAY$  twice
  - or because there are multiple ways of interpreting  $XAY$  (say, in a rule schema).
- And, what if the output of the rule creates or destroys instances of  $XAY$ ?

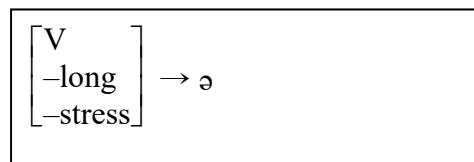
There's a whole can of worms here that's only barely been re-opened in the OT era. I drew a lot of today's examples from Howard 1972, Johnson 1970, and Anderson 1974. Other sources of interesting cases include Vago & Battistella 1982, Battistella 1979, Jensen & Stong-Jensen 1973, Jensen 1973, Vago 1992, and of course this week's readings from Kenstowicz & Kisseberth 1979 and Piggott 2018.

### 2. 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 (Data from Josephs 1990). Recall vowel reduction:

<i>X</i>	<i>his/her/its X</i>	
rákt	rəkt-él	'sickness'
sésəb	səsəb-él	'fire'
bótk	bətk-él	'operation'
ríŋəl	rəŋəl-él	'pain'



- ? How should your rules apply to an underlying representation like /ðiloba? + eli/ 'his injury', after stress applies to produce ðiloba?éli?  
(real outcome is [ðələbə?él])

ðiloba?éli

? Let's sketch an OT analysis (I'm leaving out any candidates with stress in wrong place or that fail to delete final vowel)—any issues?

/ðilobaʔ + eli/					
<i>a</i> ðilobaʔél					
<i>b</i> ðələbəʔél					
<i>c</i> ðələbəʔél					
<i>d</i> ðələbaʔél					
<i>e</i> ðiləbəʔ él					
<i>f</i> ðələbaʔél					
<i>g</i> ðiləbaʔél					
<i>h</i> ðilobaʔél					

### 3. Eastern Ojibwe glide formation: self-bleeding

- Ojibwe belongs to the Algonquian family, which stretches over quite a lot of what is now the U.S. and Canada
- Ojibwe itself also has a wide distribution
- There are around 100,000 speakers now
  - Conquest and forced removal of children to English-only boarding schools have greatly reduced the number of speakers from what it once was
- Mostly uses Roman alphabet, but some use of Ojibwe Syllabics



Waadookodaading: Ojibwe Language Immersion School<sup>1</sup>

<sup>1</sup> <https://dpi.wi.gov/news/dpi-connected/ojibwe-language-immersion-school-ways>

- Some English words that are from Algonquian languages—not always clear whether Ojibwa or another: *woodchuck, skunk, Chicago, Winnipeg, pecan, wigwam, manitou, thunderbird (calque), Michigan, Mississippi, totem, moose, moccasin*

(Example taken from Johnson/Howard [see there for a complication], originally from Bloomfield 1956—but see Miner 1979 for a criticism of similar data in Menominee)

- $\left\{ \begin{array}{l} o \rightarrow w \\ i \rightarrow "y" \end{array} \right\} / \_ V$  : what will happen to?

? What could happen to /eninioak/ ‘men’? (Correct surface form is [eniniwak].)

## eninioak

/eninioak/					
<i>a</i> eninioak					
<i>b</i> eniniwak					
<i>c</i> eninjoak					
<i>d</i> eninjwak					

#### 4. Klamath (self-bleeding)

- Plateau Penutian language
- Was spoken in southern Oregon/northern California
- No fluent speakers now

- Factors contributing to language falling out of use: speakers of multiple languages were forcibly relocated to a single reservation; forced removal of children to English-only boarding schools



Language class at Klamath Culture Camp<sup>2</sup>



Natalie Ball, artist<sup>3</sup>

Data and description taken from Kisseberth 1972; originally from Barker 1963

glottalized stops:     $\overset{̣}{p}$   $\overset{̣}{t}$   $\overset{̣}{č}$   $\overset{̣}{k}$   $\overset{̣}{q}$   
 glottalized sonorants:  $\overset{̣}{m}$   $\overset{̣}{n}$   $\overset{̣}{y}$   $\overset{̣}{w}$   $\overset{̣}{l}$   
 regular sonorants:     $m$   $n$   $w$   $y$   $l$   
 voiceless sonorants:  $M$   $N$   $W$   $Y$   $L$

*Deglottalization rules, informally:*

glottalized stop → deglottalized / \_\_C-other-than {m,n,w,y,l}  
 other glottalized → deglottalized / \_\_C

