

Classes 3 & 4: Issues in process application: multiple targets, directionality, iterativity, multi-site variation

To do

- HW #1, Variation in French, due Fri., Jan. 20
- Sanders study questions due Tues., Jan. 24
- Look at the term paper instructions and start to think about a topic.

Overview: Multiple application

The basic problem to be dealt with this week is what to do with a form that, for some rule $A \rightarrow B / X_Y$, contains multiple instances of XAY , either because XAY straightforwardly occurs twice in the form, or because there are multiple ways of interpreting XAY (in a rule schema). And, what if the output of the rule create or destroys instances of XAY ?

There's a whole can of worms here that's only barely been re-opened in the OT era.

Great sources for term-paper topics, which I also relied on to get many of this handout's examples: Howard 1972, Johnson 1970, and Anderson 1974 (which you read a chapter from). I'd stay away from the stress cases, though, since their rule-application issues tend to go away under metrical stress theory.

1. 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 vowel reduction (You remember Palauan from last quarter: Austronesian language from Palau (Micronesia) with about 25,000 speakers. Data from Josephs 1990.)

<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 would your rules apply to an underlying representation like /ðiloba? + eli/ 'his injury'? (real outcome is [ðələbə?él])
- Let's sketch an OT analysis—any problems?

2. Klamath (self-bleeding)

(Penutian language of Oregon, very endangered. Data and description taken from Kisseberth 1972; originally from Barker 1963, which I didn't have a chance to consult)

glottalized stops: $\overset{\text{̣}}{p}$ $\overset{\text{̣}}{t}$ $\overset{\text{̣}}{c}$ $\overset{\text{̣}}{k}$ $\overset{\text{̣}}{q}$
 glottalized sonorants: $\overset{\text{̣}}{m}$ $\overset{\text{̣}}{n}$ $\overset{\text{̣}}{y}$ $\overset{\text{̣}}{w}$ $\overset{\text{̣}}{l}$
 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

$\overset{\text{̣}}{q} \rightarrow q$ / $_ \overset{\text{̣}}{n}$	$n\check{c}o\overset{\text{̣}}{q}$ -a	'is deaf'	$n\check{c}oq$ - $\overset{\text{̣}}{n}$ apg-a	'is almost deaf'
$\overset{\text{̣}}{p} \rightarrow p$ / $_ \overset{\text{̣}}{t}$	$\overset{\text{̣}}{p}e\overset{\text{̣}}{t}$ -a	'a hole enlarges'	$\overset{\text{̣}}{p}e$ - $\overset{\text{̣}}{p}t$ -a	'dist. holes tear out'
$\overset{\text{̣}}{t} \rightarrow t$ / $_ \overset{\text{̣}}{k}$	m - $\overset{\text{̣}}{p}e\overset{\text{̣}}{t}$ -a	'enlarges hole'	m - $\overset{\text{̣}}{p}e\overset{\text{̣}}{t}$ - $\overset{\text{̣}}{k}y$ -o:l-a	'chips open a hole'
$\overset{\text{̣}}{q} \rightarrow q$ / $_ \overset{\text{̣}}{c}$	$\overset{\text{̣}}{q}o\check{c}$ -a	'bends'	$\overset{\text{̣}}{q}o$ - $\overset{\text{̣}}{q}\check{c}$ -a	'dist. bend'
$\overset{\text{̣}}{p} \rightarrow p$ / $_ \overset{\text{̣}}{W}$	$n\overset{\text{̣}}{t}o\overset{\text{̣}}{p}$ -a	'rots, spoils'	$n\overset{\text{̣}}{t}o\overset{\text{̣}}{p}$ - $\overset{\text{̣}}{W}i$:y-a	'almost rotted'
$\overset{\text{̣}}{p} \rightarrow p$ / $_ \overset{\text{̣}}{y}$			$n\overset{\text{̣}}{t}o\overset{\text{̣}}{p}$ - $\overset{\text{̣}}{y}e$:g-a	'starts to spoil'
$\overset{\text{̣}}{t} \rightarrow t$ / $_ \overset{\text{̣}}{w}$			$w\overset{\text{̣}}{L}e\overset{\text{̣}}{t}$ -wal	'lies spread eagled on top of'
	cf.		$w\overset{\text{̣}}{L}e\overset{\text{̣}}{t}$ -pga	'is lying flat on back'
$\overset{\text{̣}}{n} \rightarrow n$ / $_ \overset{\text{̣}}{k}$	$\overset{\text{̣}}{n}o$ - $\overset{\text{̣}}{k}a$	'little head'	$\overset{\text{̣}}{n}o$ - $\overset{\text{̣}}{n}$ - $\overset{\text{̣}}{k}a$	'dist. little heads'
$\overset{\text{̣}}{w} \rightarrow w$ / $_ \overset{\text{̣}}{c}$	$\overset{\text{̣}}{w}i\check{c}$ -a	'is breathless'	$\overset{\text{̣}}{w}i$ - $\overset{\text{̣}}{w}\check{c}$ -a	'dist. are breathless'
$\overset{\text{̣}}{y} \rightarrow y$ / $_ \overset{\text{̣}}{G}^1$	$\overset{\text{̣}}{?}$ - $\overset{\text{̣}}{i}w\overset{\text{̣}}{y}aq$	'put in pl. obj.'	$\overset{\text{̣}}{?}i$ - $\overset{\text{̣}}{?}o$: $\overset{\text{̣}}{y}Ga$	'dist. put pl. obj. into'
$\overset{\text{̣}}{l} \rightarrow l$ / $_ \overset{\text{̣}}{l}$	k - $\overset{\text{̣}}{b}o\overset{\text{̣}}{l}$ -a	'hits in stomach'	w - $\overset{\text{̣}}{b}o\overset{\text{̣}}{l}$ - $\overset{\text{̣}}{l}G$ -a	'falls on stomach'
$\overset{\text{̣}}{w} \rightarrow w$ / $_ \overset{\text{̣}}{l}$	$ga\overset{\text{̣}}{w}al$	'finds'	$ga\overset{\text{̣}}{w}l$ - $\overset{\text{̣}}{i}$:ya	'finds for someone'

