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

0. Before we start

- Mid-course anagrams: how many can your team get in 10 minutes?
    - That's how many candies your team will win

(There's an educational purpose here: see how many concepts from the course so far you can remember)

crackly brutes	
lemur chase	
cider nixing sorter	
accept diver quayside	
stew tug	
fret uremia tax	
annex connives potions	
ceding fourteen	
contend beguiler	
a crumbed pill option	
spicy acorn	
thermocurrent importunes acts	
ginger grit	
big clonk	
rot incants	
ensures splitter	
hypomotility rate	
decant aid	
rantings trick	
a brunching domino	
denser mask	
unfit flashes	
crepe condoners	

Overview: How to deal with multiple application sites?

1. Another game, this one about today's topic

- phonology-app-4.vercel.app/
- I'll demo *very* briefly and incompletely, then you try it on your device for 5 minutes
- Make a list of all the issues that arise

2. Multiple application

- What to do with a form that, for some rule A → B / X__Y or constraint *XAY, contains multiple instances of *XAY*
  - either because *XAY* straightforwardly occurs twice in the form...
    - C → Ø / 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 upcoming readings from Kenstowicz & Kisseberth 1979 and Piggott 1980.

3. 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:

X	*his/her/its X*	
ɾákt	ɾəkt-él	'sickness'
sɛ́səb	səsəb-él	'fire'
bótk	bətk-él	'operation'
ɾíŋəl	ɾəŋəl-él	'pain'

$$\begin{bmatrix} \text{V} \\ \text{–long} \\ \text{–stress} \end{bmatrix} \rightarrow \text{ə}$$

? How should your rules apply to an underlying representation like /ðilobaʔ+ɛli/ 'his injury', after stress applies to produce ðilobaʔɛ́li?
(real outcome is [ðələbəʔél]: there is also a rule deleting final Vs)

ðilobaʔɛ́li

⁇ 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+ɛli/					
a ðilobaʔɛ́l					
☞ *b* ðələbəʔɛ́l					
c ðəlobəʔɛ́l					
d ðələbaʔɛ́l					
e ðiləbəʔɛ́l					
f ðəlobaʔɛ́l					
g ðiləbaʔɛ́l					
h ðilobəʔɛ́l					

4. 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 residential 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[1]

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

[1] dpi.wi.gov/news/dpi-connected/ojibwe-language-immersion-school-ways commons.wikimedia.org/wiki/File:Anishinaabewaki.jpg , commons.wikimedia.org/wiki/File:Ojibwe-Syllabics-Centennial-park.JPG

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

- $\left\{\begin{matrix}o\rightarrow w\\ i\rightarrow \text{"y"}\end{matrix}\right\}$ / __ V : what will happen to?

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

eninioak

/eninioak/					
a eninioak					
☞ *b* eniniwak					
c eninjoak					
d eninjwak					

5. Klamath (self-bleeding)

- Plateau Penutian language
- Was spoken in southern Oregon/northern California
- Not currently spoken in daily life
  - 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[2]

Natalie Ball, artist[3]

[2] klamathtribes.org/news/the-klamath-tribes-culture-camp-2016-is-in-full-swing-this-week/

[3] www.heraldandnews.com/news/local_news/existence-as-resistance/article_40d89b35-5a5c-5623-9e1b-7e2ab02ef88a.html

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

glottalized stops: p̰ t̰ č̰ k̰ q̰
glottalized sonorants: m̰ n̰ y̰ w̰ l̰
regular sonorants: m n w y l ("y" here = IPA [j])
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