$\overset{̣}{q} \rightarrow q / \_ \overset{̣}{n}$	$n\check{c}o\overset{̣}{q}$ -a	‘is deaf’	$n\check{c}oq$ - $\overset{̣}{n}apg$ -a	‘is almost deaf’
$\overset{̣}{p} \rightarrow p / \_ \overset{̣}{t}$	$\overset{̣}{p}et$ -a	‘a hole enlarges’	$\overset{̣}{p}e$ - $\overset{̣}{p}t$ -a	‘dist. holes tear out’
$\overset{̣}{t} \rightarrow t / \_ \overset{̣}{k}$	$m$ - $\overset{̣}{p}et$ -a	‘enlarges hole’	$m$ - $\overset{̣}{p}et$ - $ky$ - $o:l$ -a	‘chips open a hole’
$\overset{̣}{q} \rightarrow q / \_ \overset{̣}{č}$	$\overset{̣}{q}o\check{c}$ -a	‘bends’	$\overset{̣}{q}o$ - $\overset{̣}{q}\check{c}$ -a	‘dist. bend’
$\overset{̣}{p} \rightarrow p / \_ W$	$n\overset{̣}{t}o\overset{̣}{p}$ -a	‘rots, spoils’	$n\overset{̣}{t}o\overset{̣}{p}$ - $Wi:y$ -a	‘almost rotted’
$\overset{̣}{p} \rightarrow p / \_ y$			$n\overset{̣}{t}o\overset{̣}{p}$ - $ye:g$ -a	‘starts to spoil’
$\overset{̣}{t} \rightarrow t / \_ w$			$wLet$ -wal	‘lies spread eagled on top of’
	cf.		$wLet$ -pga	‘is lying flat on back’
$\overset{̣}{n} \rightarrow n / \_ \overset{̣}{k}$	$\overset{̣}{n}o$ - $\overset{̣}{k}a$	‘little head’	$\overset{̣}{n}o$ - $n$ - $\overset{̣}{k}a$	‘dist. little heads’
$\overset{̣}{w} \rightarrow w / \_ \overset{̣}{č}$	$\overset{̣}{w}i\check{c}$ -a	‘is breathless’	$wi$ - $w\check{c}$ -a	‘dist. are breathless’

<sup>2</sup> <https://klamathtribes.org/news/the-klamath-tribes-culture-camp-2016-is-in-full-swing-this-week/>

<sup>3</sup> [https://www.heraldandnews.com/news/local\\_news/existence-as-resistance/article\\_40d89b35-5a5c-5623-9e1b-7e2ab02ef88a.html](https://www.heraldandnews.com/news/local_news/existence-as-resistance/article_40d89b35-5a5c-5623-9e1b-7e2ab02ef88a.html)

$\dot{y} \rightarrow y / \_G^4$	ʔ-iw $\dot{y}$ aq	'put in pl. obj.'	ʔi-ʔo:yGa	'dist. put pl. obj. into'
$\dot{l} \rightarrow l / \_l$	k-bo $\dot{l}$ -a	'hits in stomach'	w-bo $\dot{l}$ -lG-a	'falls on stomach'
$\dot{w} \rightarrow w / \_l$	ga $\dot{w}$ al	'finds'	gaw $\dot{l}$ -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:  $\dot{q}lq$ ,  $\dot{p}lq$ ?

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<sup>4</sup> Kisseberth has  $g$  with a dot below, but dot won't show under the  $g$  in my font.

Here are the data:	/q̣laq/:	nčoq- <b>laq</b> -Wi:y-a	‘ears are stopped up’
		nčo <b>q</b> - <b>lg</b> -a	‘ears are almost stopped up’
		hos-ta <b>q</b> - <b>laq</b>	‘make him stop!’
		hos-ta <b>q</b> - <b>lg</b> -a	‘makes someone stop an action’
		to <b>q</b> - <b>lg</b> -a	‘stops an action’
	/p̣laq/:	sno-ntap- <b>laq</b> -s	‘rotted wokus <sup>5</sup> ’
		sno-ntap <b>̣</b> - <b>lg</b> -a	‘causes to rot down’

? How about an OT analysis? Can we easily rule out \*q̣lq → qlq?

/... q̣laq .../					
<i>a</i> ... q̣lq ...					
☞ <i>b</i> ... qlq ...					
<i>c</i> ... q̣lq ...					
<i>d</i> ... qlq ...					

### 5. Southern Kikuyu (self-counterbleeding)

- Kikuyu is a Bantu (and therefore Niger-Congo) language of Kenya
- About 6.5 million speakers



*Kipsang Rotich, voice actor— voice Star Wars character Nien Nunb, in Kalenjin and Kikuyu<sup>6</sup>*



*Wahome Mutahi, humorist wrote in English and Kikuyu*



*Ngũgĩ wa Thiong'o author of most-translated story from Africa<sup>7</sup>*

<sup>5</sup> some kind of aquatic plant gathered for food

<sup>6</sup> [https://star-wars-canon.fandom.com/wiki/Kipsang\\_Rotich](https://star-wars-canon.fandom.com/wiki/Kipsang_Rotich)

<sup>7</sup> read it here: <https://jaladafrica.org/2016/03/22/jalada-translation-issue-01-ngugi-wa-thiong'o/>

Datum from Johnson 1970, originally from Bennett 1967

$k \rightarrow \gamma / \_ V_0[\text{voiceless stop}]$

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

/nekakaakeroma/					
a ...k...k...k...					
b ...k...γ...k...					
c ...γ...γ...k...					

