Opaque Interactions as Gradience in Phonology

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Main claims

- In Gua (Niger-Congo, Ghana) two phrasal phonological processes interact in an opaque counterbleeding pattern.
- I show that this pattern is expected if gradient symbolic representations with shared activity are assumed.
- Spreading leads to reduction of gradient activity on feature-bearing units, which share the activity of the linked feature among themselves.
- This account makes the testable prediction that cases of phrase-level opacity should always involve a process that can be modeled as spreading.

Outline

1. Opaque Interactions in Phonology
2. Gradience in Phonology
3. Case Study: Gua
4. Outlook: Gradience at the Phonology-Phonetics Interface
5. Conclusion

Opaque Interactions in Phonology

(1) Definition of Opacity (cf. Baković, 2007)
A rule applies opaquely if there are surface structures where

a. the rule underapplies, e.g. there are contexts for the rule to apply where the rule does not apply
b. or the rule overapplies, e.g. there are structures derived by the rule outside of its context.

Opacity in Phonology II

- A famous example of overapplication involves deletion and palatalization in Bedouin Hijazi Arabic (McCarthy, 2007).
- Even if the palatalization-triggering vowel /i/ is deleted on the surface, palatalization still applies.

(2) Counterbleeding in Bedouin Hijazi Arabic (McCarthy, 2007)

a. /ʃarib/-/at/ → [ʃarbat] ‘she drank’

b. /ħaːkim/ → [ħaːkʲim] “ruling (masculine singular)”

c. /ħaːkim-in/ → [ħaːkʲmin] ‘ruling (masculine plural)’

Opacity as a challenge to OT

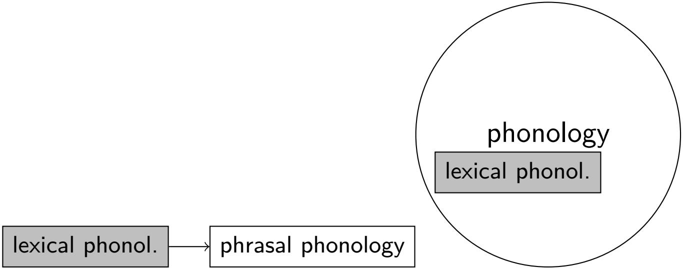
- Opacity poses a challenge to parallel frameworks of phonology, such as Optimality Theory (Prince & Smolensky, 1993), because the phonological generalization cannot be read of the surface representations.
  - If a process applies without its context on the surface, no surface-oriented markedness constraint can be violated,
  - A palatalization triggering markedness constraint cannot apply to the surface form in the Arabic data.
  - If a process does not apply in its context on the surface, a surface-oriented markedness constraint is still violated.

Possible OT-Extensions for Opacity I

- Several extensions have been proposed in order to allow a restricted amount of opacity in Optimality Theory, e.g. Stratal OT (Bermúdez-Otero, 2012; Kiparsky, 2015) or Base-Derivative Correspondence (Benua, 1997; McCarthy, 1998).
- Most of these approaches focus on word-level/lexical phonology.
  - In Stratal OT, this is achieved by introducing restricted serial interaction for words.
  - In Base-Derivative Correspondence, the correspondence relation is standardly defined between a base and a derived lexical form.

Possible OT-Extensions for Opacity II

(3) Opacity in Stratal OT and Base-Derivative Correspondence



Phrase-Level Opacity

- Phrase-level opacity thus poses a more severe challenge to parallel theories of phonology, such as Optimality Theory, even with extensions.
- If two processes interact opaquely and apply at the phrase-level, this is a problem.
- I will term this prediction the No-Phrase-Level-Opacity-Hypothesis and provide a counterexample from Gua.

(4) No Phrase-level Opacity Hypothesis
A process X and a process Y cannot interact opaquely if both X and Y apply at the phrasal stratum.

Gradience in Phonology

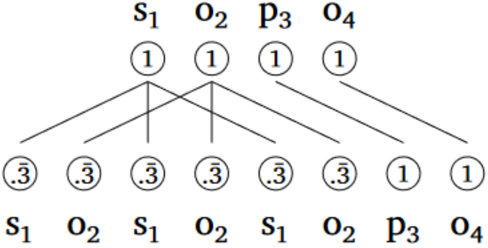
Gradience in Phonology

- Goldrick & Smolensky (2016) introduced gradient representations into Harmonic Grammar, an interactionist frameworks of phonology.
- Gradient Symbolic Representations combine symbolic representations with gradient activity that influences phonological computation in a Harmonic Grammar framework.
- Each phonological object is associated with a gradient activity that influences constraint violations.

