EVALUATING OT:

The problem of non-optional directional iterativity

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Chomsky on iterative rules

"anything I've done in the study of language or in other fields is hardly more than the application of normal standards of rationality, which have been taken for granted in the natural sciences for centuries, to phenomena in these fields. When you do, some things are immediately obvious. **For example, it's immediately obvious that language involves a discrete infinity of constructions, that grammar involves iterative rules of several types.** That is where the serious work begins [...]"

Chomsky, Noam. 1983. Dialogues on the psychology of language and thought, Robert Rieber, ed. New York: Plenum Press, pp. 60-61.

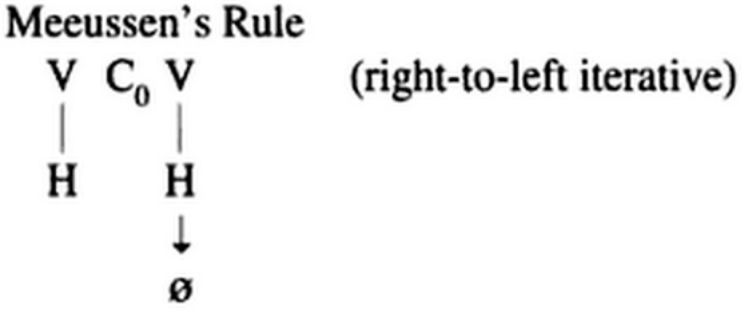
Itō and Mester on rules

"There is no sequential phonological derivation in the sense of traditional generative phonology. There is no set of rules and operations applying in a certain order"

Itô, Junko and Armin Mester. 1997. Correspondence and compositionality: The ga-gyō variation in Japanese phonology, p. 419. New York: OUP.

Are there predictive differences?

- One interesting possibility: directional iterative rules
- Meeussen's Rule (Goldsmith 1984; figure from Hyman 1993:199), generally analysed as an OCP effect



- locally-optimizing outcome for /H-H-H/: [HLL]
- globally-optimizing outcome for /H-H-H/: [HLH]
- What do we actually find?...

Meeussen's Rule Type 1

- /H-H-H/ → [HLL]
- Ganda (Hyman 1982 apud Hyman 2000 fig.14)

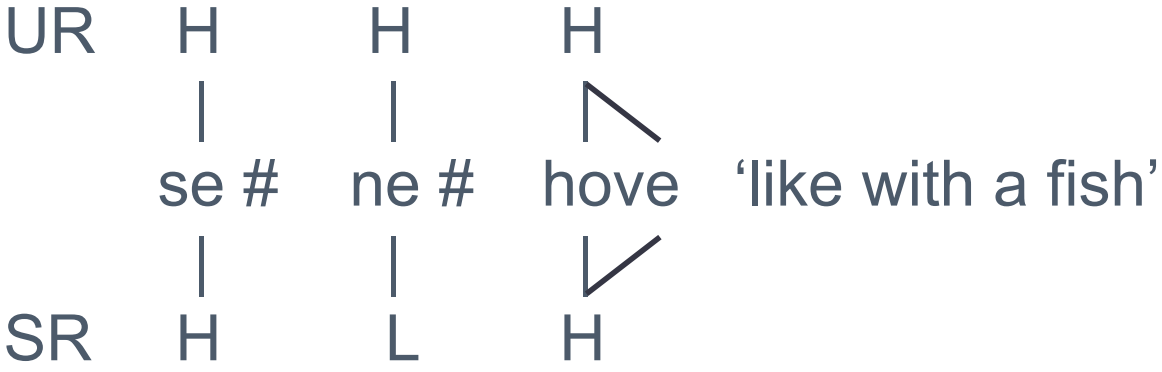
UR	H	H	H	
	|	|	|	
	ba -	li -	lab - a	'they will see'
	|	|	|	
SR	H	L	L	

- This is the locally-optimizing outcome one would expect in RBP if MR applies R→L.
- It is a problem for globally-optimizing OCP driven accounts, which predict *HLH (Odden 2008:71).

cf. Tonga (Goldsmith 1984), Khayo (Marlo 2009:8) and Nyala-West (Ebarb and Marlo 2010:7); Kikerewe, Jita, Tonga, Rimi, Kihunde, Nilamba, Haya (Odden 2008:70)

Meeussen's Rule Type 2

- /H-H-H/ → [HLH]
- Shona (Odden 1980 apud van Oostendorp 2005)



- This is the globally-optimizing outcome one would expect in Classic OT.
- It is also the outcome in RBP if MR applies L→R.

cf. also LuSaamia (Salting and Ladbury 2004), Shinzagidja (Idsardi and Purnell 1997:143), Tiriki (Paster and Kim 2011), Totela (Crane 2010)

Meeussen's Rule: Summary

- Outcomes of MR:
  a. locally-optimizing/R→L outcome: /H-H-H/ → [HLL]
  b. globally-optimizing/L→R outcome: /H-H-H/ → [HLH]
- Predictive difference:
  - RBP allows both (a) and (b)
  - Classic OT allows only (b)
- But what about serial versions of OT?...
- We'll investigate this question using a particularly interesting example of localized iterativity, Dybo's Rule in Abkhaz.

