Classes 11 & 12: Process interaction

To do
- Woleaian assignment is due Friday
- Project: turn in primary-vs-secondary-source report, or just a progress report, Thursday.
- Next week's reading: Hayes 1995 study questions due next Tuesday

Overview
Last week we saw how a process can interact with itself. In what ways can processes interact with each other? Which types of interaction are easy to capture in each theory?

0. First, we review Harmonic Serialism

Typology of OT-related theories—note distinction between small-h, -s and capital-H, S:

		strict domination	constraint weighting	
			winner has best weighted sum of violations	probability proportional to exponentiated weighted sum
parallel evaluation		**classical OT**	**Harmonic Grammar**	**MaxEnt**
harmonic serialism (mentioned as possibility in Prince & Smolensky 2004)	one iteration at a time	**Harmonic Serialism** (McCarthy 2006; McCarthy 2008)	HS + HG (Pater 2011)	*logically possible*
	a candidate is a derivation	**candidate chains** (OT-CC) (McCarthy 2007a)	*logically possible*	*logically possible*

Difference #1

Classic OT Gen(/input/) = {all results of applying all rules to input, in any order, repetition OK}
Gen(/ab/) = {ab, b, a, tab, abi, tabi, tabii, tabiii, Ø, ba, qo, ...} (infinite set)

Harmonic Ser. Gen(/input/) = {all results of applying just one minimal change to input}
Gen(/ab/) = {ab, b, a, tab, abi, eb, ɑb, ãb, ap, am, ... } (finite set)

One way to define **minimal**: A change is minimal iff it incurs just one faithfulness violation (so, constraint inventory matters).

Difference #2
In Harmonic Serialism, keep applying grammar to its own output until the result stops changing.

Dakota from Elfner (to appear)—orig. Shaw 1985 (Siouan lang., U.S. & Canada, 15,400 speakers)

I simplified some constraints—see Elfner for real story.

1. Start with underlying form:

/čap/	WordMust HaveStress	NoCoda	Don'tAdd Stress	FeetAre Iambic	Dep-V	Don'tDelete Stress	Max-V
a čap	*!	*					
☞ *b* (čáp)		*	*				
c ča.pa	*!				*		

2. Feed output (čáp) into grammar :

(čáp)	WordMust HaveStress	NoCoda	Don'tAdd Stress	FeetAre Iambic	Dep-V	Don'tDelete Stress	Max-V
d čap	*!	*				*	
e (čáp)		*!					
☞ *f* (čá.pa)				*	*		

3. Feed output (čá.pa) into grammar:

(čá.pa)	WordMust HaveStress	NoCoda	Don'tAdd Stress	FeetAre Iambic	Dep-V	Don'tDelete Stress	Max-V
g ča.pa	*!					*	
☞ *h* (čá.pa)				*			
i (čá)(pá)			*!				
j (čáp)		*!					*

4. Input=output, so stop iterating.

- What does this grammar predict for input like /cite/[1]

- Why can't we get *(ča.pá) in Harmonic Serialism?

- What happens if we switch the ranking of WordMustHaveStress and NoCoda?

⇨ One advantage of Harmonic Serialism is it can sometimes get either bleeding or counterbleeding, depending on ranking (Elfner to appear).

[1] hypothetical—real examples have clusters that muddy the issue

1. The classic interaction typology, for reference

interaction	*definition*	*schematic derivation*	*result*
R1 feeds R2	R1 creates environment for R2 to apply to	/bind/ d → Ø / __# bin n → Ø / __# bi [bi]	transparent: • no [d#] on the surface • no [n#] on the surface
R1 counterfeeds R2	R1 applies too late to create environment for R2	/bind/ n → Ø / __# -- d → Ø / __# bin [bin]	opacity—*underapplication*: • [n#] on surface, despite rule targeting *n#*
R1 bleeds R2	R1 destroys environment for R2 to apply to	/bind/ d → Ø / __# bin Ø → i/ C__C# -- [bin]	transparent: • no [d#] on the surface • no [i] inserted, because no surrounding *C__C#*
R1 counterbleeds R2	R1 applies too late to destroy environment for R2	/bind/ Ø → i/ C__C# binid d → Ø / __# bini [bini]	opacity—*overapplication*: • [i] inserted, despite lack of surrounding *C__C#*