Example: Gradience in Reduplication

- Building on the analysis of French Liaison by Goldrick & Smolensky (2016), Zimmermann (2021) assumes that overapplication in multiple reduplication can be analyzed as distribution of activity.
- Reduplicated material has less activation and therefore triggers less constraint violations.

(5) Reduplication as distribution of activity (Zimmermann, 2021)

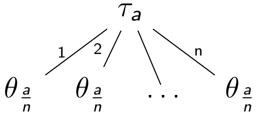


Proposal: Shared Activity I

- I propose that phrase-level opacity follows from Shared Activity (cf. Faust & Smolensky, 2017; Zimmermann, 2021) in gradient symbolic representations (Goldrick & Smolensky, 2016).
- Processes are opaque if activity — and consequently constraint violation — is changed by feature sharing.
  - Reduction of markedness violation leads to underapplication.
  - Increase of faithfulness violations leads to overapplication.

(6) **Shared Activity**
The activity a of a feature-bearing unit θ depends on the number n of FBUs associated to the feature τ that is associated to the FBU θ, i.e. $a(\theta) = \frac{a(\tau)}{n}$.

(7) Shared Activity in Feature spreading



Case Study: Gua

Phrase-Level Opacity in Gua

- In Gua (Niger-Congo, Ghana) vowel harmony and hiatus resolution interact opaquely at the phrase-level (Obiri-Yeboah & Rasin, 2023).
- Cross-word vowel harmony applies even though the trigger is not present on the surface.
- Instead, the triggering vowel is assimilated to a following vowel.

(8) Opaque Interaction between harmony and hiatus resolution (Obiri-Yeboah & Rasin, 2023, 15,18)

a. /àɲɛ̃́ kwè ɛ̀dɛ̀/ → [àɲẽ́ kwɛ̀ ɛ̀dɛ̀]
man grind.HAB something
'A man grinds something'

b. /àhɛ́ tè ɔ̀kpʊ́kɔ́/ → [àhé tɔ̀ ɔ̀kpʊ́kɔ́]
knowledge slaughter.PST table
'Knowledge slaughtered a table.'

Vowel Harmony in Gua I

- Gua has a process of cross-word ATR harmony inside phonological phrases.
- It applies to a word-final [-ATR] vowel if it is followed by a syllable with a [+ATR] vowel.
- The word-final vowel becomes [+ATR].

(9) Oral vowel inventory (Obiri-Yeboah & Rasin, 2023, 7)

+ATR		-ATR	
i	u	ɪ	ʊ
e	o	ɛ	ɔ
	a		ɜ

(10) Phrasal regressive [+ATR] harmony (Obiri-Yeboah & Rasin, 2023,
8)

a. tʊ́ wátɕì
calabash break.PST
'A calabash broke.'

b. tú hè
calabash fall.PST
'A calabash fell.'

c. kpʊ́tɔ̀ fíńtɪ̃̀
frog jump.PST
'A frog jumped.'

d. kpʊ́tò sũ̀
frog cry.PST
'A frog cried.'

Hiatus resolution in Gua

- A second phrasal process in Gua is vowel hiatus resolution.
- This includes total regressive assimilation if two non-high vowels become adjacent across word boundaries inside a phrase.

(11) Phrasal Hiatus resolution (Obiri-Yeboah & Rasin, 2023, 12,13)

a. kwɛ̀lé téì
fry.IMP fish
'Fry food!'

b. kwɛ̀ló òní
fry.IMP meat
'Fry fish!'

c. kpò òní
close fish

d. kpɛ̀ ɛ́sɛ̂̃
close people

Opacity: vowel harmony and hiatus resolution I

- The context for both processes can be present in an intraphrasal sequence of three words where the medial word is monosyllabic.
- The final vowel of the first word harmonizes with the *underlying* non-high vowel of the following word.
- This underlying vowel does not surface because it fully assimilates to the initial vowel of the following word.
- On the surface, there is thus no trigger for the cross-word harmony present.