Overview

- locally-optimizing iterative clash deletion, focusing on the Abkhaz stress system (basic insights from Vaux and Wolfe 2000)
  - traditional analysis: Dybo's Rule
  - RBP analysis à la Halle & Idsardi 1995
  - comparison with parallel and serial OT analyses
- **conclusions:**
  - the phonological component of the human language faculty requires the ability to execute operations in a non-optional, (process-specific) directional, local manner.
  - Theories designed to be unable to carry out such computations and/or select the outputs of such computations as the exclusive winners under EVAL appear to face a serious challenge accounting for the relevant empirical phenomena.

Abkhaz stress assignment

- Dybo's Rule: Assign word stress to ① leftmost underlyingly accented syllable ② not followed by another accented syllable; ③ otherwise stress falls on the final syllable
  - Dybo 1977; cf. also Spruit 1985, Trigo 1992, Kathman 1992

	unaccented nominal root	
	/madza/	secret
①	[á-madza]	DEF-secret
③	[madzá-k']	secret-INDEF

  - x̲ = lexically accented segment; x́ = surface stress

Dybo, Vladimir. 1977. Zapadnokavkazskaja akcentnaja sistema i problema ee proisxozhdenija. In Konferencia Nostraticheskie jazyki i nostraticheskoe jazykoznanie, Tezisy doladov, 41-45.

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unaccented root		accented root	
á-pa-ra	jump	a-pa-rá	pleat (v)
á-fa-ra	eat	a-ja-rá	lie down
á-ta-ra	give	a-tsa-rá	go

① ②

  - x = lexically accented segment; x́ = surface stress

Dybo, Vladimir. 1977. Zapadnokavkazskaja akcentnaja sistema i problema ee proisxozhdenija. In Konferencia Nostraticheskie jazyki i nostraticheskoe jazykoznanie, Tezisy doladov, 41-45.

Analysis à la Halle & Idsardi 1995

i. Project stress-bearing elements.
ii. Project a right bracket) for all lexical accents.
iii. Line 0 Edge Marking: LLL
iv. Clash Deletion:) → Ø / _ *) [iterative, L→R]
v. Project rightmost element of Line 0 feet to Line 1
vi. Project leftmost element of Line 1 feet to Line 2

- The conflicting directionality identified by Dybo results from Left vs Right headedness on Lines 0 and 1 respectively (v, vi), and the iterativity and directionality via iv (cf. Howard 1972).

Analysis à la Halle & Idsardi 1995

- a-pa-rá ‘to pleat’, á-pa-ra ‘to jump’, madzá-k’ ‘a secret’

i. Project stress-bearing elements:

```
Line 0   *   *   *       *   *   *       *   *
         a-pa-rá       á-pa-ra      madzá-k’
```

Analysis à la Halle & Idsardi 1995

- a-pa-rá ‘to pleat’ vs. á-pa-ra ‘to jump’

i. Project stress-bearing elements.

ii. Project a right bracket) for all lexical accents:

```
Line 0   *) *) *)      *) *  *)      *  *
         a-pa-rá       á-pa-ra     madzá-k’
```

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i. Project stress-bearing elements.

ii. Project a right bracket) for all lexical accents.

iii. Line 0 Edge Marking: LLL:

```
Line 0  (*) *) *)      (*) *  *)      (*  *
          a-pa-rá        á-pa-ra      madzá-k’
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```
                ①  ②
Line 0  (*)  *)  *)      (*) *   *)      (*   *
          a-pa-rá        á-pa-ra        madzá-k’
```

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i. Project stress-bearing elements.

ii. Project a right bracket) for all lexical accents.

iii. Line 0 Edge Marking: LLL.

iv. Clash Deletion:) → Ø / _ *) [iterative, L→R].

v. Project rightmost element of Line 0 feet to Line 1:

```
Line 1          *       *       *           *
Line 0  (*   *   *)     (*) *   *)      (*   *
          a-pa-rá        á-pa-ra       madzá-k’
```

Analysis à la Halle & Idsardi 1995

- a-pa-rá ‘to pleat’ vs. á-pa-ra ‘to jump’

i. Project stress-bearing elements.

ii. Project a right bracket) for all lexical accents.

iii. Line 0 Edge Marking: LLL.

iv. Clash Deletion:) → Ø / _ *) [iterative, L→R].

v. Project rightmost element of Line 0 feet to Line 1.

vi. Project leftmost element of Line 1 feet to Line 2:

```
Line 2          *       *                   *
Line 1          *       *       *           *
Line 0 (*   *   *)     (*) *   *)      (*   *
        a-pa-rá         á-pa-ra       madzá-k'
```

Summary

- Iterative clash deletion produces edgemost effects (rightmost member of a sequence of accents survives), but the domain (accent sequence) is not a prosodic constituent.
- In RBP the effect is completely straightforward: having an abstract derivation allows local stepwise computation.

