

Stressed syllables are not singled out for transparency: A gestural account

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1. Introduction

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Primary Issue

- A recent study of position privilege in vowel harmony observes that **while prominent positions may block harmony, they are not singled out for transparency** (Kaplan & Walker to appear).
- This typological gap is not predicted under traditional theoretical assumptions in Optimality Theory.
 - If transparent vowels are **skipped** by harmony, a grammar is predicted in which satisfaction of positional faithfulness (Beckman 1998) and the constraint that drives spreading (“spreading imperative”) is enforced at the cost of the constraint that penalizes skipping (e.g. *SKIP, Uffmann 2004).

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Primary Issue

- A recent study of position privilege in vowel harmony observes that **while prominent positions may block harmony, they are not singled out for transparency** (Kaplan & Walker to appear).
- Example: the ranking in (1a) can generate a harmony pattern that operates among unstressed vowels but skips stressed vowels (1b).

(1) a. Transparency only in stressed syllable:
'**σ-Faithfulness** >> **Spreading Imperative** >> *SKIP

b. V 'V V V → V 'V V V
 [+F] [+F] [+F] [-F] [-F] [+F] [-F] [-F]

1. Introduction

Overview

- The unwanted prediction relies on an assumption that harmony can skip a vowel.
- This work adopts a different starting assumption: that harmony does not skip segments, as framed within representations of gestural phonology, as in (i).

i. No Skipping:

- Spreading does not skip vowels.
- Positional faithfulness thus cannot drive harmony to skip the stressed syllable.
- **“Co-active transparency”** may arise when vowels have overlapping directly opposing (antagonistic) gestures with the presence of one of those gestures being perceptually covert (Smith 2018).

1. Introduction

Overview

- Following on this reasoning, this work focuses on the interaction of positional prominence with the potential for gestural overlap, as in (ii).
- ii. **Stressed vowels are not receptive to overlapping opposing gestures:**
 - Co-active transparency is disfavored in stressed vowels.
 - Stressed vowels are not receptive to co-active antagonistic gestures because they are a locus of hyperarticulation due to a μ -gesture associated with metrically prominent positions.
 - A stressed vowel with an antagonistic gesture can thus be singled out to block harmony but not to be transparent to harmony.
- Note: the “ μ ” in a μ -gesture is not a mora.

1. Introduction

Overview

(2) **Patterns with positional asymmetries**

a. **Unstressed vowels alone are transparent to harmony**

Ex: **Eastern Andalusian Spanish** (Jiménez & Lloret 2007, 2020, Lloret & Jiménez 2009)

However, stressed syllables are not singled out as a prosodic position for transparency.

b. **Stressed vowels alone block harmony**

Ex: **Servigliano** (Camilli 1929, Mascaró 2011, Walker 2011)

However, unstressed syllables are not singled out as a prosodic position for blocking.

- (There is also transparency and blocking that is not sensitive to prosodic position.)
- The issues involving transparency (2a) are examined in this talk through a case study of vowel harmony in Eastern Andalusian Spanish.

1. Introduction

Road map

- i. Introduction
- ii. Vowel laxing harmony in the variety of Eastern Andalusian Spanish spoken in Granada (EASG): spreading to stressed vowels, transparency in some unstressed vowels, plus the potential for harmony in the full word domain.
- iii. Gestural approach to harmony and transparency; interaction with prosodic μ -gestures for stressed vowels.
- iv. Constraint-based analysis of harmony among nonhigh vowels in EASG.
- v. High vowels in EASG harmony
- vi. Compare autosegmental representations
- vii. Conclusion

2. Stress-sensitive harmony in Eastern Andalusian Spanish

2. Stress-sensitive harmony in Eastern Andalusian Spanish

Eastern Andalusian Spanish (Granada variety, EASG)

Vowel laxing harmony that exhibits interactions between prosodic position and transparency (Jiménez & Lloret 2007, 2020, Lloret & Jiménez 2009).

