24.961 Serial Derivations in OT

- In Classical OT the input is mapped to the output in one step with no intermediate stages (fully parallel)
- This factor allows constraints to perform global comparisons referring to information that only becomes available later in the derivation in the traditional ordered rule framework: top down effects, remote structures
- but there are situations where valid generalizations require reference to intermediate stages between the input and the output
- two alternative approaches are explored in the current generative literature to capture this phenomenon: Stratal Optimality Theory (Kiparsky, Rubach, Anttila, Bermudez-Otero, Jones, …) and Harmonic Serialism (McCarthy, Pater, Elfner, Pruitt, …)

Harmonic Serialism

- input mapped to output via a Gen-Eval loop; Gen is restricted to minimal modifications of the input: add or delete a single segment, change a single feature coefficient. What counts as a minimal change is a research question (e.g. reparsing of syllable structure comes for free)
- the candidates are submitted to the ranked constraint set and an optimal candidate emerges through normal evaluation, which is then sent back to Gen for another round of candidate creation by minimal changes
- when the Gen-Eval loop leads to no change, the derivation is said to "converge" on the output
- derivations thus display *monotonic improvement*, given the M > F constraint ranking

Example 1 Macushi Carib (McCarthy 2010)

- stress is parsed by left-to-right iambs and then the weak vowel of the foot is deleted

/wanamari/	->	wnámrí	'mirror'
/u-wanamari-ɾɨ/	->	wánmárɾɨ	'my mirror'

- insertion and deletion of a foot is assumed to be an elementary operation
- constraints and ranking:

  Parse-syllables: penalize a syllable that is not parsed by a foot
  *Weak vowel in foot: penalize an unstressed vowel in the foot
  Max-V

  ranking: Parse-syll » *Weak-Vowel » Max-V

(5) Step 1 of /wanamari/ → [(wná)(mrí)]

	wanamari	PARSE-SYLLABLE	*V-PLACE$_{weak}$	MAX
a. →	(waná)mari	**	*	
b.	wanamari	****!		
c.	wanmari	***!		*

(6) Step 2 of /wanamari/ → [(wná)(mrí)]

	wanamari	PARSE-SYLLABLE	*V-PLACE$_{weak}$	MAX
a. →	(waná)(marí)		**	
b.	(waná)mari	**!	*	
c.	(wná)mari	**!		*

Step 3 of /wanamari/ → [(wná)(mrí)]

	(waná)(marí)	PARSE-SYLLABLE	*V-PLACE$_{weak}$	MAX
a. →	(wná)(marí)		*	*
b.	(waná)(marí)		**!	

So Parse-Syll » *V-Place/weak enforces multiple footing of the word before deletion can occur; then the weak vowel of (marí) deletes to give (wná)(mrí). When this output is submitted again to Gen-Eval, all syllables are parsed, no weak vowels appear, and no further deletion will occur so Eval converges on same output as in the previous loop and thus (wná)(mrí) is the final output. An alternative derivation that deletes the weak vowel of the second foot and then the first also converges on (wná)(mrí).

Classical OT has no intermediate stage and thus has no easy way to distinguish the intended winner from losing competitors based solely on the output forms plus Max-V: it is only by going through the intermediate step of creating an iambic (s's) that the deleting weak vowels are defined

/wanamari/	Parse-syll	*weak	Max-V
>(wná)(mrí)			**
(wá)(nmá)(rí)			*
/u-wanamari-ri/			
>(má)(nrí)(ri)			***
(ú)(mná)(rrí)			***

Example 2: opaque stress in Levantine Arabic (Elfner 2009)

/katab-at/	->	(káta)bat	'she wrote'
/katab-na/		ka(táb)na	'we wrote'
/katab-t/		katábit	'I wrote'

1. derivational model (Abu-Salim 1982)

/katab-at/	/katab-t/	
kátabat	katábt	stress
----------	katábit	epenthesis

2. OT constraints:

*Complex onset,coda: penalize syllables with a complex onset or coda
PwHd: penalize a Prosodic word that does not parse a foot (and therefore have stress)
Foot-Bin: penalize a foot that is not bimoraic (one heavy or two lights)
Non-Fin: penalize a foot that parses a word-final syllable
Parse segments into syllables: penalize a segment not in a syllable
Align-Rt: penalize feet that are not aligned with right edge of word

3. ranking: PwHd, Non-Fin, Ft-Bin » Align-Rt

/katab-at/	PwHd	Ft-Bin	Non-Fin	Align-Rt
> (ká.ta).bat				*
ka.ta.bat	*!			
ka(tá.bat)			*!	
ka(tá)bat		*!		*

4. ranking: PwHd » *Complex » Parse-seg

/katab-t/ -> ka(tá)bit: step 1

/katab-t/	PwHd	*Complex	Parse-seg
> ka(táb)<t>			*
ka.ta.bit	*!		
ka.(tábt)		*!	

/katab-t/ -> ka(tá)bit: step 2

/ ka(táb)<t>/	PwHd	*Complex	Parse-seg
> ka(tá)bit			
ka(táb)<t>			*!