ABKHAZ STRESS IN OT

Classic OT

Harmonic Serialism

Stratal OT

1. Classic OT

- Rightmost default
- Leftmost lexical accent
- Clash avoidance

Classic OT: Rightmost default

- **PARSE-σ:** Assign one violation mark for each syllable that is not a member of some foot. (Pruitt 2008:59)
- **IAMB:** Assign one violation mark for a foot whose head is not aligned with the right edge of the foot. (Pruitt 2010:12)
- **FTBIN(σ):** Assign one violation mark for a foot with fewer than two syllables. (Pruitt 2008:10)

/madza-k'/	FTBIN	PARSE-σ	IAMB
☞(madzák')			
(mádzak')			*!
madzak'		*!*	
ma(dzák')	*!	*	
(má)dzak'	*!	*	
(má)(dzák')	*!*		

Classic OT: Leftmost lexical accent

- **Lexical accents** (McCarthy and Pruitt 2013:17)
  - h→HEAD: Assign one violation mark for every h-bearing segment that is not in the head syllable of a foot. (McCarthy and Pruitt 2013:17)
  - MAX(h): Assign one violation mark for every underlying h (= lexical accent) lacking a surface correspondent.
- **Leftmost underlying accent**
  - ALIGN-L(σ́ʰ): Assign one violation mark for a lexically-accented, stressed syllable that does not align with the left edge of a Prosodic Word. (equivalent to Zoll 1997's constraint favoring edge alignment of heavy/ prominent/marked elements)
- **Key rankings**
  - ALIGN-L(σ́ʰ) >> IAMB (conflicting directionality à la Zoll 1997)

/a͟ʰ-pa-ra͟ʰ/	MAX(h)	ALIGN-L(σ́ʰ)	FTBIN	PARSE-σ	h→HEAD	IAMB
☞(áʰparaʰ)					*	*
(áʰpa)raʰ				*!	*	*
aʰparaʰ				*!**	**	
(áʰ)paraʰ			*!	**	*	
(aʰparáʰ)		*!			*	
(aparáʰ)	*!	*				

Classic OT: Clash avoidance

- current ranking wrongly selects leftmost accented element by dint of ALIGN-L(σ́^{h}).
- the desired winner, (aparáʰ), is ruled out by both MAX(h) and ALIGN-L(σ́^{h}).
- Traditional solution: OCP effect / clash avoidance…

/a^{h}-pa^{h}-ra^{h}/	MAX(h)	ALIGN-L(σ́^{h})	FTBIN	PARSE-σ	h→HEAD	IAMB
☞(aparáʰ)	*!*	*				
☠**(á^{h}pa^{h}ra^{h})**					**	*
(á^{h}pa^{h})ra^{h}				*!	**	*
(a^{h}pa^{h}rá^{h})		*!			**	
(á^{h}pará^{h})	*!					*
(a^{h}pará^{h})	*!	*			*	
(á^{h}para)	*!*					*

Classic OT: Clash avoidance

- *CLASH: Assign one violation mark for every adjacent pair of h syllables. (cf. Kager 1994, Pruitt 2010:21) >> MAX(h)
- This can rule out the unwanted *(áʰpaʰraʰ). But now there's a new problem, *(áʰparaʰ)…

/a͟ʰ-pa͟ʰ-ra͟ʰ/	*CLASH	MAX(h)	ALIGN-L(σ́ʰ)	FTBIN	PARSE-σ	h→HEAD	IAMB
☞(aparáʰ)		**!	*				
(áʰpaʰraʰ)	*!*					**	*
☠**(áʰparaʰ)**		*				*	*
(áʰpara)		**!					*
(aʰparáʰ)		*	*!			*	
(áʰpaʰra)	*!	*				*	*
(aʰpaʰráʰ)	*!*		*			**	
(áʰpaʰ)raʰ	*!*				*	**	*

Classic OT: Clash avoidance

- Why is (á^{h}para^{h}) winning?
  i. the winner is the equivalent of Odden's HHH→HLH: globally-minimal violation of MAX(h) to avoid clash.
  ii. ALIGN-L(σ́^{h}) favors R→L deletion but we need L→R deletion
- What can be done about this?...

/a^{h}-pa^{h}-ra^{h}/	*CLASH	MAX(h)	ALIGN-L(σ́^{h})	FTBIN	PARSE-σ	h→HEAD	IAMB
☞(aparáʰ)		**!	*				
(áʰpaʰraʰ)	*!*					**	*
☠**(áʰparaʰ)**		*				*	*
(áʰpara)		**!					*
(aʰparáʰ)		*	*!			*	
(áʰpaʰra)	*!	*				*	*
(aʰpaʰráʰ)	*!*		*			**	
(áʰpaʰ)raʰ	*!*				*	**	*

Classic OT: Clash avoidance

- Desired winner: (aʰparáʰ) (or anything with final stress)
- One strategy: IAMB >> ALIGN-L…
  - But this would generate the wrong winner for á-pa-ra ‘jump’ and lose the conflicting directionality effect.
- no permutation by Boersma’s Praat learning algorithms yields the desired input-output mappings.
- Can *CLASH be reformulated?...