Here’s the datum: [neyayaakeroma] (\*[nekayaakeroma]) [Is it reduplicated, though?]

**6. Tshiluba (self-feeding)**

- Also known as Lua-Kasai
- Bantu (and therefore Niger-Congo) language of D.R. of Congo
- 6.3 million speakers



*Dikembe Mutombo, retired NBA player*



*Tshala Muana, musician*

Data from Johnson 1970

l → n / [+nasal] V<sub>0</sub> \_\_

u-kwač-ile	‘he took’	u-dʲim-ine	‘he cultivated
ku-kwač-il-a	‘to take (ben.)’	ku-dʲim-in-a	‘to cultivate (ben.)’
u-kwač-idʲ-ile	‘he took (ben.)’	u-dʲim-inʲ-ine	‘he cultivated (ben.)’
(l → dʲ / __ i)			

? In an OT analysis, can we easily rule out \*u-dʲim-inʲ-ile? \*u-dʲim-ilʲ-ile?

/ u-dʲim-il-ile /					
a ...m... lʲ...l...					
b ...m...nʲ...l...					
c ...m...nʲ...n...					

**7. Self-counterfeeding?**

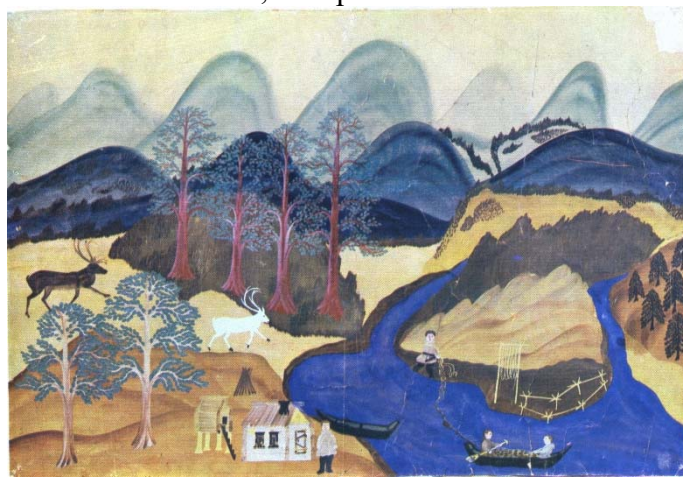
- Howard 1972 presents some possible cases but reanalyzes them.
- Kaplan 2008, reanalyzes many purported cases of self-counterfeeding.

Kavitskaya & Staroverov 2010 present a case from Tundra Nenets

- Uralic language of Siberia and Arctic Russia with 30,000 speakers



Anastasia Lapsui, filmmaker



Konstantin Pankov, painter

- /ʌ/ deletes in even-numbered syllables (from left edge) and final syllable,
  - subject to consonant-cluster constraints—roughly, no complex onsets, and complex codas must have falling sonority





- /xΛrΛ/ → xΛr ‘knife-nom.sg.abs.’
- /xΛrΛ-rΛ/ → xΛ.rΛ-r ‘knife-2sg.poss’ I assume [rr] is a bad coda.
- /xΛrΛ-ta/ → xΛr.-da ‘knife-3sg.poss’
  
- /xarΛtΛ/ → xa.rΛd ‘house-nom.sg.abs.’ [see below]
- /xarΛtΛ-rΛ/ → xar.dΛ-r ‘house-2sg.poss’
- /xarΛtΛ-ta/ → xar.dΛ.-da ‘house-3sg.poss’
  
- /nultΛnΛ-s<sup>j</sup>Λ/ → nult.nΛ-s<sup>j</sup> ‘house-3sg.poss’

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

/xarΛtΛ-ta/ → xar.dΛ.-da ; xar.dΛ.-da ↗ xard.da (though rdd is apparently legal)



? Can we capture this with rules? OT?

? Consider /xarΛtΛ/ → xa.rΛd, \*xard. Can our SPE analysis capture this? It’s not just plain self-counterfeeding.

/ xarΛtΛ /					
a xarΛdΛ					
b xarΛd					
c xardΛ					
d xard					

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

[K&S’s analysis involves OT machinery we won’t have a chance to cover in this course, Candidate Chains (McCarthy 2007)..]