- A rule *underapplies* if there are surface instances of its structural description.
- A rule *overapplies* if there are instances in which it has applied, although the non-affected part of the structural description (the environment) is no longer present.

(The terms *underapplication* and *overapplication* come from Wilbur's (1973) discussion of reduplication. McCarthy 1999 adapts them for discussing opacity.)

2. Baković 2007, Baković 2011: dissociating opacity-vs-transparency from interaction type

Baković shows that the typology is **not**...

	transparency	underapplication opacity	overapplication opacity
feeding	✓		
bleeding	✓		
counter-feeding		✓	
counter-bleeding			✓

...but rather (at least)...

	transparency	underapplication opacity	overapplication opacity
feeding	✓	✓	✓
bleeding	✓		
counter-feeding	✓	✓	
counter-bleeding	✓		✓
other	✓	✓	

...so process-interaction types actually don't account for opacity vs. transparency.

Let's go through Baković's typology:

3. Counterfeeding-on-environment[2] → underapplication

Bedouin Arabic

UR	badw		
a → i / __ σ	*n/a*	= ℙ	
G → V/ C __ #	badu	= ℚ	
SR	badu	'Bedouin'	(Baković 2007, p. 222; from McCarthy 1999)

- What would be the transparent outcome?

4. Counterfeeding-on-focus → underapplication

Bedouin Arabic again

UR	katab		
i → ∅ / __ σ	*n/a*	= ℙ	
a → i / __ σ	kitab	= ℚ	
SR	kitab	'he wrote'	(Baković 2007, p. 222; from McCarthy 1999)

- What would be the transparent outcome?
- Both of these counterfeedings are hard for OT (why?). But counterfeeding-on-focus is fairly salvageable. Let's discuss some options...

5. "Surface-true counterfeeding" → transparency!

Educated Singapore English: Baković 2011 p. 16; from Mohanan 1992, Anttila et al. 2008

Epenthesis: /reɪz/ → [reɪz + əz] (and, I infer, /reɪs/ → [reɪs + əz])

Deletion: /test/ → [tes] cf. /tɛst+ɪŋ/ → [tɛst+ɪŋ]

no data, but Degemination "deletes one of two tautosyllabic near-identical consonants" (p. 16)
/lɪst+z/ → [lɪs]

- In an SPE analysis, what rule order do we need to get [lɪs]? Why does B. call this result "transparent"?
- OT analysis?

[2] Term from McCarthy 1999.

6. Underapplication without counterfeeding (Baković to appear p. 8ff.)

"Disjunctive blocking" (p. 8)

- How would this rule schema apply to these words: V → [+stress] / __ $(C_2V)C_0$ # ?

  /badupil/ /pikomsak/

  Remember how expansion conventions work—abbreviates two rules, disjunctively ordered.

- In what sense does underapplication result?

Nonderived-environment blocking—roughly, when when a rule can't apply if its structural description was already met in the underlying form (before morphology):

e.g. a → i / __ C# /likat/ *fails to apply* /noka/+/l/ → [nokil]

Restriction to certain morphological classes (Estonian final V deletion in nominative singular only)

Optionality (French schwas may or may not delete)

Lexical exceptions (English *obesity* fails to undergo 'trisyllabic shortening')

7. "Fed counterfeeding"[3] on environment→ underapplication

Lardil

		a. /dibirdibi/	b. /yiliyili/	c. /wangalk/
Apocope:	V ⟶ ∅ / σ σ __ #	∅	∅	
Deletion:	[–apical] ⟶ ∅ / __ #	∅		∅
		[dibirdi]	[yiliyil]	[wangal]

Glosses: (9a) 'rock cod', (9b) 'oyster species', (9c) 'boomerang'

(Baković to appear, p. 6; from Hale 1973)

- Why "fed counterfeeding" here?
- Ways to do this in OT?