/aʰ-paʰ-raʰ/	*CLASH	MAX(h)	ALIGN-L(σ́ʰ)	FTBIN	PARSE-σ	h→HEAD	IAMB
☞(aparáʰ)		**!	*				
(áʰpaʰraʰ)	*!*					**	*
☠**(áʰparaʰ)**		*				*	*
(áʰpara)		**!					*
(aʰparáʰ)		*	*!			*	
(áʰpaʰra)	*!	*				*	*
(aʰpaʰráʰ)	*!*		*			**	
(áʰpaʰ)raʰ	*!*				*	**	*

Classic OT: Two-level *CLASH?

- Odden (2008:71): a two-level constraint prohibiting a *surface* H after an *underlying* H can generate the desired clash deletion outcomes for Meeussen's Rule (HHH → HLL). Can something similar work for Abkhaz?

/a̲ʰ-pa̲ʰ-ra̲ʰ/	*CLASH	MAX(h)	ALIGN-L(σ́ʰ)	FTBIN	PARSE-σ	h→HEAD	IAMB
☞(aparáʰ)		**!	*				
(áʰpaʰraʰ)	*!*					**	*
☠**(áʰparaʰ)**		*				*	*
(áʰpara)		**!					*
(aʰparáʰ)		*	*!			*	
(áʰpaʰra)	*!	*				*	*
(aʰpaʰráʰ)	*!*		*			**	
(áʰpaʰ)raʰ	*!*				*	**	*

Classic OT: Two-level *CLASH?

- *$_{O}$CLASH (inspired by McCarthy's (2002) Comparative Markedness theory): Assign a violation mark for each surface h followed by a syllable whose correspondent in the input/ FFC is marked with an h.
- rules out the problematic *(á^{h}para^{h}).

/a^{h}-pa^{h}-ra^{h}/	*$_{O}$CLASH	MAX(h)	ALIGN-L(σ́^{h})	FTBIN	PARSE-σ	h→HEAD	IAMB
☞(aparáʰ)		**	*				
(áʰpara)	*!	**					*
(aʰparáʰ)	*!						
(áʰpaʰ)raʰ	*!*				*	**	*
(áʰ)paʰraʰ	*!*			*	**	**	
(áʰpaʰraʰ)	*!*					**	*
(áʰparaʰ)	*!		*			**	
(aʰpaʰráʰ)	*!*		*			**	

Classic OT: Two-level *CLASH?

- Problem: "classical markedness constraints cannot refer to the input" (McCarthy 2002:49; cf also Kaplan 2008)
- Comparative Markedness (McCarthy 2002) retreats to two-level constraints, but it's not clear if McCarthy actually believes in this theory, especially after moving to HS:
  - "Comparative Markedness is found to have some advantages *and some disadvantages* in comparison with classic OT" (2002)
- Can the two-level constraint problem be avoided by other means?...
  - Stratal OT
  - HS
  - [the process-ordering power of OT-CC (which is necessary in any case to deal with counterbleeding opacity) may be up to the task, at least given *OCLASH, but I haven't had time to work through this yet]

2. Harmonic Serialism

- In Harmonic Serialism and OT-CC (McCarthy 2007 etc.), one serially derives the surface form one operation at a time, with the same ranking of CON at each stage.
- This makes it possible in principle to simulate RBP's L→R sequence of Clash Deletion.
- "gradualness in the domain of metrical structure-building is instantiated by construing 'one difference' as the addition of one headed (that is, stressed) metrical foot. Thus, at each iteration GEN produces candidates corresponding to all possible ways of adding one foot to that input (in addition to candidates representing other kinds of single changes)." (Pruitt 2008:5)

2. Harmonic Serialism

- with garden-variety *CLASH (Assign one violation mark for every adjacent pair of h syllables):
- prediction: /vʰvʰvʰ/ → [v́ʰvvʰ] (i.e. global optimization effect).
- stage 1:

/a̲ʰ-pa̲ʰ-ra̲ʰ/	*CLASH	MAX(h)	ALIGN-L(σ́ʰ)	FTBIN	PARSE-σ	h→HEAD	IAMB
☞aʰparaʰ		*			*	**	
apaʰraʰ	*!	*			*	**	
aʰpaʰra	*!	*			*	**	
(áʰpaʰraʰ)	*!*						*
(aʰpaʰráʰ)	*!*		*				

(N.B. I use here one of the rankings that works for Classic OT with *OCLASH. All of these rankings encounter the same problem as the one above.)