- The interaction is thus opaque because vowel harmony seems to apply without an overt trigger.
- This is a case of overapplication or counterbleeding.

(12) Opaque interaction between harmony and hiatus resolution (Obiri-Yeboah & Rasin, 2023, 15,18)

a. /àɲɛ̃́ kwè ɛ̀dɛ̀/ → [àɲẽ́ kwɛ̀ ɛ̀dɛ̀]
man grind.HAB something
'A man grinds something'

b. /àhɛ́ tè ɔ̀kpʊ́kɔ́/ → [àhé tɔ̀ ɔ̀kpʊ́kɔ́]
knowledge slaughter.PST table
'Knowledge slaughtered a table.'

Gradient Analysis I

- I assume that spreading as well as coalescence involve sharing activity (cf. also Zaleska, 2018).
- Sharing activity increases the violation of faithfulness constraints.
- This means that spreading further (by coalescence) is worse than spreading less and shifting the [+ATR] feature for harmony.

Gradient Analysis II

(13) List of Constraints

a. *[-ATR]#(C)[+ATR]: Count −1 for a sequence of a word-final syllable and a following [+ATR] syllable that do not share a [+ATR] feature.

b. $*[\text{-high}]_i\#[\text{-high}]_j$: Count -1 for a sequence of a non-high word-final vowel and a following non-high vowel that do not share all features.

c. IDENT#V: Count -1 for a word-initial vowel that is associated to different feature values in the input and the output.

d. IDENT(-ATR): Count -1 for a vowel that is [-ATR] feature in the input but not in the output.

e. $\text{IDENT}(+\text{ATR})_g$: Count 1-$x$ for a vowel with activity x that is associated to a [+ATR] feature in the input but not in the output.

Gradient Analysis: Vowel Harmony I

- Following Obiri-Yeboah & Rasin (2023), I derive vowel harmony by a directional markedness constraint *[-ATR]#[+ATR] (cf. also Mahanta, 2008, 2012) and a split in faithfulness between IDENT(+ATR)$_g$ and IDENT(-ATR).
- The weight of IDENT(-ATR) is the lowest.
- IDENT(+ATR)$_g$ is sensitive to shared activation.

Gradient Analysis: Vowel Harmony II

(14) Phrasal Harmony in Gradient Harmonic Grammar

-ATR +ATR I: tʊ́ hè $\mathcal{W}$	*[-A]#[+A] 23	ID(+A)$_g$ 21	ID(-A) 1	$\mathcal{H}$
-ATR +ATR a. tʊ́$_{1.0}$ hè$_{1.0}$	-1			-23.0
+ATR b. tú$_{.5}$ hè$_{.5}$			-1	-1.0
-ATR c. tʊ́$_{.5}$ hɛ̀$_{.5}$		-0.5		-10.5

Gradient Analysis: Hiatus Resolution I

- Vowel hiatus is derived by a constraint against different mid vowels across a word boundary $*[\text{-h}]_i\#*[\text{-h}]_j$ and a positional faithfulness constraint for word-initial vowels $\text{I}\textsc{d}\#\text{V}$ (again, based on Obiri-Yeboah & Rasin (2023)).
- These weights have to be higher than the two general faithfulness constraints.

(15) Hiatus Resolution in Gradient Harmonic Grammar

I: +ATR -ATR kpò$_{1.0}$ ɛ́$_{.5}$ sɛ̃̂$_{.5}$ $\mathcal{W}$	*[-h]$_i$#[-h]$_j$ 22	ID#V 22	ID(+A)$_g$ 21	ID(-A) 1	$\mathcal{H}$
a. +ATR -ATR kpò$_{1.0}$ ɛ́$_{.5}$ sɛ̃̂$_{.5}$	-1				-22
b. -ATR kpɛ̀$_{.\bar{3}}$ ɛ́$_{.\bar{3}}$ sɛ̃̂$_{.\bar{3}}$			-0.$\bar{3}$		-7
c. +ATR -ATR kpò$_{.\bar{3}}$ ó$_{.\bar{3}}$ sɛ̃̂$_{.\bar{3}}$		-1		-1	-23

Gradient Analysis: Opaque Interaction I

- In the opaque case, application of both processes is enforced by the high weight of the markedness constraints.
- Under the assumption that adjacent autosegmental features automatically fuse to satisfy the OCP (Leben, 1973; Goldsmith, 1976; Myers, 1997), coalescence would lead to more sharing of activity and therefore more violation of the gradient faithfulness constraint $\textsc{Ident}(+\text{ATR})_{\text{g}}$.
- This is crucially worse than shifting the [+ATR] feature and spreading slightly less.
- This is thus a gradient instance of the counting effect in Harmonic Grammar (McPherson, 2016).

