Class 14 and 15: Process interaction

Overview: Should processes be able to look forward into the derivation? How far? We'll contrast SPE, OT, and a major variant of classic OT, Harmonic Serialism. Then we'll start to revisit the typology of opaque process interaction and what each theory predicts.

1. Global power

- Can a rule "see" anything other than its immediate input? Can it look further ahead? Further back?
- In SPE, rules aren't supposed to have *global power* (term from Lakoff 1970).
- But global power follows naturally in OT: every candidate is the very end of a derivation, and "sees" the very beginning (through correspondence).
  - Now we have something that OT can handle easily but SPE can't.
  - So how robust are the claimed cases?

2. 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)'
	prɛ́t-e	pr**ɛ́**t-i	'priest (m sg/pl)'
	bɛ́l-o	b**ɛ́**l-i	'beautiful (m sg/pl)'
	mɔ́d-o	m**ɔ́**d-i	'way (m sg/pl)'
[hi] can spread <u>through</u> 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 get all the way to the stressed V	ángol-o	**á**ng**o**l-i	'angel (m sg/pl)'
	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.

/mov-i/				
a móvi				
☞ *b* múvi				

/pɛ́rseg-i/				
☞ *c* pɛ́rsegi				
d pɛ́rsigi				
e pírsigi				

- See Kaplan 2011 for a seemingly contrasting case of *non*-look-ahead or "**myopia**" in Chamorro.

3. Case of global power in the reverse direction (look-back)

- Analysis briefly entertained (and rejected) in your Piggott 1980 reading:

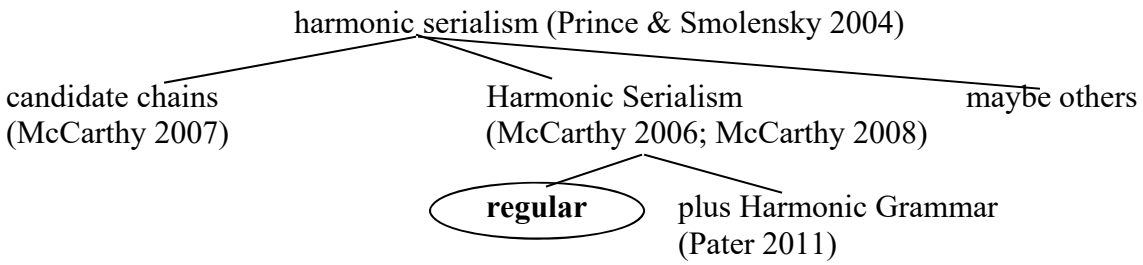
- Odawa final deletion of glides and lax vowels

  - /aniššināpēwiw/ → [aniššināpēwi], but doesn't self-feed to *[niššināpēw] or *[niššināpē]

  - One way to prevent self-feeding (if you want a theory that generally requires it) is to say that the deletion rule deletes only in the *underlying* environment __#

4. A major variant of OT: Harmonic Serialism

- Distinction between small-*h*, small-*s* and capital-*H*, capital-*S*:



- **Difference #1: Gen()**

Classic OT Gen(/input/) = {all results of applying any 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)

  - A change is minimal iff it incurs just one faithfulness violation (so, constraint inventory matters).

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

5. Example of how Harmonic Serialism operates: Dakota

- Siouan language, prairies of U.S. and Canada
- Fluent speakers in the hundreds
- Some English words of Dakota origin: *tepee, Minnesota*

Dakota Language immersion program, South Dakota[1]

Ella Cara Deloria, linguist

Analysis adapted from Elfner 2016—*data orig.* Shaw 1985

	/čap/	WordMust HaveStress	NoCoda	Don'tAdd Stress	StressIs Final[2]	Dep-V	Don'tDelete Stress	Max-V
a	čap	*!	*					
☞ *b*	čáp		*	*				
c	ča.pa	*!				*		

? Why is [ča.pá] not a candidate?

[1] www.nativeshop.org/programs/language-and-culture/dakota-language-immersion.html
[2] Not the real constraint—see Elfner, who uses "feet".

feed *čáp* into grammar—again, [ča.pá] is not a candidate (why not?)

čáp	WordMust HaveStress	NoCoda	Don'tAdd Stress	StressIs Final	Dep-V	Don'tDelete Stress	Max-V
d čap	*!	*				*	
e čáp		*!					
☞ *f* čá.pa				*	*		

feed *čá.pa* into grammar:

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

Input=output, so stop iterating.