2. Harmonic Serialism

- with garden-variety *CLASH (Assign one violation mark for every adjacent pair of h syllables):
- prediction: /vʰvʰvʰ/ → [v́ʰvvʰ].
- stage 2:

/aʰparaʰ/	*CLASH	MAX(h)	ALIGN-L(σ́ʰ)	FTBIN	PARSE-σ	h→HEAD	IAMB
☞(áʰparaʰ)						*	*
aʰparaʰ					*!**	**	
aparaʰ		*!				*	
(aʰpará ʰ)			*!			*	

2. Harmonic Serialism

- with garden-variety *CLASH (Assign one violation mark for every adjacent pair of h syllables):
- prediction: /v^{h}v^{h}v^{h}/ → [v́^{h}vv^{h}].
- stage 3:

/(á^{h}para^{h})/	*CLASH	MAX(h)	ALIGN-L(σ^{h})	FTBIN	PARSE-σ	h→HEAD	IAMB
☞(á^{h}para^{h})						*	*
(a^{h}pará^{h})			*!			*	

- input = output; derivation terminates.
- Outcome: incorrect global optimization (á^{h}para^{h}), rather than the desired local optimization (apará^{h}).

2. Harmonic Serialism

- with *$_{O}$CLASH (Assign a violation mark for each surface h followed by a syllable whose correspondent in the input/FFC is marked with an h):
- stage 1:

/a^{h}-pa^{h}-ra^{h}/	*$_{O}$CLASH	MAX(h)	ALIGN-L(σ́^{h})	FTBIN	PARSE-σ	h→HEAD	IAMB
☞apa^{h}ra^{h}	*	*			*	**	
☞a^{h}para^{h}	*	*			*	**	
a^{h}pa^{h}ra	**!	*			*	**	
(á^{h}pa^{h}ra^{h})	**!						*
(a^{h}pa^{h}rá^{h})	**!		*				

- Outcome: tie between local and global optimization candidates.
- [gradient Align-R(h) might help, but the constraint seems spurious, not only because of the gradience (q.v. McCarthy).]

Harmonic Serialism: stage 2

/apaʰraʰ/	*$_{O}$Clash	Max(h)	Align-L(σ́ʰ)	FtBin	Parse-σ	h→Head	Iamb
☞aparaʰ		*			***	*	
apaʰraʰ	*!				***	**	
apaʰra	*!	*			***	*	
(apáʰraʰ)	*!		*			*	*
(apaʰráʰ)	*!		*			*	
(ápaʰraʰ)	*!					**	*

/aʰparaʰ/	*$_{O}$Clash	Max(h)	Align-L(σ́ʰ)	FtBin	Parse-σ	h→Head	Iamb
☞(áʰparaʰ)						*	*
(aʰpáraʰ)						**!	*
aʰparaʰ					*!**	**	
(aʰparáʰ)			*!			*	
aparaʰ		*!			***	*	
aʰpara		*!			***	*	

Harmonic Serialism: stage 3

/apara^{h}/	*$_{O}$Clash	Max(h)	Align-L(σ́^{h})	FtBin	Parse-σ	h→Head	Iamb
☞(ápara^{h})						*	*
apara^{h}					*!**	*	
(aparáh)			*!			*	
apara		*!					

/(á^{h}para^{h})/	*$_{O}$Clash	Max(h)	Align-L(σ́^{h})	FtBin	Parse-σ	h→Head	Iamb
☞(á^{h}para^{h})						*	
a^{h}para^{h}					*!*	**	
(a^{h}pará^{h})			*!				

- input = output; derivation terminates.

Harmonic Serialism: stage 4

/(ápara^{h})/	*$_{O}$CLASH	MAX(h)	ALIGN-L(σ́^{h})	FTBIN	PARSE-σ	h→HEAD	IAMB
☞(ápara^{h})							
(ápara)		*!					

- input = output; derivation terminates.

Harmonic Serialism

- winners for /$v^hv^hv^h$/: [$v\acute{}^hvv^h$], [$\acute{v}vv^h$].

Harmonic Serialism: Summary

- surface *CLASH winner for /vʰvʰvʰ/: [v́ʰvvʰ]
- *$_{o}$CLASH winners for /vʰvʰvʰ/: [v́ʰvvʰ], [v́vvʰ]
- actual winner: [v$^{(h)}$vv́ʰ]
- why the mismatch?...