- EASG has five contrastive vowels /i, e, a, o, u/.
- Aspiration or loss of a word-final /s/ triggers lax/open allophonic variants of vowels in the final syllable.
- Herrero de Haro (2017: 144) characterizes these variants as lowered; lowering may be accompanied by an F2 movement.

2. Stress-sensitive harmony in Eastern Andalusian Spanish

- A final lax/open triggers harmony in a nonhigh stressed vowel (3a).
- Intervening post-tonic nonhigh vowels optionally harmonize (3b).
- Nonhigh pretonic vowels also optionally harmonize (3c).
- (Identical vowels are prone to harmonize.)

(3) a.	nenes	[ˈnɛnɛ ^(h)]	‘boys’
	asas	[ˈa̘sa̘ ^(h)]	‘handles’
b.	tréboles	[ˈtrɛβɔlɛ ^(h)] ~ [ˈtrɛβɔlɛ ^(h)]	‘clovers’
c.	comemos	[koˈmɛmɔ ^(h)] ~ [koˈmɛmɔ ^(h)]	‘we eat’
	abetos	[a̘ˈβɛtɔ ^(h)] ~ [aˈβɛtɔ ^(h)]	‘firs’

- On the status of high vowels [i, u] in EASG harmony, see § 5.

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c.	comemos	[kɔˈmɛmɔ ^(h)] ~ [koˈmɛmɔ ^(h)]	‘we eat’
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2. Stress-sensitive harmony in Eastern Andalusian Spanish

Focal issue here

- **Unstressed** nonhigh vowels can be **transparent**
- However, **stressed** nonhigh vowels must be **audibly harmonizing**; they do not vacillate between open and closed variants.

2. Stress-sensitive harmony in Eastern Andalusian Spanish

Further details

- Optional audible harmonizing of unstressed nonhigh vowels exhibits restrictions.
- Vowels in a post-tonic sequence uniformly display harmony, or not (4a). The same goes for pretonic vowel sequences (4b).
- If pretonic nonhigh vowels display harmony, so do post-tonic nonhigh vowels if there are any present in the word (4c). A way of interpreting this is that whatever drives full spreading in the word (i.e. spreading beyond the stressed syllable) does not allow for transparency.

(4) a.	cómetelos	[^h ˈkometelɔ] ~ [^h ˈkometelɔ] * ^h [ˈkometelɔ], * ^h [ˈkometelɔ]	‘eat them (for you)!’
b.	monederos	[mɔneˈðerɔ ^h] ~ [moneˈðerɔ ^h] * ^h [mɔneˈðerɔ], * ^h [mɔneˈðerɔ ^h]	‘purses’
c.	recógelos	[reˈkɔhelɔ ^h] ~ [reˈkɔhelɔ ^h] ~ [reˈkɔhelɔ ^h] * ^h [reˈkɔhelɔ]	‘gather them-MASC’

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b.	monederos	[mɔɲɛˈðɛɾɔ ^h] ~ [moneˈðɛɾɔ ^h] * ^h [mɔɲɛˈðɛɾɔ], * ^h [mɔneˈðɛɾɔ]	‘purses’
c.	recógelos	[reˈkɔhɛlɔ ^h] ~ [reˈkɔhɛlɔ ^h] ~ [reˈkɔhelɔ ^h] * ^h [reˈkɔhelɔ]	‘gather them-MASC’

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b.	monederos	[mɔnɛˈðɛɾɔ ^h] ~ [mɔnɛˈðɛɾɔ ^h] * ^h [mɔnɛˈðɛɾɔ], * ^h [mɔnɛˈðɛɾɔ ^h]	‘purses’
c.	recógelos	[rɛˈkɔhɛlɔ ^h] ~ [rɛˈkɔhɛlɔ ^h] ~ [rɛˈkɔhɛlɔ ^h] * ^h [rɛˈkɔhɛlɔ]	‘gather them-MASC’

2. Stress-sensitive harmony in Eastern Andalusian Spanish

Previous analyses (Jiménez and Lloret 2007, 2020)