q̰→q / __n̰	nčo**q̰**-a	'is deaf'	nčo**q**-n̰apg-a	'is almost deaf'
p̰→p / __t̰	**p̰**et̰-a	'a hole enlarges'	p̰e-**p**t̰-a	'dist. holes tear out'
t̰→t / __k̰	m-p̰e**t̰**-a	'enlarges hole'	m-p̰e**t**-k̰y-o:l-a	'chips open a hole'
q̰→q / __č̰	**q̰**oč̰-a	'bends'	q̰o-**q**č̰-a	'dist. bend'
p̰→p / __W	nt̰o**p̰**-a	'rots, spoils'	nt̰o**p**-Wi:y-a	'almost rotted'
p̰↛p / __y			nt̰o**p̰**-ye:g-a	'starts to spoil'
t̰↛t / __w			wLe**t̰**-wal	'lies spread eagled on top of'
	cf.		wLe**t**-pga	'is lying flat on back'
n̰→n / __k̰	**n̰**o-k̰a	'little head'	n̰o-**n**-k̰a	'dist. little heads'
w̰→w / __č̰	**w̰**ič̰-a	'is breathless'	wi-**w**č̰-a	'dist. are breathless'
y̰→y / __ɢ[4]	ʔ-iw**y̰**aq	'put in pl. obj.'	ʔi-ʔo:**y**ɢa	'dist. put pl. obj. into'
l̰→l / __l	k-bo**l̰**-a	'hits in stomach'	w-bo**l**-lɢ-a	'falls on stomach'
w̰→w / __l	ga**w̰**al	'finds'	ga**w**l-i:ya	'finds for someone'

- Semi-formally, suppose we can collapse these two rules into a single rule schema:

glottalized<stop> → deglottalized / __ C<-other-than-{m,n,w,y,l>

(I'll leave it as an exercise to see if you can turn this into real features)

⁇ How do we expect the schema to apply to these sequences: q̰l̰q, p̰l̰q?

[4] Kisseberth has *g* with a dot below, but dot won't show under the *g* in my font.

Here are the data:	/q̊l̊aq/:	nčo**q-l̊aq**-Wi:y-a	‘ears are stopped up’
		nčo**q̊-lG**-a	‘ears are almost stopped up’
		hos-ta**q-l̊aq**	‘make him stop!’
		hos-ta**q̊-lG**-a	‘makes someone stop an action’
		to**q̊-lG**-a	‘stops an action’
	/p̊l̊aq/:	sno-nta**p-l̊aq**-s	‘rotted wokas[5]’
		sno-nta**p̊-lG**-a	‘causes to rot down’

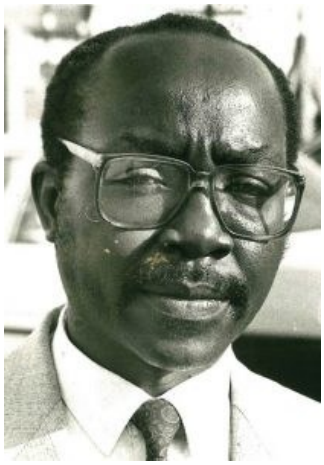
? How about an OT analysis? Can we easily rule out *q̊l̊q → qlq?

/… q̊l̊aq …/					
a … q̊l̊q …					
☞ *b* … q̊l̊q …					
c … q̊lq …					
d … qlq …					

6. Southern Gikuyu (self-counterbleeding)

- Gikuyu, aka Kikuyu, is a Niger-Congo language of Kenya
- About 6.5 million speakers

Kipsang Rotich, voice actor—voiced Star Wars character Nien Nunb, in Kalenjin and Kikuyu[6]



Wahome Mutahi, humorist wrote in English and Kikuyu

Ngũgĩ wa Thiong'o author of most-translated story from Africa[7]

[5] an aquatic plant gathered for food

[6] star-wars-canon.fandom.com/wiki/Kipsang_Rotich

[7] read it here: jaladaafrica.org/2016/03/22/jalada-translation-issue-01-ngugi-wa-thiongo/

Datum from Johnson 1970, originally from Bennett 1967

k → ɣ / __V_0[voiceless stop]

- The language name is pronounced [ɣēkōjó]. Speculate on why it gets spelled as both Kikuyu and Gikuyu

- What should happen to /ne**k**a**k**aakeroma/ ‘he will bite him’ in SPE? OT?

/ne**k**a**k**aakeroma/					
a ne**k**a**k**aakeroma					
b ne**k**a**ɣ**aakeroma					
c ne**ɣ**a**k**aakeroma					

Here’s the datum: [ne**ɣ**a**ɣ**aakeroma] (*[ne**k**a**ɣ**aakeroma]) [Is it reduplicated, though??]