Harmonic Serialism: Summary

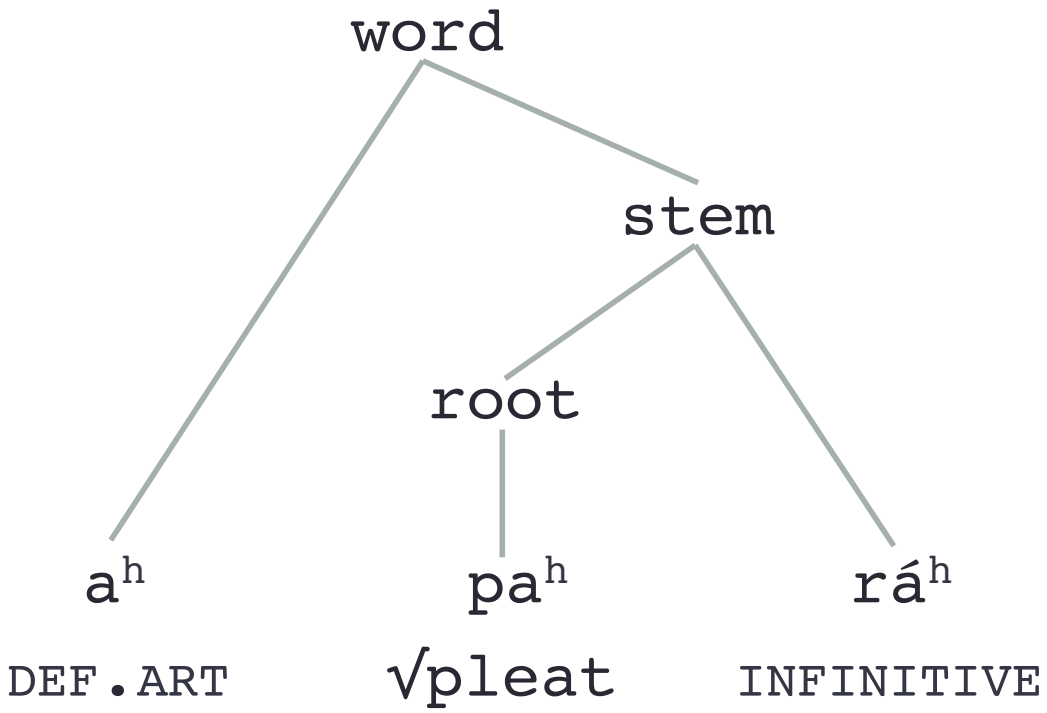
- actual winner: [v$^{(h)}$vv$\acute{}^{h}$]
- why does HS generate [v$\acute{}^{h}$vv^{h}]?
  - Globally minimal repair.
- why does HS generate [v$\acute{}$vv^{h}]?
  - The distribution of h's shows the rightmost pattern we saw for two-level locally minimal repair, analogous to what the RBP analysis of Abkhaz generates.
  - Why then don't we get the expected/desired final stress?
    - Align-L(σ$\acute{}^{h}$) >> h→HEAD, IAMB

3. Stratal OT

- Can morphologically-determined staged computation (Orgun 1996, Alderete 1999, Revithiadou 1999, Kiparsky 2000, Bermúdez-Otero 2003 et seqq.) derive the desired results?
- “for the purposes of phonological interpretation, morphosyntactic constituents are divided into three types: stem-level, word-level, and phrase-level. Each type is associated with its own ranking of phonological constraints.” (http://www.bermudez-otero.com/Stratal_Optimality_Theory.htm)
- let’s consider the case of a-pa-rá ‘pleat’...

Stratal OT: Morphosyntactic structure

Though one would require evidence from Abkhaz to be sure, the following structure seems likely:



Stratal OT: derivation

- How might this alter the Classic OT derivations already considered?
- Assumptions:
  - same ranking of CON at both the Stem and Word levels, letting the morphological structure do the work.
  - original single-level version of *CLASH: Assign one violation mark for every adjacent pair of h syllables.

Stratal OT: derivation

- Stage 1: Stem level

/pa^{h}-ra^{h}/	*CLASH	MAX(h)	ALIGN-L(σ́^{h})	FTBIN	PARSE-σ	h→HEAD	IAMB
☞(pá^{h}ra)		*					*
(pára^{h})		*				*!	*
(pará^{h})		*	*!				
(pára)		**!					*
(pará)		**!					
(pa^{h}rá^{h})	*!		*			*	
(pá^{h}ra^{h})	*!					*	*

- **Problem**: without 2-level *CLASH, we still get rightmost deletion, (pá^{h}ra).
  - in order to avoid this we could have IAMB>>ALIGN-L at Stem level...
  - but this would neutralize the á-pa-ra : a-pa-rá contrast to á-pa-ra (by removing the Conflicting Directionality mechanism)..

Stratal OT: derivation

- What we need to derive the desired outcome for a-pa-rá ‘pleat’ is [[a-pa-]$_{stem}$rá]$_{word}$.
- Stage 1: Stem level with the ranking used for Classic OT:

/aʰ-paʰ/	*Clash	Max(h)	Align-L(σ́ʰ)	FtBin	Parse-σ	h→Head	Iamb
☞(áʰpa)		*					*
(aʰpá)		*				*!	
(apáʰ)		*	*!				
(ápaʰ)		*	*!			*	*
(áʰpaʰ)	*!					*	*
(aʰpáʰ)	*!		*!			*	

- Problem: this should lead to *á-pa-ra.
- We need to try a different ranking...