### 8. Self-counterfeeding again: morphological truncation

- In Lardil (which you read about in Prince & Smolensky 1993, based on Hale 1973), /pulumunitami/ → pulumunitam (FREE-V) → [pulumunita] (CODACOND)
  - but this doesn't cause any further deletion
  - See (Round 2011), though—there's more it
- Tohono O'odham
  - variety of O'odham, Uto-Aztecan language from Arizona and Sonora with about 9,600 speakers
  - Language attrition contributed to by English-language boarding school



*Juan Dolores, linguist*



*Ofelia Zepeda, linguist, poet*



- Data here from Fitzgerald 2002:

<i>imperfective</i>	<i>perfective</i>	
míd	mé:	'running'
ǰún	ǰú:	'being a certain time of day or night'
hím	hí:	'walking'
húg	hú:	'eating object'
nóđ	nó:	'bending object'
ǰáǰ	ǰé:	'waking up'
wúđ	wú:	'tying object with rope'
şí:sp	şí:s	'pinning'
híkčk	híkč	'cutting'
bídşp	bídş	'painting object'
híhim	híhi	'walking (pl)'
híhink	híhin	'barking (pl)'
ǰíŋok	ǰíŋo	'speaking (pl)'

- Let's compare basic SPE and OT analyses.

/ híkčk /					
<i>a</i> híkčk					
☞ <i>b</i> híkč					
<i>c</i> hík					
<i>d</i> hí					

- Wolf 2011 discusses a similar example from Chemehuevi (also Uto-Aztecan) and cites (p. 106) several more apparently self-counterfeeding truncation cases: Catalan, Hidatsa, Karok, Latvian, Lithuanian, Odawa, Ponapean, Woleaian.

### 9. 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? Unlike with regular counterfeeding and counterbleeding, it's not as simple as choosing two different order for rules. What additional flexibility could we give the rule theory to allow all four types of self-interaction?

### 10. 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.

- ☞ Let's see which of today's cases this gets right

### 11. If extra time: directionality in Tianjin tone sandhi

A northern variety of Chinese. (Milliken et al. 1997, Chen 2000; see also Kuang 2008)

<i>the tones</i>	tone A	21 or 11	L	[descriptions disagree]
	tone B	45 or 55	H	
	tone C	13, 213, or 24	LH	
	tone D	53	HL	

#### *basic rules*

AA → CA	bing <sup>L</sup>	gao <sup>L</sup>	→	bing <sup>LH</sup>	gao <sup>L</sup>	‘ice cream’
CC → BC	shui <sup>LH</sup>	guo <sup>LH</sup>	→	shui <sup>H</sup>	guo <sup>LH</sup>	‘fruit’
DD → AD	si <sup>HL</sup>	lu <sup>HL</sup>	→	si <sup>L</sup>	lu <sup>HL</sup>	‘bus route #4’
DA → BA	da <sup>HL</sup>	jie <sup>L</sup>	→	da <sup>H</sup>	jie <sup>L</sup>	‘street’

Why *these* rules? Who knows! Tone sandhi tends to be pretty arbitrary synchronically. See Mortensen 2006 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<sup>HL</sup> liao<sup>HL</sup>] bu<sup>HL</sup>] → AAD (L.L.HL) ‘plastic cloth’ (how to prevent \*CAD?)  
 [shang<sup>HL</sup> [yi<sup>HL</sup> yuan<sup>HL</sup>]] → DAD (HL.L.HL) ‘House of Lords’ (\*BAD?)

/AAA/: [[ Xi<sup>L</sup> guan<sup>L</sup> ] Jie<sup>L</sup>] → ACA (L.LH.L) ‘Xiguan Street’, not \*CCA or \*BCA  
 [ kai<sup>L</sup> [fei<sup>L</sup>ji<sup>L</sup>]] → ACA (L.LH.L) ‘fly an airplane’

/DDA/: [[si<sup>HL</sup>ji<sup>HL</sup>] qing<sup>L</sup>] → ABA (L.H.L) ‘evergreen’  
 [zuo<sup>HL</sup> [dian<sup>HL</sup> che<sup>L</sup>]] → ABA (L.H.L), not \*DBA ‘take a tram’

and for the rest, schematically....

/CCC/	→	BBC (LH.LH.LH → H.H.LH)
/CAA/	→	BCA (LH.L.L → H.LH.L)
/ADD/	→	CAD (L.HL.HL → LH.L.HL)
/DAA/	→	DCA (HL.L.L → HL.LH.L)

We’ll leave some of this as a paradox—there’s an extensive literature you can check out, though.

**Next time:** Application issues with optional processes.

**To do:**

- Pohnpeian assignment due Friday night
- K&K and Piggott reading annotations due Monday night

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