- Jiménez & Lloret analyze harmony in EASG as spreading of [-ATR] or [RTR].
- To address positional asymmetries in variation for harmony in unstressed syllables, Jiménez & Lloret propose more than one spreading imperative (cf. Kaplan 2018):
 - i. A positional licensing constraint that requires [-ATR] to be licensed by affiliation with the **stressed syllable**.
 - ii. A constraint requiring [-ATR] to be affiliated with **all vowels**.¹
- Transparent post-tonic nonhigh vowels do not undergo harmony, violating *DUPLICATE(F), which is similar in effect to *SKIP.
- The account developed here assumes two active spreading imperatives, similar in domain to those above, but transparency is treated differently, without skipping.

¹ Jiménez & Lloret (2020) propose a third constraint that requires licensing by association with the main foot. This constraint drives harmony to the stressed syllable plus post-tonic vowels but not pretonic vowels.

3. Harmony in gestural phonology

3. Harmony in Gestural Phonology

3.1 The Gestural Harmony Model (Smith 2018)

- In the gestural approach to harmony developed by Smith (2018), *gestures* are the atomic units of phonological representation.
- Gestures have both spatial and temporal properties: they are specified for a goal articulatory state for which the achievement unfolds dynamically over the gesture's interval of activation (e.g. Browman & Goldstein 1986, 1995).

Vowel harmony: No skipping

- Vowel harmony results when a vocalic gesture's period of activation is extended so that it overlaps gestures of other segments.
- In this approach, harmony cannot skip a segment, because a gesture's activation interval is continuous.

3. Harmony in Gestural Phonology

3.1 The Gestural Harmony Model (Smith 2018)

Vowel harmony: Co-active transparency

- **Transparent segments** are undergoers of harmony, that is, they are overlapped by the harmonizing gesture.
 - Nevertheless, the nature of gestures is such that they are specified for a **goal** articulatory state, which allows that they might not achieve their target.
 - This makes possible an analysis of transparent segments as undergoers of harmony for which the target of the harmonizing gesture is not achieved due to a co-active opposing gesture.
- When overlapping gestures impose opposing demands on an articulator, their goal states are blended.
- The blended outcome is the weighted average of the blending strengths specified for each gesture (Saltzman & Munhall 1989, Fowler & Saltzman 1993).
- If one of the gestures has a much higher blending strength, ***its target state may be achieved at the cost of the weaker opposing gesture.***

3. Harmony in Gestural Phonology

3.1 The Gestural Harmony Model (Smith 2018)

Vowel harmony: Blocking

- **Blocking** of harmony is enforced by *OVERLAP($Gest_x$, $Gest_y$) constraints, which penalize forms with concurrently active gestures that are incompatible to some degree.²

(5) *OVERLAP($Gest_x$, $Gest_y$):

Assign a violation mark for a pair of gestures of type X and type Y that are concurrently active.

² OT constraints (Prince & Smolensky 2004) that operate over gestural representations have been proposed in numerous previous analyses. See, e.g. Gafos (2002), Davidson (2003), Hall (2003), Bradley (2007), Tejada (2012), Smith (2018), Walker & Proctor (2019).

3. Harmony in Gestural Phonology

3.1 The Gestural Harmony Model (Smith 2018)

Terminology

- ***Incompatible*** gestures are articulatorily or perceptually marked when concurrently active.
- ***Antagonistic*** gestures are a proper subset of incompatible gestures; they are specified for directly opposing articulatory states.
- Segments that ***undergo*** harmony are those in which the harmonizing gesture is concurrently active. There are two kinds of undergoers of harmony.
 - ***Audibly harmonizing vowels*** are those in which the harmonizing gesture is perceptibly audible,
 - ***Transparent vowels*** are those in which the harmonizing gesture is not audibly perceived due to blending with an antagonistic gesture, an instance of **co-active transparency**.

