Allomorph selection predicts opacity in Harmonic Serialism

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Introduction. Opacity has been a challenge for constraint-based grammars. In this paper, we show that unlike parallel Optimality Theory (OT), Harmonic Serialism (HS) predicts all cases of opacity as allomorph selection.

Background. Opaque interactions present a cornerstone of rule-based grammars (Kiparsky 1976). In contrast, many constraint-based approaches cannot model opaque interactions, including parallel OT (McCarthy 1999, 2007). HS predicts only limited counterbleeding opacity, but is not a general solution to this challenge. As an alternative, Sanders (2003) and others have argued that opaque interactions are a historical or morphological residue and are not productive.

Proposal. In opaque interactions, there is a phonological process that either exceptionally fails to apply (counterfeeding) or applies in unexpected contexts (counterbleeding). In our proposal, these exceptionally-behaving processes are interpreted as different input allomorphs. All derivations start with allomorph selection, which counts as a single step in the derivation (Wolf 2008; Bonet 2013). The winning allomorph is then fed back to Gen as an input for another round of evaluation. As usual in HS, this loop is repeated until the fully faithful parse of the latest input wins. Our claim is that allomorph selection predicts opaque interactions in and only in HS. We demonstrate this claim on two representative cases below.

Lomongo counterfeeding. Lomongo (Hulstaert 1961; Kentowicz & Kisseberth 1979) shows gliding of non-low vowels (/o-isa/ → [wisa] 'you hide') and voiced obstruent deletion after vowels (/ba-bina/ → [baina] 'they dance'). The interaction is opaque: when deletion applies, gliding underapplies (/o-bina/ → [oina], not *[wina] 'you dance'). In a rule-based account gliding applies before deletion, constituting a counterfeeding order.

We propose that gliding is actually allomorph selection. Under such an analysis, allomorph selection applies at the first step and is driven by a top-ranked constraint against an unsyllabifiable onset cluster *CC (1). At step 2, deletion applies, driven by *Vb (≡ No Vs followed by voiced obstruents). At step 3, top-ranked IDENT inhibits gliding, which would be the transparent mapping. This analysis works because hiatus is disfavored only at the first step (cf. [wisa] step 1), in which faithfulness is irrelevant due to the presence of the two allomorphs underlyingly.

(1) Lomongo: /{o,w}-bina/ → [oina] *(→ [wina]); /{o,w}-isa/ → [wisa]

[oina] step 1: Allomorph selection

{o,w}bina	ID	*CC	*Vb	MAX	*VV
☞ obina			*		
wbina		*!			

[oina] step 3: Convergence (VV preferred)

oina	ID	*CC	*Vb	MAX	*VV
☞ oina					*
wina	*!				

[oina] step 2: Deletion (VV preferred)

obina	ID	*CC	*Vb	MAX	*VV
☞ oina				*	*
obina			*!		

[wisa] step 1: Allomorph sel'n (VV avoided)

{o,w}isa	ID	*CC	*Vb	MAX	*VV
☞ wisa					
oisa					*!

Low German counterbleeding. Low German (Kiparsky 1968; Kenstowicz & Kisseberth 1971) exhibits postvocalic spirantization of voiced obstruents (/taːg-ə/ → [taːɣə] 'days') and final devoicing (/haʊz/ → [haʊs] 'house'). The interaction is again opaque: when devoicing applies, spirantization overapplies (/taːg/ → taːɣ → [taːx] 'day'). In a rule-based account spirantization applies before devoicing, constituting a counterbleeding order.

Parallel to the Lomongo analysis, we propose that allomoph selection is at play, in this case of the root (2). The two root allomorphs differ in terms of the feature [continuant] only. Allomorph selection applies at the first step; the constraint *Vg (≡ No Vs followed by voiced stops; cf. *Vb above) favours the fricative allomorph. At step 2, final devoicing applies, followed by convergence at step 3 (omitted). Affixed words have no devoicing.

(2) Low German: /{taːg,taːɣ}/ → taːɣ → [taːx]; /{taːg,taːɣ}-ə/ → [taːɣ-ə]; /haʊz/ → [haʊs]

[taːx] step 1: Allomorph selection

{taːg,taːɣ}	*Vg	FinDev	Id(voi)
☞ taːɣ		*	
taːg	*!	*	

[taːɣə] step 1: Allomorph selection

{taːg,taːɣ}ə	*Vg	FinDev	Id(voi)
☞ taːɣə			
taːgə	*!		

[taːx] step 2: Devoicing

taːɣ	*Vg	FinDev	Id(voi)
☞ taːx			*
taːɣ		*!	

[haʊs] step 1: Devoicing

haʊz	*Vg	FinDev	Id(voi)
☞ haʊs			*
haʊz		*!	

Failure of parallel OT. Parallel OT cannot deal with opaque interactions, even as allomorphy, shown in (3). In Lomongo, hiatus will be avoided and the incorrect transparent candidate [wina] will be preferred (indicated by '☜'). In Low German, the transparent and the opaque candidate tie because there is no constraint that favours the actually attested candidate [taːx]; other markedness constraints make incorrect predictions about other inputs.

(3) Parallel OT fails

Lomongo [oina] counterfeeding

{o,w}bina	Id	*CC	*Vb	Max	*VV
☹ oina					*!
☜ wina					
obina			*!		

Low German [taːx] counterbleeding

{taːg,taːɣ}	*Vg	FinDev	Id(voi)
☞ taːk			*
☞ taːx			*
taːg	*!	*	

Discussion. We have shown that allomorph selection predicts both major types of opacity in HS, but not in parallel OT. We corroborated these findings by analyzing other well-known and typologically diverse opaque cases. Allomorph selection works in HS because the allomorph selection inactivates a crucial faithfulness constraint. In the case of Lomongo, for instance, this constraint is Ident, which is inactive at the allomorph selection step but makes sure that the derivation does not converge to the opaque candidate [wina] in later steps. In Low German, the constraint is Ident(continuant), omitted. In our derivation, this constraint is inactive. However, in the non-allomorphy analysis, Ident(continuant) would be the one favouring the unattested transparent candidate [taːk].

The present approach makes a specific prediction: opacity is possible, but it will typically involve allomorphy for one of the interacting processes, which will thus not be fully phonological. While purely phonological alternations and allomorphy are sometimes difficult to distinguish, a wide variety of cases do show additional exceptionality typical of allomorphy. For instance, while speakers of Low German extend final devoicing to nonce words, this is not the case for spirantization (Sanders 2003:196). Our approach predicts similar exceptionality can be found in other opaque cases.

Conclusions. HS predicts opaque interactions, but only when allomorph selection is involved. This matches data from a large set of languages and provides answers to one of the long-standing issues in phonological theory.