[3] Baković gets the term from Kavitskaya & Staroverov 2009

8. Fed counterfeeding on focus = "Duke of York" derivations[4]→ underapplication

Nootka

	a. /mu: q /	b. /ħaju+ q i/	c. /ɬa:kʷ+ʃitɬ/
Labialization:			
[+dors] ⟶ [+rnd] / [+rnd] __	q^w	q^w	
Delabialization:			
[+dors] ⟶ [–rnd] / __]$_\sigma$	q		k
	[mu: q]	[ħaju+q^wi]	[ɬa: k +ʃitɬ]

Glosses: (11a) 'throwing off sparks', (11b) 'ten on top', (11c) 'to take pity on'

(Baković to appear, p. 7; from Sapir & Swadesh 1978, McCarthy 1999, 2003, 2007a, 2007b)

- Why "fed counterfeeding"?
- Ways to do this in OT?

9. Counterbleeding → overapplication

Yokuts

UR	ʔili:+l		
[+long] → [–high]	ʔile:l	= ℙ	cf. /ʔili:+hin/ → [ʔile:hin] 'fans'
V → [–long] / __ C#	ʔilel	= ℚ	cf. /pana:+l/ → [panal] 'might arrive'
SR	ʔilel	'might fan'	

(Baković 2007, p. 223; from McCarthy 1999)

- What would be the transparent outcome?
- Any ideas for how to do this in OT?

[4] Term from Pullum 1976

10. Counterbleeding by mutual bleeding → transparent!

Lardil

		a. /papi+ ɯɻ/	b. /tʲæmpæ+ɯɻ/
Epenthesis:	∅ ⟶ w / i __ u	w	
Elision:	V ⟶ ∅ / V __		∅
		[papi+wɯɻ]	[tʲæmpæ+ɻ]

Glosses: (25a) 'father's mother (acc. fut.)', (25b) 'mother's father (acc. fut.)'

(Baković to appear, p. 22; from Hale 1973)

- In what sense is this mutual bleeding?
- OT analysis?

11. "Self-destructive feeding"→ overapplication!

Turkish

UR	bebek+n		
∅ → i / C__C#	bebekin	= ℙ	cf. /ip+n/ → [ipin] 'your rope'
k → ∅ / V__+V	bebein	= ℚ	cf. /bebek+i/ → [bebei] 'baby (ACC)'
SR	bebein	'your baby'	

(Baković 2007, p. 226; from Sprouse 1997)

UR	ajak+sɯ		
[+cont] → ∅/ C__	ajakɯ	= ℙ	cf. /arɯ+sɯ/ → [arɯsɯ] 'his bee'
k → ∅ / V__+V	ajaɯ	= ℚ	cf. /ajak+ɯ/ → [ajaɯ] 'foot (ACC)'
SR	ajaɯ	'his foot'	

(Baković 2007, p. 227; from Kenstowicz & Kisseberth 1979)

- What would be the transparent outcome?
- Any ideas for how to do it in OT?

12. "Non-gratuitous feeding" → overapplication

Classical Arabic

UR	ktub		
∅ → V_i / #__CCV_i	uktub	= ℙ	
∅ → ʔ / #__V	ʔuktub	= ℚ	cf. /al-walad-u/ → [ʔalwaladu]
SR	ʔuktub	'write (MASC SG)!'	'the boy (NOM)'

(Baković 2007, p. 231; from McCarthy 2007b)

- What would be the transparent outcome?
- Ideas for how to do this in OT?