5. On the next Gen-Eval loop, ka(tá)bit is still mapped to ka(tá)bit and so this is the output.

6. The serialization of Stress before Epenthesis depends crucially on allowing candidates with just one change per loop (either epenthesis or foot parsing but not both) and relying on constraint ranking to choose foot parsing over epenthesis as the optimal output; on the second loop the requirement to have a stress is satisfied and so the candidate with epenthesis plus the earlier introduced stress can emerge as the winner.

7. Classical OT cannot (easily) choose (kata)bat over ka(ta)bat while also choosing ka(ta)bit over (kata)bit without referring to the derivational status of the vowels as underlying (templatic) vs. inserted.

Example 3: Salayarese stress and epenthesis

/kartu/ -> kará:tu but /kikir/ -> kí:kiru

ranking hierarchy: *rC » *r# » *rV (this is a familiar hierarchy when we see Donca's work)

ranking: *rC » PWrHd » *r# » *rV

/kartu/ -> kará:tu Step 1

/kartu/	*rC	PWrHd	*r#
> karatu		*	
kartu	*W		
(kár)tu	*W		

/kartu/ -> kará:tu Step 2

/karatu/	*rC	PWrHd	*r#
> ka(rá)tu			
karatu		*W	

/kartu/ -> kará:tu Step 3

/ ka(rá)tu /	StoW		
> ka(rá:)tu			
ka(rá)tu	*W		

/kikir/ -> kí:kiru Step 1

/kikir/	*rC	PWrHd	*r#
> (kíki)r			
kikir		*W	
kikiru		*W	

/kikir/ -> kí:kiru Step 2

/(kíki)r/	*rC	PWrHd	*r#
> (kíki)ru			
(kí:ki)r			*W

/kikir/ -> kí:kiru Step 3

/(kíki)ru /	Str-to-W		
> (kí:ki)ru			
/(kíki)ru	*W		

The Serial OT model will not be able to treat all cases of derivational opacity the same way; future research will determine which provides an overall better typology of the data

Stratal OT

In this model the input is mapped to the output through a series of sub-grammars of classical-format parallel OT constraint rankings. The subgrammars reflect successively more inclusive morphological and phrasal domains: e.g. stem > word > phrase. The constraint rankings may differ (minimally) from one stratum to another.

Example 1 Levantive Arabic stress and epenthesis

1. derivational model: /katab-at/ /katab-t/

kátabat	katábt	stress
----------	katábit	epenthesis

word-level: Dep-V » Parse-Segment; PwHd, Non-Fin, Ft-Bin » Align-Rt

/katab-t/	Dep-V	Parse-Seg	
> ka(táb)t		*	
(káta)bit	*!		

phrase-level: Parse-Seg » Dep-V

/ ka(táb)t /	Ident-stress	Parse-Seg	Dep-V
> ka(tá)bit			*
ka(táb)t		*!	
(káta)bit	*!		

Stratal OT appears to be able to describe more cases of opacity than Harmonic Serialism if one is allowed to freely assign different alternations to different strata, sometimes without independent evidence from the morphology. At least for the Arabic case there is some independent evidence for the phrasal (postlexical) status of the epenthesis since if the next word begins with a vowel then there is no epenthesis: katábt il-kútub 'I wrote the books' vs. šírib il-ʔáhwa 'he drank the coffee'

Example 2: North German (Ito & Mester 2002)

Meere [me:Rə] Meer [me:ɐ]
Licht [ç] Buch [x] Chemie [ç] solch [ç]
Kirche [kɪɐçə]

rules: /bu:ç/ / kɪrçə /
bu:x -------- ç -> x / [+back]----
------- kɪɐçə r -> ɐ in coda

Stratum 1

*[+back, -cons] ç » Ident-[back] (M > F)

/buɕ /	*[+back, -cons] ç	Ident-[back]
> bux		*
buɕ	*!	

Ident-cons » *coda-rhotic (F > M)

/me:R/	Ident-[cons]	*coda-rhotic
> me:R		*
me:ɐ	*!	

Stratum 2

Ident-back > *[+back, -cons] ç (F > M)
*coda-r > Ident-cons (M > F)

/me:R/	*coda-rhotic	Ident-[cons]
> me:ɐ		*
me:R	*!	

/kɪRɕə/	Ident-[back]	*[+back, -cons] ɕ
> kɪʁɕə		*
kɪʁxə	*!	

Bloomfield (1933) observed that diminutive suffix –chen does not shift to a back consonant after a back vocoid (Kuh, Kuhchen [ku:ɕən]) and suggested that there was a # juncture in this structure /ku:#ɕən/, supporting the idea that the Ident-[back] » *[+back, -cons] ɕ ranking characterizes the outer layer of word structure

See the recent thesis of Patrick Jones for an in-depth analysis of the complex tonal patterns of Kinande cast with the Stratal OT model.

References

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24.961 Introduction to Phonology

Fall 2014