Gradient Analysis: Opaque Interaction II

(16) Counterbleeding as Gradient Faithfulness

I: -ATR +ATR -ATR à$_{.5}$ hɛ́$_{.5}$ tè$_{1.0}$ ɔ̀$_{.\bar{3}}$ kpʊ́$_{.\bar{3}}$ kɔ́$_{.\bar{3}}$ $\mathcal{W}$	*[-A]#[+A] 23	*[-h]$_i$#[-h]$_j$ 22	Id(+A)$_g$ 21	Id(-A) 1	$\mathcal{H}$
a. -ATR +ATR -ATR à$_{.5}$ hɛ́$_{.5}$ tè$_{1.0}$ ɔ̀$_{.\bar{3}}$ kpʊ́$_{.\bar{3}}$ kɔ́$_{.\bar{3}}$	-1	-1			-45.0
b. -ATR +ATR -ATR à$_{1.0}$ hé$_{.5}$ tè$_{.5}$ ɔ̀$_{.\bar{3}}$ kpʊ́$_{.\bar{3}}$ kɔ́$_{.\bar{3}}$		-1		-1	-23.0
c. -ATR à$_{.1\bar{6}}$ hɛ́$_{.1\bar{6}}$ tɔ̀$_{.1\bar{6}}$ ɔ̀$_{.1\bar{6}}$ kpʊ́$_{.1\bar{6}}$ kɔ́$_{.1\bar{6}}$			-0.8$\bar{3}$		-17.5
d. -ATR +ATR -ATR à$_{1.0}$ hé$_{1.0}$ tɔ̀$_{.25}$ ɔ̀$_{.25}$ kpʊ́$_{.25}$ kɔ́$_{.25}$			-0.75	-1	-16.75

Extensions and Predictions

- The account can be expanded to derive further complexities of opaque interactions in Gua.
- It can also be extended to other cases of phrasal opacity.
  - Counterfeeding in Kere phrasal tone processes (Rarrick, 2017).
  - Phonologically derived environment effects in Tiriki tone spreading and downstep (Paster & Kim, 2011).
- The main prediction is that any case of phrasal opacity should involve at least one process that can be modeled as spreading.
  - This excludes e.g. opaque interaction of dissimilation, epenthesis, and/or deletion.
  - This is more restricted than some comparable theories, e.g. extrinsically ordered rules (Chomsky & Halle, 1968).
  - It nevertheless allows for some phrase-level opacity.

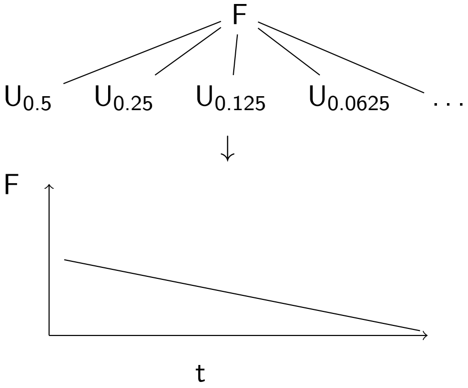
Outlook: Gradience at the Phonology-Phonetics Interface

'Petering out' in vowel harmony

- Vowel harmony often becomes weaker if a vowel feature is spread out across more vowels, in a pattern of 'petering out' (McCollum, 2018, 2019a,b; Kiparsky, 2023).
- Phonological weakness can involve the loss of iterativity, the emergence of blockers or more restricted locality conditions (cf. Mullin, 2011).
  - If some constraints prefers output activation closer to 1.0 (cf. BeCat in McCollum, 2019a), this could block long vowel harmony if it leads to severe markedness violations.
- Phonetic weakness can involve reduction in an acoustic dimension that is affected by vowel harmony (McCollum, 2019a,b).
  - Distributing the activation unevenly between vowels associated to the same feature derives this, if some constraint favors activation on the original host of the feature (cf. Zimmermann, 2021).