7. Tshiluba (self-feeding)

- Also known as Lua-Kasai
- Niger-Congo language of D.R. of Congo
- 6.3 million speakers

Dikembe Mutombo, retired NBA player
Double-majored in linguistics and diplomacy at Georgetown

Tshala Muana, musician
Songs mostly in Tshiluba

Data from Johnson 1970

l → n / [+nasal] V_0 __

u-kwač-i**l**e	‘he took’	u-d^{y}im-i**n**e	‘he cultivated
ku-kwač-i**l**-a	‘to take (ben.)’	ku-d^{y}im-i**n**-a	‘to cultivate (ben.)’
u-kwač-i**d**^{y}-i**l**e	‘he took (ben.)’	u-d^{y}im-i**n**^{y}-i**n**e	‘he cultivated (ben.)’
(l→d^{y}/__i)			

? In an OT analysis, can we easily rule out *u-d^{y}im-i**n**^{y}-i**l**e? *u-d^{y}im-i**l**^{y}-i**l**e?

/ u-d^{y}im-il-ile /					
a …m… l^{y}…l…					
b …m…n^{y}…l…					
c …m…n^{y}…n…					

8. Self-counterfeeding?

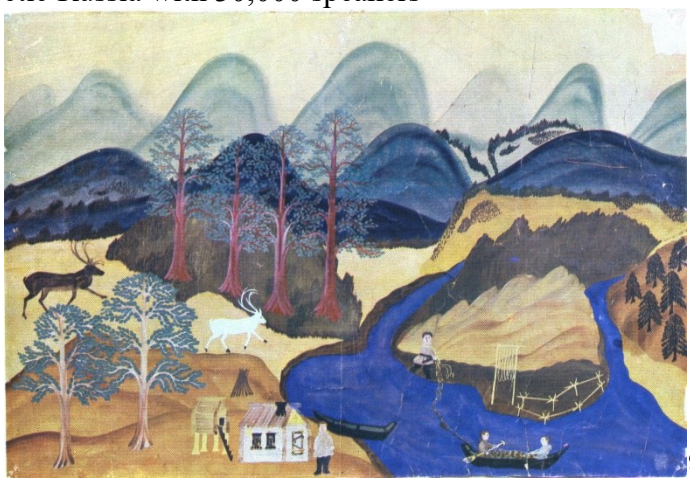
- Howard 1972 presents some possible cases but reanalyzes them.
  - That is, Howard presents new analyses that don't involve actual self-counterfeeding
- Kaplan 2008, reanalyzes many purported cases of self-counterfeeding.
  - Likewise, Kaplan argues that they aren't really self-feeding

Kavitskaya & Staroverov 2010 present a case from **Tundra Nenets**

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

 [8]

Anastasia Lapsui, filmmaker

 [9]

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

/xʌrʌ/	→ xʌr	'knife-*nom.sg.abs.*'	
/xʌrʌ-rʌ/	→ xʌ.rʌ-r	'knife-*2sg.poss*'	I assume [rr] is a bad coda.
/xʌrʌ-ta/	→ xʌr.-da	'knife-*3sg.poss*'	
/xarʌtʌ/	→ xa.rʌd	'house-*nom.sg.abs.*'	[see below]
/xarʌtʌ-rʌ/	→ xar.dʌ-r	'house-*2sg.poss*'	
/xarʌtʌ-ta/	→ xar.dʌ.-da	'house-*3sg.poss*'	

/nultʌnʌ-sʲʌ/ → nul**t.**nʌ-sʲ 'house-*3sg.poss*'

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

/xarʌtʌ-ta/ → xar.dʌ.-da ; xar.d**ʌ**.-da ↛ xard.da (though *rdd* is apparently legal)

[8] commons.wikimedia.org/wiki/File:Anastasia_Lapsui.jpg

[9] commons.wikimedia.org/wiki/File:PankovFishermen.jpg

- Can we capture this with rules? OT?

- Consider /xarʌtʌ/ → xa.rʌd, *xard. Can our SPE analysis capture this? It's not just plain self-counterfeeding.