3. Harmony in Gestural Phonology

3.1 The Gestural Harmony Model (Smith 2018)

Comparing autosegmental representations

- The idea that the phonological unit that spreads in harmony is temporally continuous is not unique to gestural representations.
- For example, Ní Chiosáin & Padgett (2001) postulate that featural entities are continuous and uninterrupted, based on an axiom of convexity.
- In various other work on autosegmental feature spreading, **gapped configurations** are ill-formed or disallowed (e.g. Kiparsky 1981, Levergood 1984, Archangeli & Pulleyblank 1994, Walker 2000). A segmental version is framed in (6):

(6)
$$\begin{array}{c} * \alpha \beta \gamma \\ \quad \backslash / \\ \quad \quad F \end{array}$$
 Where F is any feature, and α , β , γ are segments

- A prohibition on gapped configurations prevents skipping in harmony.
- **However, the goal-based nature of gestural representations makes co-active transparency possible.**

3. Harmony in Gestural Phonology

3.2 Integrating prosodic gestures

Stressed positions

- For stress, prosodic gestures come into play (Byrd & Krivokapić 2021).

$\mu_{\text{PROMINENT}}$ -gesture

A prosodic gesture that is associated with the stress peak (Katsika & Tsai 2021; “ μ_{PROM} ” after Bennett et al. 2023).

- With respect to spatial effects, a μ_{PROM} -gesture modulates spatial target parameters of co-active gestures, causing them to become more extreme or **hyperarticulated**.
 - μ -gestures may also have temporal effects; however, the focus here is on spatial effects only.

3. Harmony in Gestural Phonology

3.2 Integrating prosodic gestures

Proposal: μ -gestures in position-sensitive constraints

(7) *OVERLAP constraints in a stringency relation

a. ***Sensitive to prosodic position***

*OVERLAP(μ_{PROM} , Gest_x, Gest_y)

b. ***General***

*OVERLAP(Gest_x, Gest_y)

- The prosodic position-sensitive constraint in (7a) arises from avoidance of incompatible gestures in a context of hyperarticulation.

3. Harmony in Gestural Phonology

3.2 Integrating prosodic gestures

a) Blocking

- *OVERLAP(μ_{PROM} , Gest_x, Gest_y) can enforce blocking of harmony by specific gestures in contexts where a μ_{PROM} -gesture is active, i.e. in a stressed syllable.
 - Example: /a/ blocks raising harmony in stressed syllables in Servigliano (Camilli 1929, Mascaró 2011, Walker 2011).

(8) Schematic ranking for blocking in a prominent position:

*OVERLAP(μ_{PROM} , Gest_x, Gest_y) >> Spreading imperative >> *OVERLAP(Gest_x, Gest_y)

b) Transparency

- If a gestural overlap configuration like that involved in co-active transparency occurred in a stressed V, it would give rise to hyperarticulated antagonistic gestures.

3. Harmony in Gestural Phonology

3.2 Integrating prosodic gestures

Representation of transparency in EASG

- The narrow TR gesture is temporally extended from the final V to overlap with the stressed V with an associated μ_{PROM} -gesture.
- In EASG, overlap with an antagonistic wide TR is not permitted in this hyperarticulated context, so the wide TR gesture of the stressed V is deleted.
- However, the intervening post-tonic V retains its wide TR gesture.
- Despite co-active narrow and wide TR gestures in the post-tonic V, it is realized with a wide TR, due to the high blending strength specified for this gesture.
- The constraint ranking that generates this representation for EASG is discussed in section 4.

['trɛβoɛ^(h)] variant for 'clovers'