- Can we collapse this into a single rule schema?

- How do we expect the schema to apply to these sequences: $\overset{\text{̣}}{q}lq$, $\overset{\text{̣}}{p}lq$?

¹ Kisseberth has g with a dot below, but dot won't show under the g in my font.

Here are the data:	/q̣laq/:	n̄coq- l̄ aq-Wi:y-a	‘ears are stopped up’
		n̄co q̣ - l̄ G-a	‘ears are almost stopped up’
		hos-taq- l̄ aq	‘make him stop!’
		hos-taq- l̄ G-a	‘makes someone stop an action’
		to q̣ - l̄ G-a	‘stops an action’
	/p̣laq/:	sno-ntap- l̄ aq-s	‘rotted woka ² s’
		sno-ntap- p̣ - l̄ G-a	‘causes to rot down’

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

3. Southern Kikuyu (self-counterbleeding)

(Gikuyu/Kikuyu is a Niger-Congo language of Kenya with 7.2 million speakers; datum from Johnson 1970, originally from Bennett 1967, which I also didn’t have a chance to consult)

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

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

Here’s the datum: [neyɔyaakeroma] (*[nekɔyaakeroma]) [Is it reduplicated, though?]

4. Tshiluba (self-feeding)

(Lua-Kasai/Tshiluba is a Niger-Congo language of D.R. of Congo with 6.3 million speakers; original consultant work from Johnson 1970)

$l \rightarrow n / [+nasal] V_0 _$

u-kwač-ile	‘he took’	u-d ^y im-ine	‘he cultivated
ku-kwač-il-a	‘to take (ben.)’	ku-d ^y im-in-a	‘to cultivate (ben.)’
u-kwač-id ^y -ile	‘he took (ben.)’	u-d ^y im-in ^y -ine	‘he cultivated (ben.)’
(l → d ^y / <u>i</u>)			

- In an OT analysis, can we easily rule out *u-d^yim-in^y-ile? *u-d^yim-il^y-ile?

² some kind of aquatic plant gathered for food

5. 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 (Nenets is a Uralic language of Siberia and Arctic Russia with 31,300 speakers):

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

/xʌrʌ/	→ xʌr	‘knife- <i>nom.sg.abs.</i> ’	
/xʌrʌ-rʌ/	→ xʌ.rʌ-r	‘knife- <i>2sg.poss</i> ’	I assume [rr] is a bad coda.
/xʌrʌ-ta/	→ xʌr.-da	‘knife- <i>3sg.poss</i> ’	

/xarʌtʌ/	→ xa.rʌd	‘house- <i>nom.sg.abs.</i> ’	[see below]
/xarʌtʌ-rʌ/	→ xar.dʌ-r	‘house- <i>2sg.poss</i> ’	
/xarʌtʌ-ta/	→ xar.dʌ.-da	‘house- <i>3sg.poss</i> ’	

/nultʌnʌ-sʲʌ/ → nult.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.dʌ.-da ⇏ xard.da (though *rdd* is apparently legal)

- 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.
- 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).]