Unevenly distributed activation

(17) Phonology-Phonetics mapping of unevenly distributed activation

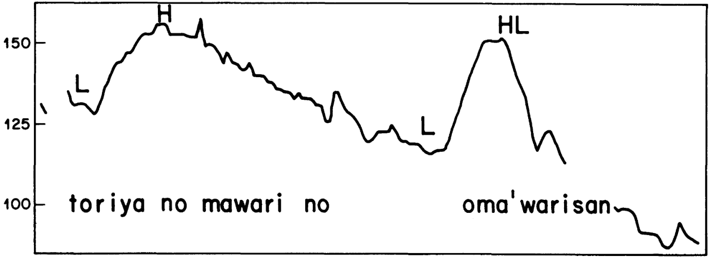


Downdrift & interpolation I

- More generally, gradient activity could be used to explain patterns of downtrends (Beckman & Pierrehumbert, 1986, 262) and interpolation (Bruce, 2007).
- Downtrends occur e.g. as the continuous lowering of the pitch in a span of TBUs that are phonologically high-toned.
  - This can be straightforwardly analyzed as the phonetic interpretation of asymmetrically distributed Shared Activity.
- Interpolation refers to the (potentially language-specific) assignment of phonetic pitch of phonologically underspecified TBUs between two tonally specified TBUs with phonetic pitch targets.
  - This could be reinterpreted as the phonetic interpretation of phonological differences in asymmetrically shared activation, such that the pitch is highest at the TBU with the most activation.

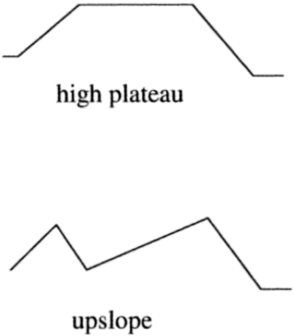
Downdrift & interpolation II

(18) Downtrend in Japanese (Beckman & Pierrehumbert, 1986, 262)



Downdrift & interpolation III

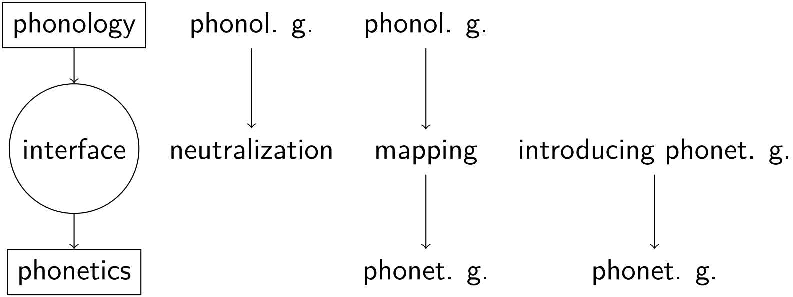
(19) Different interpolation in Swedish dialects (Bruce, 2007, 136)



A unified Phonology-Phonetics Interface? I

- Gradience is often seen as a defining feature of phonetics rather than phonology (Cohn, 2006).
- If gradience in phonology follows from the phonological grammar and influences gradience in phonetics, this might lead to a simplification of the phonology-phonetics interface.
- This raises the question of why gradience in phonology in some languages influences phonology (e.g. opacity) and in some languages it only influences phonetics?
- Ultimately, this concerns the question of modularity between phonology and phonetics.

(20) Gradience at the phonology-phonetics interface



Conclusion

Conclusion

- In this talk, I have shown that cases of phrase-level opacity exist.
- These pose a challenge even for extended version of parallel theories of phonology, such as Optimality Theory.
- I propose that shared activity can derive cases of phrase-level opacity, such as counterbleeding in Gua vowel harmony.
- I have also shown that this account can be extended beyond other cases of opacity and raises interesting questions about the phonology-phonetics interface.