Stratal OT: derivation

- we want the Stem level to output something like (apá^{h}).
- if we demote ALIGN-L below IAMB:

/a^{h}-pa^{h}/	*CLASH	MAX(h)	FTBIN	PARSE-σ	h→HEAD	IAMB	ALIGN-L(σ́^{h})
☞(apá^{h})		*					*
(á^{h}pa)		*				*!	
(a^{h}pá)		*			*!		
(ápa^{h})		*			*!	*	*
(á^{h}pa^{h})	*!				*	*	
(a^{h}pá^{h})	*!				*		*

- This ranking generates the wrong output for á-madza ‘the secret’:

Stratal OT: derivation

- á-madza ‘the secret’
- Stem level output: (madzá)
- Word-level:

/aʰ-(madzá)/	*Clash	Max(h)	FtBin	Parse-σ	h→Head	Iamb	Align-L(σ́ʰ)
aʰ(madzá)				*	*		
(aʰ)(madzá)			*!		*	*	
(áʰ)(madza)			*!			*	
a(madzá)		*!					

- At the Word level we need Align-L >> FtBin, Iamb to generate á-madza...
- but this generates the wrong output for a-pa-rá:

Stratal OT: derivation

- Stem level for a-pa-rá:

/aʰ-paʰ/	*Clash	Max(h)	FtBin	Parse-σ	h→Head	Iamb	Align-L(σ́ʰ)
☞(apáʰ)		*					*
(áʰpa)		*				*!	
(aʰpá)		*			*!		
(ápaʰ)		*			*!	*	*
(áʰpaʰ)	*!				*	*	
(aʰpáʰ)	*!				*		*

- Word level, assuming FEC (desired: a-pa-rá):

/(apáʰ)-ráʰ	*Clash	Max(h)	Align-L(σ́ʰ)	FtBin	Parse-σ	h→Head	Iamb
☞(apa)(ráʰ)		*	*	*			
☠**(apá)raʰ**		*			*	*	
(ápaʰ)(raʰ)	*			*		**	**

Stratal OT: further concerns

i. in order to get (some of) the facts to work out, we need to assume the suspicious structure $[[\text{def.art}[\text{root}]]_{\text{stem}}\text{infinitive}]_{\text{word}}$.

ii. we predict that an Abkhaz word of the structure [v̲-[v̲-v̲]$_{\text{stem}}$]$_{\text{word}}$ will surface as v́vv, whereas the Halle & Idsardi analysis predicts vvv́.

- I can't think of any clear cases of this type other than our infinitives, but if Dybo's generalization is right then the Stratal OT account may have a problem.

Conclusions 1

- the Classic OT tenets of globalism/parallelism and minimal violation favor outputs which do the global minimum necessary to avoid stress clash, which harmonically bound the desired winners with their greater number of clash deletions.
  - for Meeussen's Rule, /H-H-H/ → *[HLH], not [HLL]
  - for Abkhaz, /$v^hv^hv^h$/ → *[$v\acute{}^hvv^h$] not [$vv\acute{}^h$]
- perhaps surprisingly, serial OT models have the same problem.

Conclusions 2

- this problem can be avoided for Classic OT by invoking a two-level $*_{o}$CLASH constraint in the Abkhaz case, but at the cost of weakening the scope of Markedness constraints.
- the added power of $*_{o}$CLASH appears not to save HS or Stratal OT.

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Stratal OT: derivation

- Stem level:

/a̲ʰ-pa/	*Clash	Max(h)	FtBin	Parse-σ	h→Head	Iamb	Align-L(σ́ʰ)
(apáʰ)		*!					*
☞(áʰpa)						*	
(aʰpá)					*!		
(ápaʰ)		*!			*	*	

- Word level, assuming FEC (desired: á̲-pa-ra̲):

/(á̲ʰpa)-rá̲ʰ	*Clash	Max(h)	Align-L(σ́ʰ)	FtBin	Parse-σ	h→Head	Iamb
(áʰpa)raʰ					*!	*	*
(áʰpa)(raʰ)				*!		*	*
(aʰpa)(ráʰ)			*	*!		*	

Discussion

- NB MR differs from Dybo's Rule because you can see the other underlying H in HLH surface structures, whereas there is only one surface stress in Abkhaz

Predicted outcomes

			HHH	HHHH	HHHHH
non-iterative	L-R	leftmost	LHH	LHHH	LHHHH
		rightmost	HLH	HLHH	HLHHH
	R-L	leftmost	HLH	HHLH	HHHLH
		rightmost	HHL	HHHL	HHHHL
iterative	L-R	leftmost	LLH	LLLH	LLLLH
		rightmost	HLH	HLHL	HLHLH
	R-L	leftmost	HLH	LHLH	HLHLH
		rightmost	HLL	HLLL	HLLLL

*oClash can't get HLHL: it requires HHHH -> HLLL

OT-CC and Harmonic Serialism

- **Problem:** HS (and maybe OT-CC?) can generate the desired outputs for Abkhaz, Tonga, etc., but can't rule out equally harmonic outputs produced by derivations that do not apply clash deletion in L→R order—this should result in optionality between e.g. apará and ápara for 'pleat'.
- In order to avoid optionality, directionality has to be built into the process; this isn't allowed in existing forms of OT.

Harmonic Serialism using Praat ranking

- with garden-variety *CLASH (Assign one violation mark for every adjacent pair of h syllables):
- stage 1—already the wrong outcome.