6. Self-counterfeeding? again: morphological truncation

Most famous case is Lardil (discussed extensively in Prince & Smolensky 2004, based on Hale 1973, but see Round 2011 for a fresh take with new data).

Tohono O'odham (variety of O'odham, Uto-Aztecan language from Arizona and Sonora with about 9,600 speakers; Lewis 2009). Data here are from Fitzgerald 2002:

<i>imperfective</i>	<i>perfective</i>	
míɖ	mí:	'running'
ǰún	ǰú:	'being a certain time of day or night'
hím	hí:	'walking'
húg	hú:	'eating object'
nóɖ	nó:	'bending object'
ɲáɲ	ɲá:	'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)'
ɲíɲok	ɲíɲo	'speaking (pl)'

- Let's compare basic SPE and OT analyses.

7. 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? It's not as simply as choosing two different orders for rules. What additional flexibility could we give the rule theory to allow all four types of self-interaction?
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Now some directionality issues...

8. Tricky case from Latvian; from SPE, pp. 365-366,³ which uses different features

glide formation: $\begin{bmatrix} -\text{cons} \\ +\text{high} \end{bmatrix} \rightarrow [-\text{syll}] / ___ [+ \text{syll}]$

truncation: $V \rightarrow \emptyset / ___ \#$

- First, remember the special convention about the + boundary: / $___ Y$ is really / $___ (+)Y$. That means that every rule is really a schema (can you see how?)!

³ Originally from Halle & Zeps 1966. But see Christina Skelton's 200A paper from 2009: the data are uncertain and the underlying forms are open to question.

- Apply the rules to these cases and discuss:

/#iāi+a#/	‘rides’
/#kuru+iai#/	‘basket (gen. sg.)’
/#aui+a#/	‘puts on (footgear)’

- Here are the actual outcomes, apparently: [jaj], [kurwja], [auj]. Are these problematic for any of the rule approaches we’ve seen?
- How about an OT analysis? What problems do we run in to?

9. 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.

- Does one of these work for Latvian?

10. Tianjin tone sandhi

A northern dialect of Mandarin. (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 ^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/?

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’

[ran out of time to type full data]

/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 google, though.

Now some optionality issues when there are multiple targets...

Cases taken from Kaplan 2011, Riggle & Wilson 2005, Vaux 2008—good sources for term-paper topics!! See those papers for various approaches to multi-site optionality.

11. Warao: global optionality

Language isolate of Venezuela, Guyana, and Suriname; 28,100 speakers. From Osborn 1966.

Little raw data, but Osborn is very definite about the generalization:

“/p/ has allophones [p b]. The voiced allophone [b] is heard more frequently than the voiceless [p] in most words. In every word, except for a few words noted below, alternation between [b] and [p] is presumably possible, since many alternations of this order have been heard. Thus in /paro+parera/ *weak*, both the initial and medial phoneme /p/ is heard as [b] generally, and as [p] infrequently. In words like the one cited, with two or more occurrences of /p/, the allophones are consistently [b] or [p] for each utterance of the word. If the first occurrence of /p/ in the word is [b], the following occurrence(s) will be [b]. If the first occurrence is [p], the following occurrence(s) will be [p]. The following are examples of words with two occurrences of /p/: poto+poto *soft*, apaupute *he will put them*, kapa+kapa *kind of banana*.” (p. 109)

I.e., [paro-parera] ~ [baro-barera], but not *[paro-barera] or *[baro-parera].

Also, for a non-reduplicative case, [hapisapa] ~ [habisaba] ‘other side’

- Does this work in the theories of variation in OT that we've been using? How would it work in SPE+variation?

As discussed by Riggle & Wilson, Kaplan, it would be nice to have more than two non-reduplicated words, or another language where this happens!

12. Local optionality—also hard to find good cases (besides French; see below)

Vaux says that he can produce, for English *marketability*:

[mɑ:kət^həbɪlət^hi] ~ [mɑ:kərəbɪləri] ~ [mɑ:kət^həbɪləri] ~ [mɑ:kərəbɪlət^hi]

- Can any of our ideas for SPE+variation get this? OT+variation ideas?

13. Vata: iterative optionality

Ethnologue classifies as dialect of Lakota Dida, a Niger-Congo language of Côte d'Ivoire with 98,8000 speakers. Data taken from Kaplan 2009; originally from Kaye 1982, which I didn't consult.