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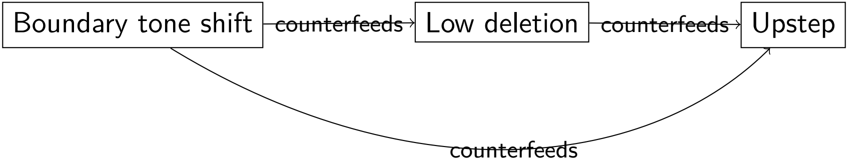
Appendix
Case Study: Phrase-level opacity in Kere phrasal tone

Kere phrasal tone

- Kere has a tonal system with high-toned, low-toned and toneless TBUs.
- In the phrasal phonology, three processes interact opaquely.
- Kere thus provides a counterexample to the NPO-hypothesis.

(21) Phrase-level opacity in Kere tone



Upstep

- Whenever two high tones occur adjacent to each other underlyingly, the register of the second high tone is raised at the phrasal level.

(22) Upstep in Kere (Rarrick, 2017, 117,118)

a. níl íglà → níl ↑íglà
water in
'in the water'

b. kàgé tái → kàgé ↑tái
times INDEF.DET
'sometimes'

Low Deletion

- Low Deletion deletes a singly linked low tone between two high tones.
- Low Deletion creates the context for Upstep but Upstep does not apply.
- Low Deletion counterfeeds Upstep.

(23) Low Deletion in Kere (Rarrick, 2017, 121,120)

a. níl màré → níl máré
   water near
   'near the water'

b. ìgé gòlé → ìgé gólé
   house old
   'old house'

Boundary Tone Shift

- Boundary Tone Shift, shifts a high tone from the final syllable, which is assigned a low boundary tone, to the preceding syllable.
- Boundary Tone Shift counterfeeds upstep and low deletion.

(24) Boundary Tone Shift (Rarrick, 2017, 148,124)

a. níl màré% → níl márè%
water near
'near the water'

b. ìgé kwì òné% → ìgé kwì ónè%
house new very
'very new house'

Constraints I

- Constraints for which gradience is relevant are evaluated gradually and marked with a subscript g.
- Other constraints are evaluated categorically and marked with a subscript c.

(25) Gradient Constraints

a. $*HH_g$ 42
Count $\frac{x+y}{2}$ violation for a TBU with activity x linked to a high tone that follows a TBU with acivity y linked to a different high tone (cf. Myers, 1997; Suzuki, 1998).

b. $*HLH_g$ 33
Count $\frac{x+y+z}{3}$ violations for a TBU with activity x linked to a high tone that follows a sequence HL of a TBU with activity z linked to a high tone and a TBU with activity y linked to a low tone (cf. Cahill, 2004).

Constraints II

(26) Categorical constraints

a. $*H\%_c$ 100

Count one violation for any phrase-final H, i.e. any phrase-final TBU (exclusively) associated to a H, such that H is not associated to any other TBU (cf. Worbs, 2016; Tebay, 2022).

b. IDENT(r)$_c$ 33

Count one violation for any upstep that is in the output but not in the input.

Upstep

- Upstep applies due to the heigh weight of the $*HH_g$ constraint.

(27)

I: $H_1\ H_1\ L_1$ / $nil_1\ i_1gla_1$	$*HH_g$	$\textsc{Ident}(r)_c$	$\mathcal{H}$
$\mathcal{W}=$	42	33	
a. $H_1\ H_1\ L_1$ / $nil_1\ i_1gla_1$	-1.0		-42.0
☞b. $H_1\ {}^{\uparrow}H_1\ L_1$ / $nil_1\ i_1gla_1$		-1.0	-33.0

Low Deletion counterfeeds Upstep I

- Low Deletion due to $*HLH_g$ results in a spread high tone directly adjacent to another high tone.
- Upstep is blocked for spread tones due to the low activity of the TBU and the resulting lower violation of $*HH_g$.

Low Deletion counterfeeds Upstep II

(28)

I: H_1 L_1 H_1 / nil_1 ma_1re_1	$^*HH_g$	$^*HLH_g$	IDENT(r)$_c$	
$\mathcal{W}$=	42	33	33	$\mathcal{H}$
a. H_1 L_1 H_1 / nil_1 ma_1re_1		-1.0		-33.0
☞b. H_1 H_1 / nil_1 $ma_{0.5}re_{0.5}$	-0.75			-31.5
c. H_1 $^{\uparrow}H_1$ / nil_1 $ma_{0.5}re_{0.5}$			-1.0	-33.0

Boundary Tone Shift counterfeeds Low Deletion & Upstep I

- Boundary Tone Shift can be modelled as leftward spread to the left due to undominated $*H\%_c$.
- If this results in a HLH configuration, the spread high tone causes less violation of $*HLH_g$ due to the lowered activity of the TBU.
- Therefore it counterfeeds Low Deletion.
- Similarly, if it results in a HH configuration, the spread H causes only gradiently violates the constraint HH_g and therefore upstep underapplies.