/a͟ʰ-pa͟ʰ-ra͟ʰ/	*CLASH	MAX(h)	FTBIN	h→HEAD	ALIGN-L(σ́ʰ)	IAMB	PARSE-σ
☞aʰparaʰ		*		**			*
apaʰraʰ	*!	*		**			*
aʰpaʰra	*!	*		**			*
(áʰpaʰraʰ)	*!*					*	
(aʰpaʰráʰ)	*!*				*		

Harmonic Serialism using Praat ranking

- with *OCLASH:
- stage 1—aʰparaʰ (globally optimizing) and apaʰraʰ (locally optimizing) go on to stage 2.

/a̲ʰ-pa̲ʰ-ra̲ʰ/	*OCLASH	MAX(h)	FTBIN	h→HEAD	ALIGN-L(σ́ʰ)	IAMB	PARSE-σ
☞aʰparaʰ	*	*		**			*
apaʰraʰ	*	*		**			*
aʰpaʰra	**!	*		**			*
(áʰpaʰraʰ)	**!					*	
(aʰpaʰráʰ)	**!				*		

Harmonic Serialism using Praat ranking

- stage 2 with *oCLASH: same outcome as w other ranking

/apaʰraʰ/	*$_{o}$CLASH	MAX(h)	FTBIN	h→HEAD	ALIGN-L(σ́ʰ)	IAMB	PARSE-σ
☞aparaʰ		*		*			***
apaʰraʰ	*!			**			***
apaʰra	*!	*		*			***
(apáʰraʰ)	*!			*	*	*	
(apaʰráʰ)	*!			*	*		
(ápaʰraʰ)	*!			**		*	

/aʰparaʰ/	*$_{o}$CLASH	MAX(h)	FTBIN	h→HEAD	ALIGN-L(σ́ʰ)	IAMB	PARSE-σ
☞(áʰparaʰ)				*		*	
(aʰpáraʰ)				**!		*	
aʰparaʰ				**!			*!**
(aʰparáʰ)				*	*!		
aparaʰ		*!		*			***
aʰpara		*!		*			***

Stratal OT: derivation w Praat rank and surface *Clash

- Stage 1: Stem level

/pa^{h}-ra^{h}/	*Clash	Max(h)	FtBin	h→Head	Align-L(σ́^{h})	Iamb	Parse-σ
☞(pá^{h}ra)		*				*	
(pára^{h})		*		*!		*	
(pará^{h})		*			*!		
(pára)		**!				*	
(pará)		**!					
(pa^{h}rá^{h})	*!			*	*		
(pá^{h}ra^{h})	*!			*		*	

- **Problem**: same outcome as with the ranking employed earlier.

Stratal OT: derivation w Praat rank and surface *Clash

- Stage 2: Word level

aʰ-(paʰra)	*Clash	Max(h)	FtBin	h→Head	Align-L(σ́ʰ)	Iamb	Parse-σ
☞a(páʰra)		*			*	*	*
aʰ(páʰra)	*!				*	*	*
a(paráʰ)		**!			*		*
(aparáʰ)		**!			*		

- **Problem**: medial stress wins instead of desired final stress

Stratal OT: derivation w Praat rank, [[x-y]-z]], and surface *Clash

- Stage 1: Stem level

/a^{h}-pa^{h}/	*Clash	Max(h)	FtBin	h→Head	Align-L(σ́^{h})	Iamb	Parse-σ
(apá^{h})		*			*!		
☞(á^{h}pa)		*				*	
(a^{h}pá)		*		*!	*		
(ápa^{h})		*		*!		*	
(á^{h}pa^{h})	*!			*		*	
(a^{h}pá^{h})	*!			*	*		

- **Problem**: initial rather than desired final stress wins, as with the ranking we employed at the beginning of the Stratal OT presentation.

Stratal OT: derivation w Praat rank, [[x-y]-z]], and *oClash

- Stage 1: Stem level

/a̲ʰ-pa̲ʰ/	*oClash	Max(h)	FtBin	h→Head	Align-L(σ́ʰ)	Iamb	Parse-σ
☞(apáʰ)		*			*!		
(áʰpa)	*!	*				*	
(aʰpá)	*!	*		*!	*		
(ápaʰ)		*		*!		*	
(áʰpaʰ)	*!			*		*	
(aʰpáʰ)	*!			*	*		

Stratal OT: derivation w Praat rank, [[x-y]-z]], and *oClash

- Stage 2: Word level

(apáʰ)-raʰ	*oClash	Max(h)	FtBin	h→Head	Align-L(σ́ʰ)	Iamb	Parse-σ
aparaʰ		*		*			***
apaʰraʰ	*!			**			***
apaʰra	*!			*			***
(apáʰraʰ)	*!			*	*	*	
(apaʰráʰ)	*!			*	*		
(ápaʰraʰ)	*!			**		*	
(apa)(ráʰ)		*	*!		*		

- Problems:
  - Free Element Condition?...