⍰ What does this grammar predict for input like /čite/?[3]

čite	WordMust HaveStress	NoCoda	Don'tAdd Stress	StressIs Final	Dep-V	Don'tDelete Stress	Max-V

	WordMust HaveStress	NoCoda	Don'tAdd Stress	StressIs Final	Dep-V	Don'tDelete Stress	Max-V

⍰ Why can't we get *[ča.pá] in this Harmonic Serialism grammar?

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

? What happens if we switch the ranking of WORDMUSTHAVESTRESS and NOCODA?

/čap/	NOCODA	WORDMUST HAVESTRESS	DON'TADD STRESS	STRESSIS FINAL	DEP-V	DON'TDELETE STRESS	MAX-V
a čap	*	*					
b čáp	*		*				
c ča.pa		*			*		

	NOCODA	WORDMUST HAVESTRESS	DON'TADD STRESS	STRESSIS FINAL	DEP-V	DON'TDELETE STRESS	MAX-V

? What happens if we try to analyze Veneto in Harmonic Serialism?

/pérseg-i/				
a pérsegi				
b pérsigi				

6. Classic look-ahead: "peeking" rule in Cupeño (Hill 1970)

- Uto-Aztecan language from Southern California
- Cupeño people continue to lay claim to Cupa/Warner Springs, from which they were forcibly removed in 1903
  - This contributed to language attrition—forced to share territory with speakers of different language
- No fluent speakers today
- Hill, when a grad student at UCLA, worked with Roscinda Nolasquez, a survivor of the three-day forced march from Cupa to Pala

[4] *(near Temecula)*

- Read the derivations from left (underlying) to right (surface):

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.

- The key is that Habilitative copying applies as many times as needed to provide two syllables following the stressed syllable—including zero times.

  ⍰ 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 complicated rules that will do this without look-ahead, but they seem to miss the point about word shape.

[4] cupa.palatribe.com/

7. Back to process interaction types: (counter){f,bl}eeding

	feeding	*bleeding*	*counterfeeding*	*counterbleeding*
examples so far	▪ Guinaang Kalinga syncope/assimilation ▪ Tshiluba nasalization (self-)	▪ English plurals ▪ Klamath glottalized Cs (self-) ▪ Eastern Ojibwa glide formation (self-) ▪ French schwa deletion (self-)	▪ Palauan vowel reduction ▪ Tundra Nenets V deletion (self-) ▪ Morphological truncation (self-)	▪ Polish vowel raising and devoicing ▪ Southern Kikuyu spirantization (self-)
OT	OK	OK	no, except in some cases (scales)	no, except in some cases (fusion)
SPE	OK	OK	OK	OK

- In the rest of today we'll look at what some SPE variants predict
- Later we'll complicate the typology

8. *The special cases I: Lena Asturian*

- Asturian is a Romance language from Spain, around 100,000 native speakers
  - Lena is a municipality is Asturias

Ramón Menéndez Pidal, philologist
person most nominated for Nobel Prize

Santa Cristina de Lena church, Lena

- Another metaphony case from (Walker 2005)

fí-a	'daughter'	fí-u	'son'
nén-a	'child (fem.)'	nín-u	'child (masc.)'
tsób-a	'wolf (fem.)'	tsúb-u	'wolf (masc.)'
gát-a	'cat (fem.)'	gét-u	'cat (masc.)'

? Account for this with two rules

- ? What type of rule interaction is this?
- ? What's the problem with translating this into OT (hint: [gét-u])?

/gátu/			
a gátu			
☞ *b* gétu			
c			

- ? Any ideas for playing with our faithfulness constraints to get this?

9. *The special cases II: Bedouin Hijazi Arabic*

- Variety of Arabic spoken by rural population in Western Saudi Arabia
  - Arabic is a member of the Afro-Asiatic language family
  - Hejaz, also known as Hijaz, is a region in Western Saudi Arabia
  - Saudi varieties of Arabic are divided, by both linguists and speakers, into nomadic (Bedouin)/rural and sedentary/urban varieties
  - So Bedouin Hijazi Arabic refers to the variety of Arabic spoken in rural Hejaz
  - Al-Mozainy's study worked only with speakers of the Harb tribe

Harb flag[5]

- Case from Al-Mozainy 1981, via Hauser & Hughto 2016

5 commons.wikimedia.org/wiki/File:%D8%B9%D9%84%D9%85_%D9%82%D8%A8%D9%8A%D9%84%D8%A9_%D8%AD%D8%B1%D8%A8.jpg

	/ʃaribat/	/ħa:kim/	/ħa:kim-in/	(H&H p. 1)
Palatalization	--	ħa:kʲim	ħa:kʲimin	
Deletion	ʃarbat	--	ħa:kʲmin	
	[ʃarbat]	[ħa:kʲim]	[ħa:kʲmin]	

? What type of rule interaction is this?