13. "Cross-derivational feeding" → overapplication, in a sense

Lithuanian: Baković 2007, p. 234ff.; see there for references

prefix obstruents assimilate in voicing and palatalization :

at-koːpʲtʲi	'to climb up'	ap-kalʲbʲetʲi	'to slander'
ad-gautʲi	'to get back'	ab-gautʲi	'to deceive'
atʲ-pjʲautʲi	'to cut off'	apʲ-tʲemʲdʲiːtʲi	'to obscure'
adʲ-bʲekʲtʲi	'to run up'	abʲ-gʲiːdʲiːtʲi	'to cure (to some extent)'

(p. 234)

epenthesis between stops of the same place (also palatalization before [i]):

atʲi-taikʲiːtʲi	'to make fit well'	apʲi-putʲi	'to grow rotten'
atʲi-tʲeisʲtʲi	'to adjudicate'	apʲi-pʲiːlʲtʲi	'to spill something on'
atʲi-duotʲi	'to give back'	apʲi-barʲtʲi	'to scold a little bit'
atʲi-dʲetʲi	'to delay'	apʲi-bʲerʲtʲi	'to strew all over'

(234)

- Baković 2005 argues that the right analysis here (and in English epenthesis before /-d/ and /-z/) should capture the idea that epenthesis occurs where a geminate *would have occurred* (because of assimilation).
  - Assimilation would have fed epenthesis (which in Baković's analysis is only triggered between identical segments), but assimilation doesn't end up needing to apply (bleeding).

- He's proposing a typological prediction:
  - assume OCP constraints are strict: they penalize only perfect identity, not near-identity
  - So, there's no reason for epenthesis to break up near-identical clusters...
  - ...unless an independently occurring assimilation process would have made them identical.
- Let's try to reconstruct Baković's OT analysis.

- Any ideas for how to capture Baković's idea in SPE? Are we stuck with an epenthesis rule that recapitulates the assimilation facts?

14. Paper-topics recap

Here's a summary of areas we've seen so far where theories make different predictions:

- (self-)feeding vs. (self-)counterfeeding—but there are many sub-types
- (self-)bleeding vs. (self-)counterbleeding—but there are many sub-types
- iterative vs. non-iterative rule application
- interaction (or not) of multiple rule targets
- directional rule application
- optionality: global vs. local vs. unique-target; iterative vs. all-or-nothing

coming up

- look-ahead: myopic vs. fell-swoop/global-power/peeking derivations (cf. "sour grapes" phenomena)
- conspiracies vs. constraint-specific repairs
- saltation
- exchange rules: e.g., [αvoice] → [–αvoice] / __#
- rule-ordering paradoxes

15. Global power

- Can a rule "see" anything other than its immediate input? (see Lithuanian)
- In SPE, rules aren't supposed to have *global power* (term from Lakoff (1970); cf. Hill 1970 for a proposal that Cupeño has a "peeking rule" that can look ahead in the derivation.
- But global power follows naturally in OT: every candidate is the very end of a derivation. So now we have a type of phenomenon that OT can handle easily but SPE can't. So how robust are the claimed cases?

16. Case of global power in Walker 2010

- Basic metaphony rule again, as seen in many Romance "dialects":

  basic rule: {é,ó} → [+high] / __C_0+C_0[+syll, +high]

- Venetan version (inventory: [i,e,ɛ,a,u,o,ɔ])—more info than we saw last time

*tense Vs rais*e	kals-ét-o	kals-**í**t-i	'sock (m. sg/pl)'
	móv-o	m**ú**v-i	'move (1 sg/2 sg)'
lax or low Vs don't	gát-o	g**á**t-i	'cat (m sg/pl)'
[hi] can spread through unstr. V	órden-o	**ú**rd**i**n-i	'order (1 sg/2 sg)'
... unless that V is /a/	lavór-a-v-a	lav**ó**r-**a**-v-i	'work (1 sg [3sg?] perf/2 sg impf)'
no spreading unless [+hi] will	ángol-o	**á**ng**o**l-i	'angel (m sg/pl)'
get all the way to the stressed V	pɛ́rseg-o	p**ɛ́**rs**e**g-i	'peach (m sg/pl)'