/ xarʌtʌ /					
a xarʌdʌ					
b xarʌd					
c xardʌ					
d xard					

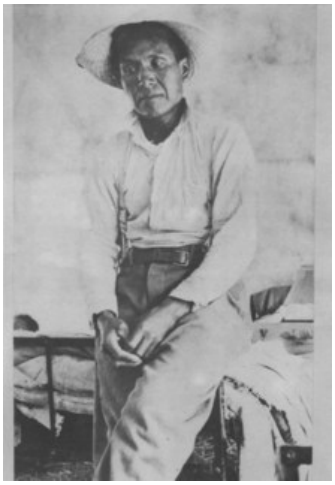
- K&S make the generalization that two /ʌ/s never delete in a row. Does that help?

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

9. 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

- Another case from **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

 [10]

Ofelia Zepeda, linguist, poet

  - Data here from Fitzgerald 2002:

imperfective	*perfective*	
mɨɖ	mɨ́:	'running'
ǰúɲ	ǰú:	'being a certain time of day or night'
hím	hí:	'walking'
húg	hú:	'eating object'
nóɗ	nó:	'bending object'
ɲɨ́ɲ	ɲɨ́:	'waking up'
wúɖ	wú:	'tying object with rope'
ʂí:sp	ʂí:s	'pinning'
híkčk	híkč	'cutting'
bídʂp	bídʂ	'painting object'
híhim	híhi	'walking (pl)'
híhink	híhin	'barking (pl)'
ɲíŋok	ɲíŋo	'speaking (pl)'

[10] www.americanindianmagazine.org/story/ofelia-zepeda-langage-praying

❓ Let's compare basic SPE and OT analyses.

/ híkčk /					
a híkčk					
☞ *b* híkč					
c hík					
d 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**.

10. 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 orders for rules. What additional flexibility could we give the rule theory to allow all four types of self-interaction? Discuss ideas.

11. Possible solution: directional application

- Left-to-right: Scan the string for the leftmost eligible segment and apply the rule to it. Then scan the <u>resulting</u> 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

12. If extra time (hah!): directionality in Tianjin tone sandhi

- A variety of Mandarin Chinese
- Spoken in the city of Tianjin
- Not far from Beijing, but very different from Beijing variety

 [11]

Tianjin Binhai Library

Data from Milliken et al. 1997, Chen 2000; see also Kuang 2008

the tones	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^{L} gao^{L}	→ bing^{LH} gao^{L}	‘ice cream’
CC → BC	shui^{LH} guo^{LH}	→ shui^{H} guo^{LH}	‘fruit’
DD → AD	si^{HL} lu^{HL}	→ si^{L} lu^{HL}	‘bus route #4’
DA → BA	da^{HL} jie^{L}	→ da^{H} jie^{L}	‘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/?

[11] time.com/collection/worlds-greatest-places-2018/5366685/tianjin-binhai-library-china/

For /DDD/ it depends on the syntactic structure (say Milliken et al.; Chen says always BAD):
[[su^{HL} liao^{HL}] bu^{HL}] → AAD (L.L.HL) 'plastic cloth' (how to prevent *CAD?)
[shang^{HL} [yi^{HL} yuan^{HL}]] → DAD (HL.L.HL) 'House of Lords' (*BAD?)

/AAA/: [[Xi^{L} guan^{L}] Jie^{L}] → ACA (L.LH.L) 'Xiguan Street', not *CCA or *BCA
[kai^{L} [fei^{L}ji^{L}]] → ACA (L.LH.L) 'fly an airplane'

/DDA/: [[si^{HL}ji^{HL}] qing^{L}] → ABA (L.H.L) 'evergreen'
[zuo^{HL} [dian^{HL} che^{L}]] → 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.

Wrap-up: Brainwriting. Write down for me something you found surprising, worrying, or satisfying about today's material. (Make sure you say which!) Pass card and add to the card you get (can't be the same thing you wrote before). Repeat till 11:45. 5 min for discussion.

Next time: Application issues with *optional* processes—the plot thickens.

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