? What's the problem for OT?

/ħa:kim-in/			
a ħa:kim-in			
b ħa:kʲim-in			
☞ *c* ħa:kʲm-in			
d ħa:km-in			

? Let's try a fusion analysis—we'll have to use something different from plain IDENT(hi)

/ħa:kim-in/			
a ħa:kim-in			
b ħa:kʲim-in			
☞ *c* ħa:kʲm-in			
d ħa:km-in			

10. How about variants of SPE that you read about?

- SPE assumes that a language can impose any order it wants on rules. Many researchers have proposed that this is not the case—that at least sometimes, rules are *intrinsically* ordered.
- Let's see ways to do that...

11. Koutsoudas, Sanders, & Noll 1974: Simultaneous repeated application (review)

- = all rules apply simultaneously to the UR, then again to the result, and again until no more application is possible. This results in *maximal application* (feeding rather than counterfeeding, counterbleeding rather than bleeding).

- ? Let's try /panipa/ with V → Ø / VC__CV and nasal place assimilation

Plus an additional principle, "proper inclusion precedence"

- 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)

- ? What kind of rule ordering is this?

- ? Try to apply these rules simultaneously and repeatedly to /akeʎ/—what's the issue?

- Koutsoudas & al. propose (p. 9):
  "For any representation R, which meets the structural descriptions of each of two rules A and B, A takes applicational precedence over B with respect to R if and only if the structural description of A properly includes the structural description of B."

the structural description (SD) of A properly includes the SD of B = you can match B's SD up with part of A's SD that it is nondistinct from, <u>and still have part of A's SD left over</u>.

? How does the definition apply to the two Spanish rules? Is ʎ → l / __ # Rule A or Rule B?

- Aside: if we adopt the analysis above I think it's a bit of a problem for OT. Why is the problematic /ʎ/ resolved by changing place in one instance, and manner in the other?

/akeʎ/	*ʎ	*ʎ#	*ʎV	IDENT(place)	IDENT(manner)	*j#	*lV
a akeʎ	*(!)	*(!)					
☹*b* akel				*!			
💣*c* akej					*	*	

/akeʎ+os/	*ʎ	*ʎ#	*ʎV	IDENT(place)	IDENT(manner)	*j#	*lV
a akeʎos	*(!)		*(!)				
b akelos				*!			*
☞*c* akejos					*		

- The constraints at the bottom can't be ranked any higher, because of forms like *cielo* and (rarer) *ley*.
- Such "constraint-specific repairs" are predicted in SPE or in some versions of rules+constraints, but not in OT.
- I'm not saying OT can't capture the Spanish data—it just can't directly translate the analysis with ʎ → l / __ # and ʎ → j.

12. Bleeding: example originally from Kiparsky (1968?)

- Schaffhausen dialect of Swiss German
- German is an Indo-European language with around 95 million speakers
- "Swiss German" refers to the varieties of German spoken in informal everyday life in Switzerland, as opposed to "Swiss Standard German," used in more formal contexts, which is similar to Standard German

 [6]

Schaffhausen

 [7]

Irène Schweizer,
jazz musician from Schaffhausen

[6] commons.wikimedia.org/wiki/File:1_schaffhausen_2012.jpg
[7] commons.wikimedia.org/wiki/File:Irene_Schweizer_(Annamarie_Ursula)_P1120606.JPG

	/bogə/	/bodə/	/bogə+PL/	/bodə+PL/
1. V → [–back] / *complicated 'umlaut' context, including plurals*	----	----	bøgə	bødə
2. o → ɔ / __ [+cons, +cor, –lat][8]	----	bɔdə	----	----

? Why is this ordering crucial?