- Spreading shows "look-ahead"—it sees all the way to the end of its iterative application (hypothetical *[**á**ng**u**l-i], *[p**ɛ́**rs**i**g-i], where stressed V is still not high)
  - if the result doesn't solve the fundamental problem of the unraised stressed vowel, then no spreading is done at all (**"sour grapes"**)

- Let's sketch a rule analysis to see why this is problematic.

- Let's develop an OT analysis.

- See (Kaplan 2011) for a seemingly contrasting case of *non*-lookahead or "**myopia**" in Chamorro.

17. Classic look-ahead: (Hill 1970)'s "peeking" rule in Cupeño

Uto-Aztecan language from Southern California with no known speakers today [(Lewis 2009)].

- Read the derivations from left to right:

Figure 1. Application of Rules to Examples (1)–(13) of Section 1.1

	Underlying Forms	A Vowel Deletion	B *-ine, yaxe* Reduction	C *a*-Reduction	D HAB	E ʔ Insertion	Final Form
(1)	cí, HAB	cí, HAB			cí	cíʔ	cíʔ
(2)	hú, HAB	hú, HAB			hú	húʔ	húʔ
(3)	yélice-ine, HAB	yélic-in, HAB	yélic-i, HAB		yélic-i		yélici
(4)	céle-ine, HAB	cél-in, HAB	cél-i, HAB		cél-i		céli
(5)	kʷáwe-yaxe, HAB	kʷáw-yax, HAB	kʷáw-ya, HAB	kʷáw-ye, HAB	kʷáw-ye		kʷáwye
(6)	qáʔaye-yaxe, HAB	qáʔay-yax, HAB	qáʔay-ya, HAB	qáʔay-ye, HAB	qáʔay-ye		qáʔaye
(7)	píneʔwexe, HAB	píneʔwex, HAB			píneʔwex		píneʔwex
(8)	cáṣpele, HAB	cáṣpel, HAB			cáṣpeʔel		cáṣpeʔel
(9)	pácike, HAB	pácik, HAB			páciʔik		páciʔik
(10)	qáwe, HAB	qáw, HAB			qáʔaʔaw		qáʔaʔaw
(11)	cále, HAB	cál, HAB			cáʔaʔal		cáʔaʔal
(12)	tĕwĕ, HAB	téw, HAB*			téʔeʔew		téʔeʔew
(13)	helʸépe, HAB	helʸép, HAB			helʸéʔeʔep		helʸéʔeʔep

(Hill p. 536)

- Step D, Habilitative Formation, adds glottal stop(s) and copied vowel(s) only if the word ends in a consonant at this point in the derivation.
  - Let's practice transformation rule notation by writing the basic rule.

- The key is that Habilitative copying applies to the extent needed to provide two syllables following the stressed syllable.
- So what's the look-ahead issue? Let's step through the derivation for (13) and think about the first application of copying.

- Hill points out that of course we *can* write rules that will do this without look-ahead, but they seem to miss the point about word shape.

18. Constraint-specific repair

- Latin American varieties of Spanish, rather abstract analysis (Harris 1983?):

	/akeʎ/	/akeʎ+os/	
1. ʎ → l / __ #	akel	---------	
2. ʎ → j	----	akej+os	
	'that'	'those'	(but see Lloret & Mascaró 2007)

- Let's try an OT translation. What issues do we encounter? Note /rej/ → [rej], /karakol+es/ → [karakoles]

19. Saltation

- Term coined by Bruce Hayes, as far as I know, but related to use by (Lass 1997).