[+ATR]: [i,u,e,o,ʌ] [-ATR]: [ɪ, ɔ, ε, ɔ, a]

[+ATR] optionally to the final syllable of a preceding word:

/ò nɪ sáká pɪ/ → ò nɪ sáká pɪ̃ ~ ò nɪ sáká pɪ̃ 'he didn't cook rice'

If all the words are monosyllabic...

/ò ká zā pɪ/ → ò ká zā pɪ̃ ~ ò ká zā pɪ̃ ~ ò ká zā pɪ̃ ~ ò ká zā pɪ̃ 'he will cook food'

- Can we get this one?

14. Hypercorrection in Dominican Spanish: unique-target optionality

(Vaux calls this "Basic Optionality")

Dialect of the Indo-European language from Spain with 328 million speakers worldwide. Data from Bradley 2006. See there for original data sources, esp. Núñez-Cedeño 1994, which I didn't get a chance to consult. If you fancy this as a term-paper topic, check out Bullock & Toribio 2010.

/s/ typically deletes in a syllable coda:

<i>Dominican Spanish</i>	<i>Conservative Spanish</i>	
se.co	se.co	'dry'
ca.so	ca.so	'case'
e.tú.pi.do	es.tú.pi.do	'stupid'
do	dos	'two' (p. 3)

Hypercorrection can insert a coda /s/ (in the "hablar fisno" speech style):⁴

<i>Dominican fisno</i>	<i>Conservative</i>	
e.tús.pi.do	es.tú.pi.do	'stupid'
de.des	des.de	'since'
in.vis.tado	in.vi.ta.do	'guest'
co.mos	co.mo	'like' (p. 4)

And there can be variation:

<i>Dominican fisno</i>	<i>Conservative</i>	
as.bo.ga.do ~ a.bos.ga.do ~ a.bo.gasdo ~ a.bo.ga.dos	a.bo.ga.do	'lawyer' (p. 4)

But, apparently there can only be one inserted s:⁵ *as.bo.ga.dos, etc.

- Any ideas, for each theory?

⁴ though not before an otherwise intervocalic tap or trill, which would be phonotactically illegal

⁵ See p. 24 for discussion of an apparent counterexample given by Harris.

15. Optionality and self-bleeding: French schwa-deletion

Indo-European language from France and surroundings with 67.8 million speakers worldwide.

There's a big literature on this; Dell 1970 is a good place to start.

/ə/ optionally deletes, except when it would create a bad consonant cluster.

/suvəniR/	→	[suvəniR] ~ [suvniR]	'to remember'
/pasəRə/	→	[pasəRə] ~ [pasRə]	'will pass'
/parvəniR/	→	[parvəniR] *[parvniR]	'to reach' ([RV] bad coda, [vɛ] bad onset)
/sufləRə/	→	[sufləRə] *[sufləR]	'will blow' ([VflRV] unsyllabifiable)
/ãri dəvə partir/	→	[ãri dəvə partir] ~ [ãri dve partir]	'Henri had to go'
/ʒak dəvə partir/	→	[ʒak dəvə partir] *[ʒak dve partir]	'Jacques had to go' ([kdv])

- What does basic SPE predict for this form (pretend the rule is obligatory): /ty dəvəne/ 'you were becoming'
- Actual result is (supposedly) [ty dəvəne] ~ [ty dvəne]⁶ ~ [ty dəvne], but *[ty dvne]—discuss.

16. Anderson 1974's solution

- Find all segments eligible for the rule and circle them.
- For each circled segment, underline the smallest environment that lets the segment meet the rule's structural description.
- If the rule is optional, you may uncircle some of the eligible segments and de-underline their environments.
- If any circled segment is contained in some other circled segment's underlined environment, uncircle (and de-underline the environments of) as few segments as possible to get rid of these overlaps.
- Now apply the rule simultaneously to the remaining circled segments.

(Of course, circling and underlining themselves have no theoretical status—this is just a convenient way to say “identify targets and environments”)

- What does Anderson's proposal predict for French /ty vudre kə sə kə lə bədo/ ⁷ 'you would like that what the beadle...'?
 - Does Anderson's proposal help with Klamath? Kikuyu? Latvian? Tianjin?

⁶ Some speakers have said they don't like this one...

⁷ I got this from an online appendix to David Odden's *Introducing Phonology* (2005: Cambridge UP): www.ling.ohio-state.edu/~odden/IntroducingPhonology/Theory%20Discussion.html

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