? What happens if we use the Koutsoudas & al. approach? *(3 minutes to discuss)*

- K & al. propose that in all apparent cases of bleeding (and counterfeeding?), the rules need to be revised. In this case, they propose a context-free rule œ → ø (remember Myers's persistent rules, which apply everywhere in the derivation that they can).

? Apply this solution to /bodə+PL/. *(3 minutes to discuss)*

? What additional fact needs to be true in Schaffhausen for this to work?

[8] In the original it's not [+cor] but [–grave]. *Grave* is an acoustic feature (roughly, lower frequencies are stronger for [+grave] segments), not much used these days. Labials and velars are [+grave]; dentals and alveolars are [–grave] (a.k.a. *acute*).

13. Some issues for the KSN proposal raised by Piggott 1980

- Odawa has a rule deleting final glides (*w, y*) and final lax vowels (vowel symbols them)
  ? What issues do (217a) and (217b) raise (whether deletion is one rule or two)?

217.	(a)	ni-aniššināpēwi	'I am an Indian'
		[ntanššināpēw]	
	(b)	aniššināpēwi-w	'he is an Indian'
		[niššnāpēwi]	
	(c)	ki-aniššināpēwi-m	'you (pl.) are Indians'
		[kitanššināpēwim]	

(p. 305)[9]

- Odawa has a rule inserting [i] in certain consonant clusters.
  ? What issues are raised by its interaction (or non-interaction) with t-palatalization and stress?

palatalization: t → č / __ + [–cons, +high, –back]

stress: stress all tense vowels, then any lax vowel that's after an unstressed syllable, plus the last syllable

/aššam-at-pany/ → [ˈššamˈtiˈpa]	'(that) you fed him (then)'
/wāpam-at-pany/ → [ˈwāpˈmatiˈpa]	'(that) you saw him (then)'

14. Preferring specificity

- Proper Inclusion Precedence: If any two rules are in a specificity relation—as defined by lining up their structural descriptions, where longer is more specific—then apply the more-specific one first, possibly preempting the less-specific one
- Elsewhere Condition: If any two *adjacent* rules are in a specificity relation—as defined by the set of forms they could apply to—and both could apply to a form, then apply the more-specific one *instead* of the less-specific one. (Anderson 1969, Kiparsky 1973...)
- OT: both rankings are possible, but the more-specific constraint won't be noticeable unless it's ranked higher *(see tableau)*

[9] Cf. Anishinaabe, a term for a large group of peoples including Ojibwe, or the Odawa version, Nishnaabe.

Pāṇini's Theorem (so named by Prince & Smolensky)

Pāṇini: Sanskrit grammarian, lived around 2500 years ago

17th-century manuscript of his grammar treatise

- General >> specific: specific constraint doesn't do anything

	/akeʎ/	*ʎ	IDENT(lateral)	*ʎ#
a	akeʎ	*!		*
☞ *b*	akej		*	
	/akeʎos/	*ʎ	IDENT(lateral)	*ʎ#
c	akeʎos	*!		
☞ *d*	akejos		*	

- Specific >> general

	/akeʎ/	*ʎ#	IDENT(lateral)	*ʎ
a	akeʎ	*!		*
☞ *b*	akej		*	
	/akeʎos/	*ʎ#	IDENT(lateral)	*ʎ
☞ *c*	akeʎos			
d	akejos		*!	

15. Summary: now we have three main theories...

- **Classic OT**. All candidates are considered: powerful Gen(), Eval() runs just once
- **OT with Harmonic Serialism**. Only "close" candidates are considered: restricted Gen(), Eval() applies repeatedly to its own output
- **SPE**. Fixed sequence of operations (each applied simultaneously to all targets): deterministic Gen(), trivial Eval() (because there is only one candidate)

- ...Plus some **SPE variants**, not so well developed
  - All rules are iterative (apply to their own output till it stops changing).
    - or rules can be tagged as either iterative or not
  - Rules can apply left-to-right or right-to-left
    - maybe this has to be learned for each rule, or maybe it follows somehow from the form of the rule.
  - No rule ordering: all rules apply simultaneously to the underlying form
  - No rule ordering: all rules apply simultaneously to the underlying form; repeat this until no more changes
  - Rules apply in order, but the order needn't be learned, because it follows from the content or potential interaction of the rules themselves
    - This can mean that rules apply in a different order to different underlying forms

Next time: Before we move on to phonology-morphology interaction, we'll spend one day on autosegmentalism next week!

Let's close with muddiest point

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