- White (2012), investigating the learnability of these cases, gathers as many real ones as he can find. There are not many! But here's one, from Campidanian Sardinian (Indo-European lang. from Italy with 345,000 speakers):

/p/ → [β] / V__, but [b] undergoes no change (and similarly for other stops)

/ɖːi paɣu sːu binu/ → [ɖːi βaɣu sːu bĩu] (Bolognesi 1998) p. 30

- Why is this problematic in OT? Let's fill in the tableaux to see.

	/ɖːi paɣu/	
a	ɖːi paɣu	
b	ɖːi baɣu	
c	ɖːi ɸaɣu	
☞ *d*	ɖːi βaɣu	

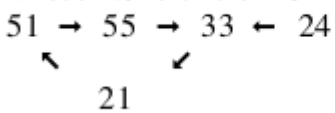
	/sːu binu/	
a	sːu pĩu	
☞ *b*	sːu bĩu	
c	sːu ɸĩu	
d	sːu βĩu	

20. Exchange rules

- These are common in tone sandhi. Here's a case from Zhang, Lai & Sailor (2006), Taiwanese (i.e. Southern Min; Sino-Tibetan language from Taiwan and China with 47 million speakers)

- Taiwanese has 5 "unchecked" tones (tones that occur in sonorant-final or open syllables).
- When non-XP-final, they all change:

(3) Taiwanese "tone circle" for non-checked syllables:



(Zhang & al. 2nd page)

- Why is this problematic in OT? (See Mortensen 2006 for a framework).

- See Moreton (1996) for extensive OT discussion of exchange rules and some other types of case.

21. If we have time: an example of a rule-ordering paradox

- Example from Icelandic (Indo-European language from Iceland with 250,000 speakers). Anderson 1974, ch. 10

syncope, roughly: certain unstressed Vs → Ø / C __ {l,r,n,ð,s}+V
u-*umlaut*: a → ö / __ C_0 u (where "u" usu. = [ʏ], "ö" = [œ])

barn	'child'	b**ö**rn+um	'child-dat.pl.'
svangt	'hungry-neut.nom.sg.'	sv**ö**ng+u	'hungry-neut.dat.sg.'
kalla	'[I] call'	k**ö**ll+um	'[we] call'

(lax, unstressed vowels delete __V)

ham**a**r	'hammer'	hamr+i	'hammer-dat.sg.'
fí**f**ill	'dandelion'	fífl+i	'dandelion-dat.sg.'
morg**u**nn	'morning'	morgn+i	'morning-dat.sg.'

(*ll, nn* stand for long *l*s and *n*; syncope is meant to be applicable)

- If syncope precedes umlaut, what kind of process interaction results for the UR /katil+um/ 'kettle-dat.pl'? For /jak+ul+e/ 'glacier-dat.sg.'?

- What about umlaut before syncope for /katil+um/? /jak+ul+e/?

➔ Whether a rule ordering is feeding, bleeding, etc. depends on the particular forms involved!

	+r/Ø		*+um*	
/katil/	ketil+l	'kettle'	k**ö**tl+um	'kettle-dat.pl'
/ragin/	regin	'gods'	r**ö**gn+um	'gods-dat.pl'
/alen/	alin	'ell of cloth'	**ö**ln+um	'ell of cloth-dat.pl'

	+ul+r		*+ul+e, +ul+an*	
/bagg/	bögg+ul+l	‘parcel’	b**ö**gg+l+i	‘parcel-dat.sg.’
/jak/	jök+ul+l	‘glacier’	j**ö**k+l+i	‘glacier-dat.sg.’
/þag/	þög+ul+l	‘taciturn’	þ**ö**g+l+an	‘taciturn-masc.acc.sg.’

- If the rules are right, we have an ordering paradox!
- See (Kiparsky 1984) for a solution in Lexical Phonology.

- I don’t think rule-ordering paradoxes form a unified phenomenon. But as a search term, “ordering paradox” will turn up some interesting puzzles worth reinvestigating.

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