Boundary Tone Shift counterfeeds Low Deletion & Upstep II

(29)

I: $L_1\ H_1\ L_1\ L_1\ H_1$ / $i_1 ge_1\ kwi_1\ o_1 ne_1$ $\mathcal{W}=$	$*HH_g$ 42	$*HLH_g$ 33	$\textsc{Ident}(r)_c$ 33	$\mathcal{H}$
☞a. $L_1\ H_1\ L_1\ H_1\ L_1$ / $i_1 ge_1\ kwi_1\ o_{0.5} ne_?$		$-0.8\bar{3}$		-27.5
b. $L_1\ H_1\ H_1\ L_1$ / $i_1 ge_1\ kwi_{0.\bar{3}}\ o_{0.\bar{3}} ne_?$	$-0.\bar{6}$			-28.0
c. $L_1\ H_1\ {}^{\uparrow}H_1\ L_1$ / $i_1 ge_1\ kwi_{0.\bar{3}}\ o_{0.\bar{3}} ne_?$			-1.0	33.0

Why is spreading no alternative to Upstep?

- Rightwards spreading is banned in Kere phrasal phonology unless it can remedy a SPECIFY violation.
- High tones are not deleted in Kere phrasal phonology.
- Leftwards spreading seems to be blocked by some positional restriction.

Further evidence for Shared Activity

- Rightward spreading that provides tones for toneless syllables also counterfeeds upstep.

(30) yòblág-na íglà → yòblág-ná íglà
bone-1SG inside
'inside our bones' (Rarrick, 2017, SR1-007)

Appendix
Case Study: Tiriki DEE

Tiriki DEE I

- In Tiriki (Bantu, Kenya), Downstep only applies at the phrasal level, if two high tones were separated by toneless TBUs at an earlier stage (Paster & Kim, 2011, 84).
- Otherwise, no downstep applies.
- These toneless moras receive a high tone by phrase-level spreading.

(31) DEE in Tiriki downstep (Paster & Kim, 2011, 81,86)

a. v-á-mú-↓mólómel-a
'they spoke for him/her'

b. à-zì-héééz-↓áá zí-↓síímbwá lí-↓dúúmà
'he is giving dogs corn'

Tiriki DEE II

(32) No Downstep in Tiriki non-spread tones

I: H_1 H_1 / θ_1 θ_1	*HH_c	*$^{\downarrow}H_g$	IDENT(r)$_c$	
$\mathcal{W}$=	4	3	2	$\mathcal{H}$
☞a. H_1 H_1 / θ_1 θ_1	-1.0			-4.0
b. H_1 $^{\downarrow}H_1$ / θ_1 θ_1		-1.0	-1.0	-5.0

(33) Downstep in Tiriki spread tones

I: H_1 H_1 / θ_1 θ_0 θ_1	$*HH_c$	$*{}^{\downarrow}H_g$	IDENT(r)$_c$	
$\mathcal{W}=$	4	3	2	$\mathcal{H}$
a. H_1 H_1 / θ_1 $\theta_{0.5}$ $\theta_{0.5}$	-1.0			-4.0
☞b. H_1 ${}^{\downarrow}H_1$ / θ_1 $\theta_{0.5}$ $\theta_{0.5}$		-0.5	-1.0	-3.5

Gua: Issues and Open Questions

- Why is harmony non-iterative?
  - Some constraint penalizes sharing between (more than two) words or
  - the triggering constraint has to be defined more carefully (Kaplan, 2008a).
- How can word-level and phrase-level vowel harmony interact opaquely?
  - Either Strata are reintroduced or
  - this can be done by weighting the word-internal trigger below the phrase-internal trigger.
- Other hiatus resolution strategies?
  - No problem, since vowel harmony involves spreading.