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# Week 10 – Opacity—addendum

April 23, 2008

## 1 Strategies to address the derivational residue in OT

- (1) Excellent reference: McCarthy, John. 2007. *Hidden Generalizations: Phonological Opacity in Optimality Theory*. Equinox Publishing, Ltd.

### 1.1 Constraint Conjunction

- (2) *Constraint Conjunction* is one strategy people have used to handle saltation.
- a. Anna Lubowicz (1998) ‘Derived Environment Effects in OT’<sup>1</sup>  
b. Ito, Junko and Armin Mester (1999)
- (3) Recall the Campidinian Sardinian data:
- a. Intervocalic lenition of voiceless stops /p, t, k/ and the voiceless affricate /tʃ/ (underlying forms justified by appearance in isolation):
- |                  |   |                  |                  |
|------------------|---|------------------|------------------|
| /bɛ:ɹu piʃ:i/    | → | [bɛ:ɹu βiʃ:i]    | ‘nice fish’      |
| /s:u trintaduzu/ | → | [s:u θrintaduzu] | ‘the thirty-two’ |
| /dɛ kuat:ru/     | → | [dɛ ɣuat:ru]     | ‘of four...’     |
| /s:u tʃɛlu/      | → | [s:u ʒɛlu]       | ‘the heaven’     |
- b. Preservation of underlying intervocalic /b, d, g/:
- |                   |   |                   |                |
|-------------------|---|-------------------|----------------|
| /s:a bia/         | → | [s:a bia]         | ‘the road’     |
| /s:u gat:u/       | → | [s:u gat:u]       | ‘the cat’      |
| /don:ia dominiyu/ | → | [don:ja dominiyu] | ‘every Sunday’ |
- (4) Lubowicz’s answer, endorsed by Ito/Mester: constraints that are violated when two conditions are met in the same location (“local conjunction”).
- a. For Campidinian Sardinian:
- \*IDENT(VOICE) AND \*V[-cont]V
- b. Intuition: “Don’t have a intervocalic stop if you’re also changing voice”

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<sup>1</sup>Lubowicz, Anna. 1999. Derived environment effects in OT. *The Proceedings of the Seventeenth West Coast Conference on Formal Linguistics*, ed. by Kimary Shahin, Susan Blake and Eun Sook Kim, 451-65. Stanford, CA: Center Study Language & Information. [Rutgers Optimality Archive 239]

- (5) Fill in constraints and reassure yourself that this gets you what is needed:

	/apa/	Id(vce) & *V[-cont]V	*V[-vce]V	ID(voice)	*β	ID(cont)	*V[-cont]V
a.	☞ aβa						
b.	apa						
c.	aba						

	/aba/	Id(vce) & *V[-cont]V	*V[-vce]V	ID(voice)	*β	ID(cont)	*V[-cont]V
a.	aba						
b.	apa						
c.	☞ aβa						

	/βa/	Id(vce) & *V[-cont]V	*V[-vce]V	ID(voice)	*β	ID(cont)	*V[-cont]V
a.	☞ ba						
b.	βa						
c.	pa						

- (6) Conjunction has to be local to avoid insane results like: /tɪk/ → [tɪk], /pag-tɪk/ → [paktɪx] (the assimilatory voicing of the first /g/ permits the second /k/ to spirantize).
- (7) As constraint families grow, the constraints grow. . . If there are  $m$  possible Markedness constraints and  $n$  Faithfulness constraints, there are now  $m \times n$  constraints. . .
- (8) Factorial Typology
- Form of the constraint: “don’t be both marked and unfaithful”
  - Lubowicz’s intent: “if you’re unfaithful, don’t be marked”
  - An additional consequence: “if you’re marked, be faithful”—meaning we can get special entities arise only in a marked context, which is going to be a problem
- (9) An Apparent Disaster Case

	/ba/	ID(voice) & *CCC	MAX(C)	*[-son, +voice]	*CCC	ID(voice)
	☞ pa					
	ba					

	/aptka/	ID(voice) & *CCC	MAX(C)	*[-son, +voice]	*CCC	ID(voice)
	☞ aptka					
	apka					

	/apdka/	ID(voice) & *CCC	MAX(C)	*[-son, +voice]	*CCC	ID(voice)
	☞ apdka					
	aptka					

- (10) What is wrong?