- Overlap of wide- and narrow-TR only in post-tonic vowel

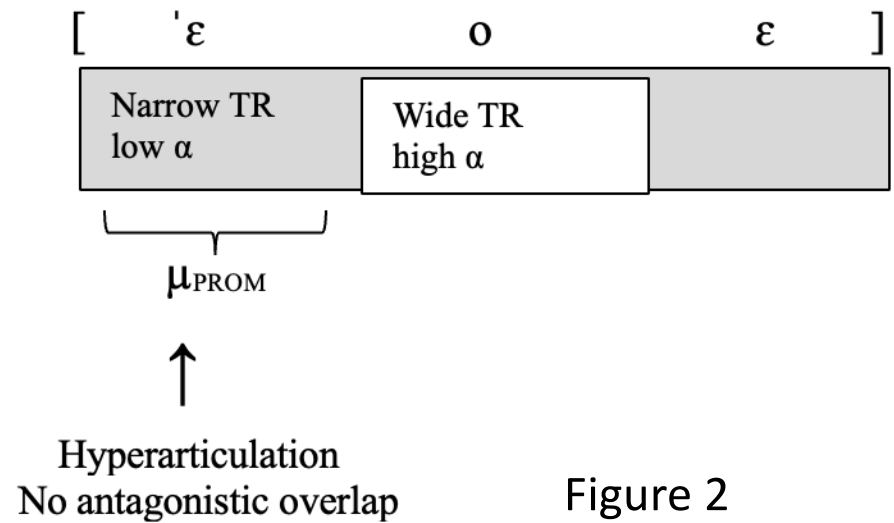


Figure 2

3. Harmony in Gestural Phonology

3.2 Integrating prosodic gestures

['trɛβɔɛ^(h)] variant for 'clovers'

- No overlap of wide- and narrow-TR in any vowel

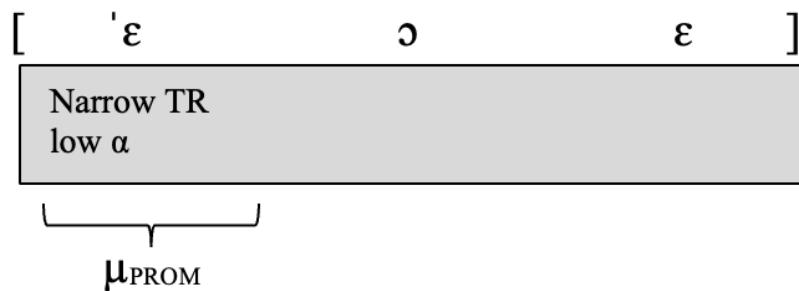


Figure 3

*['treβɔɛ^(h)] unattested variant

- Overlap of wide- and narrow-TR only in stressed vowel

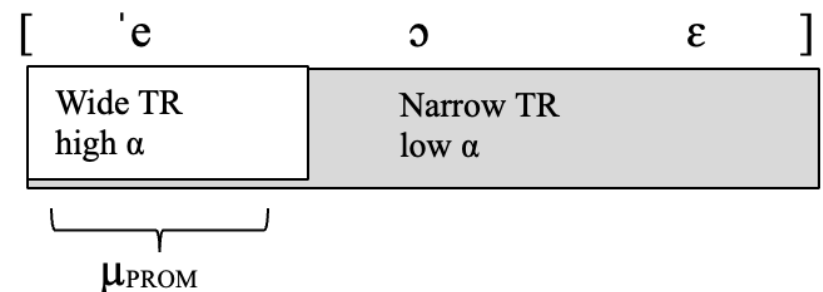


Figure 4

- The stringency relation between *OVERLAP(μ_{PROM} , Nar-TR, Wide-TR) and *OVERLAP(Nar-TR, Wide-TR) predicts that, all else equal, Nar-TR, Wide-TR will *only* be allowed to overlap in a stressed syllable when they can also overlap elsewhere.
- This is consistent with the desired prediction that a stressed syllable will not be singled out for transparency, excluding the outcome in Fig. 4.

4. Analysis of EASG

4. Analysis of EASG

Constraints

- Gestural versions of harmony-driving constraints of Jiménez & Lloret (2020):

(10) **LICENSE(narrow TR, $\forall V$)** **Lic($\forall V$)** for short

For each narrow TR gesture, assign a violation mark to each primary vowel gesture³ in the same word with which the narrow TR gesture is not concurrently active.^{4, 5}

- This maximal licensing constraint drives spreading to all vowels in the word.

³ On primary or head gestures, see Gafos (2002) and Smith (2018).

⁴ Cf. Smith (2018).

⁵ Kaplan (2018, 2019) identifies pathologies that arise in the interaction between negative positional licensing constraints and faithfulness in Harmonic Grammar. Whether those issues arise in a gestural model of harmony in OT remains to be investigated.

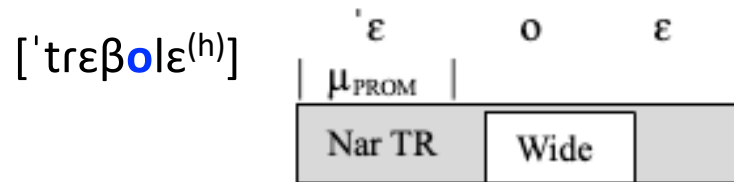
4. Analysis of EASG

Spreading to the stressed vowel

- The analysis for *tréboles* ['trɛβoɫɛ^(h)] ~ ['trɛβɔɫɛ^(h)] 'clovers' with variation in the unstressed penult V.
- Variation is attributed to different rankings of
 - *OVERLAP(Nar TR, Wide TR)
Assigns a violation if Nar TR and Wide TR gestures are concurrently active.
 - MAX-G
Assigns a violation for a gesture in the input that lacks a correspondent in the output.

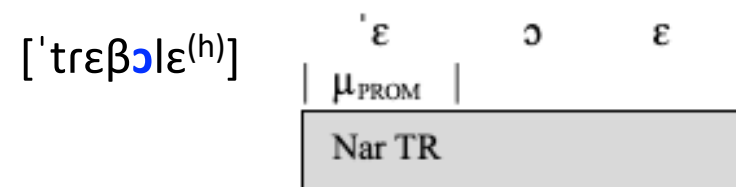
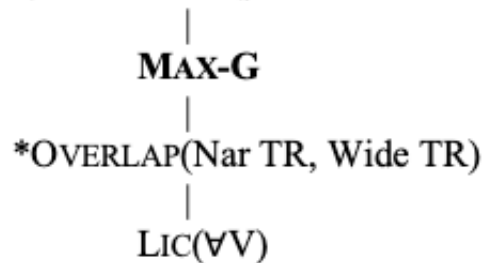
4. Analysis of EASG

Spreading to the stressed vowel: Preview



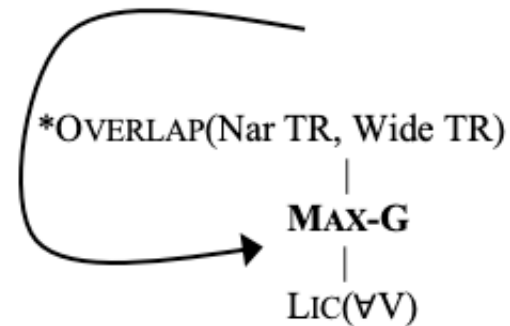
Transparent penult V, co-active
(overlapping) TR gestures in penult.

$LIC(\mu_{PROM}), *OVERLAP(\mu_{PROM}, \text{Nar TR}, \text{Wide TR})$



Audibly harmonizing penult V, no
co-active antagonistic TR gestures

$LIC(\mu_{PROM}), *OVERLAP(\mu_{PROM}, \text{Nar TR}, \text{Wide TR})$



4. Analysis of EASG

Spreading to the stressed vowel

- Rankings are illustrated for *tréboles* ['trɛβolɛ^(h)] ~ ['trɛβolɛ^(h)] 'clovers' with schematic candidates.
 - The domain of μ_{PROM} -gestures is annotated in candidates.
 - In all candidate outputs shown, the final V has a narrow TR gesture and no wide TR gesture, due to *s*-aspiration/loss.
 - The constraints that drive this representation for the final vowel are set aside here in the interests of focus.
 - The final V incurs a violation of MAX-G for the loss of wide TR gesture.
 - OCP-G, which assigns a violation to adjacent identical gestures is assumed to be enforced in output candidates, but is not shown in tableaux.
 - On formulation of IDENT-IO-[TR]- μ_{PROM} , see appendix