- a. I think it is the “primitive” approach to Faithfulness in classical OT—just IDENT, MAX, DEP, and a few others.
- b. We need to expand the power of the theory—in a way that doesn’t give it insanely excessive power.
- c. Some potentially relevant ideas:
  - (i) Steriade’s view that unfaithful mappings prefer to be phonetically minimal
  - (ii) The view that UG can impose bias, and not just absolute bans

## 1.2 Non-surface constraint environments

- (11) This strategy introduces constraints that are neither markedness nor faithfulness constraints, but some combination.
- (12) Ref. John McCarthy (1996) Remarks on phonological opacity in Optimality Theory. In Jacqueline Lecarme, Jean Lowenstamm, and Ur Shlonsky, eds., *Studies in Afroasiatic Grammar. Papers from the Second Conference on Afroasiatic Linguistics*, Sophia Antipolis, 1994. The Hague: Holland Academic Graphics. Pp. 215243.
- (13) Recall Polish counterbleeding opacity:

	<i>sg.</i>	<i>pl.</i>	
a)	trup	trupi	‘horse’
b)	wuk	wuki	‘bow’
c)	snop	snopi	‘sheaf’
d)	kot	koti	‘cat’
e)	nos	nosi	‘nose’
f)	sok	soki	‘juice’
g)	klup	klubi	‘club’
h)	trut	trudi	‘labor’
i)	grus	gruzi	‘rubble’
j)	wuk	wugi	‘lye’
k)	żwup	żwobi	‘crib’
l)	lut	lodi	‘ice’
m)	vus	vozi	‘cart’
n)	ruk	rogi	‘horn’

- (14) For Polish /voz/ → [vus], we could propose a constraint like:

“A nonlow back vowel must be high on the surface, if it is followed by a voiced obstruent at the level of underlying representation.”

★ Why/How is this different from contextual markedness?

★ Why/How is this different from contextual faithfulness?

(15) This seems most straightforward but has not been widely favored, perhaps because it seems like a brute-force solution.

★ What would the non-surface constraint(s) look like for Campidinian Sardinian?

### 1.3 Stratal OT

(16) Counterbleeding, counterfeeding, and saltation, are all manageable in OT with levels.

(17) The basic idea is to permit a limited, prespecified number of levels of structure. These, and only these, may be involved in serial derivation. (Goldsmith 1993, McCarthy and Prince 1993).

(18) Goldsmith (1993) suggests an “M(orpheme)-level”, a “W(ord)-level” and a “P(honetic)-level”

(19) See also Kiparsky (2000?) for a version of Lexical Phonology incorporating OT (called LPM-OT), in which all derivationality follows from the structure of the grammar. The levels here are essentially “stem, word, and postlexical”.<sup>2</sup>

(20) Recall Catalan has processes of word-final non-continuant deletion and nasal assimilation, so that a UR like /ben+k/ surfaces as [bɛŋ] ‘I sell’.

★ Why do we call this relation opaque?

★ What kind of opacity is this, counterbleeding or counterfeeding?

(21) With levels:

#### Stem level

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<sup>2</sup>The paper is here: <http://www.stanford.edu/~kiparsky/Papers/vdhulst-ritter.pdf>

	/bɛn+k/	MAX-C	*	+nas αplace	+cons -αplace	*[+nas][-cont] ]σ	IDENT (PLACE)
doubly bad b/c of nk]σ	bɛnk				*!	*	
assimilation fixes only one prob- lem	☞ bɛŋk					*	*
deletion not allowed	bɛn		*!				*
deletion not allowed	bɛŋ		*!				

So the output of the stem level [bɛŋk] becomes the input to the word level:

**Word level**

	/bɛn+k/	*[+nas][-cont] ]σ	*	+nas αplace	+cons -αplace	MAX-C	IDENT (PLACE)
doubly bad b/c of nk]σ (plus no reason to change back to [n])	bɛnk	*(!)			*(!)		*
bad b/c *ŋk]σ	bɛŋk		*!				
deletion fixes re- maining problem	☞ bɛŋ						*
no reason to change back to [n]	bɛn						* *

(22) So the final output is [bɛŋ].

- a. No further assimilation applies at postlexical level, since this is the only word in the utterance.

(23) Recall in Bedouin Arabic, underlying /katab/ → [kitab], but /gabr/ → [gabur].

★ Why do we call this relation opaque? Is this counterbleeding or counterfeeding?

(24) With levels:

**Earlier level (don't know whether stem or word)**

	/gabr/	DEP-V	*a] <sub>σ</sub>	*COMPLEX CODA	IDENT(hi)	IDENT(lo)
bad b/c of br] <sub>σ</sub>	☞ gabr			*		
epenthesis not allowed	ga.bur	*(!)	*(!)			
epenthesis not allowed	gi.bur	*!			*	*

**Later level (perhaps postlexical)**

	/gabr/	*COMPLEX CODA	IDENT(hi)	IDENT(lo)	DEP-V	*a] <sub>σ</sub>
bad b/c of br] <sub>σ</sub>	gabr	*!				
epenthesis fixes one problem but creates a new one	☞ ga.bur				*	*
raising not al- lowed	gi.bur		*(!)	*(!)	*	

★ Discussion. What are your thoughts on Stratal OT?

## 1.4 Candidate Chain Theory

- (25) Reference: McCarthy, John. 2007. *Hidden Generalizations: Phonological Opacity in Optimality Theory*. Equinox Publishing, Ltd.
- (26) Essential idea: The constraints in CON do not evaluate (underlying,surface) pairs. Instead, they evaluate a *sequence of derivational steps* from underlying form to surface form.
- (27) This sequence is called a *candidate chain* and this version of OT is abbreviated OT-CC.
- (28) GEN only produces candidate chains that are:

- a. gradually divergent (minimal change at each step)  
 b. harmonically improving (the change cannot have led to increased ill-formedness)
- (29) Examples of candidate chains for input /apa/ (given high-enough ranked \*V[-cont]V, \*V[-voice]V):
- a. <apa>  
 b. <apa, aba>  
 c. <apa, aba, aβa>  
 d. <apa, aφa, aβa>
- (30) Standard Markedness and Faithfulness constraints
- a. Markedness constraints apply as before; i.e only taking as arguments the final surface form.  
 b. Faithfulness constraints apply as before too (evaluated by considering underlying form and surface form). But note this is the sum of all the individual changes in the chain b/c of harmonically improving requirement. So we can think of each step in the chain as violating some faithfulness constraint.
- (31) OT-CC introduces a new kind of constraint called PREC constraints. These constraints determine the well-formedness of chains.
- a. Prec constraints have the form PREC(F1,F2) which intuitively means “a chain in which a violation of F1 occurs before a violation of F2 is ill-formed.” (see McCarthy 2007:98)
- a. Violations are assigned in two instances:
- a. Each instance of a F2 violation not preceded by a F1 violation.  
 b. Each instance of a F2 violation that is preceded by a F1 violation.
- b. So a chain with only one F1 and F2 violation where the F2 violation occurs earlier in the chain than the F1 violation incurs *two* violations of PREC(F1,F2).
- (32) OT-CC and counterbleeding. For Catalan, rank PREC(ID(PLACE),MAX-C) above IDENT(place).

/bɛn+k/	*	+nas αplace	+cons -αplace	*[+nas][-cont] ] <sub>σ</sub>			
bɛnk							
bɛnk, bɛn					*	*!	
bɛnk, bɛŋk							*
☞ bɛnk, bɛŋk, bɛŋ					*		*

★ Do you find anything odd about this analysis?

- (33) Note: A meta-constraint on the theory requires  $\text{PREC}(\text{F1}, \text{F2})$  to be outranked by  $\text{F2}$  always (see McCarthy 2007:101-102).

★ Let's work out on the board an OT-CC analysis of counterfeeding (Bedouin Arabic case) and saltation (Campidinian Sardinian case).

- (34) Commentary on this theory: see Colin Wilson (ms., 2006) "Counterfeeding from the Past" (available upon request), showing that Candidate Chain theory allows:

Rule-ordering theory makes the following prediction about the interaction of these processes: if [word-final consonant] deletion feeds [word-final raising ( $/\text{pek}/ \rightarrow \text{pe} \rightarrow [\text{pi}]$ ) and raising feeds assibilation of  $/\text{t}/$  to  $[\text{s}]$  before  $[\text{i}]$  ( $/\text{te}/ \rightarrow \text{ti} \rightarrow [\text{si}]$ ), then instances of raising that are fed by consonant deletion also feed assibilation ( $/\text{tek}/ \rightarrow \text{te} \rightarrow \text{ti} \rightarrow [\text{si}]$ ).

- (35) The bizarre case predicted by OT-CC
- a.  $/\text{pek}/ \rightarrow \text{pe} \rightarrow [\text{pi}]$
  - b.  $/\text{te}/ \rightarrow \text{ti} \rightarrow [\text{si}]$  but
  - c.  $/\text{tek}/ \rightarrow \text{te} \rightarrow \text{ti} \rightarrow [\text{ti}]$
  - d. would follow from "Don't violate  $\text{MAX}(\kappa)$  before you violate  $\text{IDENT}(\text{CONTINUANT})$ "