Transparent nonfinal unstressed vowel: MAX-G >> *OVERLAP(Nar TR, Wide TR)

	tre bo les Wide Wide Wide	LIC (μ_{PROM})	*OVERLAP (μ_{PROM} , Nar-TR, Wide-TR)	MAX- G	*OVERLAP (Nar-TR, Wide-TR)	LIC ($\forall V$)
transparent penult	a. ['treβole ^(h)] 'ε o ε μ_{PROM} Nar TR Wide			**	*	
audibly harmonizing penult	b. ['treβole ^(h)] 'ε ɔ ε μ_{PROM} Nar TR			***!		
transparent stressed V - harmonically bounded by (a)	c. ['treβole ^(h)] 'e ɔ ε μ_{PROM} Wide Nar TR		*!	**	*	
no harmony	d. ['treβole ^(h)] 'e o ε μ_{PROM} Wide TR Nar	*!		*		**

Transparent nonfinal unstressed vowel: MAX-G >> *OVERLAP(Nar TR, Wide TR)

	tre bo les Wide Wide Wide	LIC (μ_{PROM})	*OVERLAP (μ_{PROM} , Nar-TR, Wide-TR)	MAX- G	*OVERLAP (Nar-TR, Wide-TR)	LIC ($\forall V$)
transparent penult	a. ['treβole ^(h)] 'ε o ε μ_{PROM} Nar TR Wide			**	*	
audibly harmonizing penult	b. ['treβole ^(h)] 'ε ɔ ε μ_{PROM} Nar TR			***!		
transparent stressed V - harmonically bounded by (a)	c. ['treβole ^(h)] 'e ɔ ε μ_{PROM} Wide Nar TR		*!	**	*	
no harmony	d. ['treβole ^(h)] 'e o ε μ_{PROM} Wide TR Nar	*!		*		**

Transparent nonfinal unstressed vowel: MAX-G >> *OVERLAP(Nar TR, Wide TR)

	tre bo les Wide Wide Wide	LIC (μ_{PROM})	*OVERLAP (μ_{PROM} , Nar-TR, Wide-TR)	MAX- G	*OVERLAP (Nar-TR, Wide-TR)	LIC ($\forall V$)
transparent penult	a. ['treβole ^(h)] 'ε o ε μ_{PROM} Nar TR Wide			**	*	
audibly harmonizing penult	b. ['treβole ^(h)] 'ε ɔ ε μ_{PROM} Nar TR			***!		
transparent stressed V - harmonically bounded by (a)	c. ['treβole ^(h)] 'e ɔ ε μ_{PROM} Wide Nar TR		*!	**	*	
no harmony	d. ['treβole ^(h)] 'e o ε μ_{PROM} Wide TR Nar	*!		*		**

Audibly harmonizing nonfinal unstressed vowel: *OVERLAP(Nar TR, Wide TR) >> MAX-G

transparent penult

audibly harmonizing penult

transparent stressed V - harmonically bounded by (a)

no harmony

	tre bo les Wide Wide Wide	LIC (μ_{PROM})	*OVERLAP (μ_{PROM} , Nar-TR, Wide-TR)	*OVERLAP (Nar-TR, Wide-TR)	MAX-G	LIC ($\forall V$)
a. ['treβole ^(h)] 'ε o ε μ_{PROM} Nar TR Wide				*!	**	
b. ['treβole ^{h)}] 'ε ɔ ε μ_{PROM} Nar TR					***	
c. ['treβole ^{h)}] 'e ɔ ε μ_{PROM} Wide Nar TR			*!	*	**	
d. ['treβole ^(h)] 'e o ε μ_{PROM} Wide TR Nar		*!			*	**

4. Analysis of EASG

Summary: Spreading to the stressed vowel

- Transparent vowels involve **overlap** of antagonistic gestures, a form of co-active transparency; they are not skipped.
- Stressed vowels are not receptive to co-active antagonistic gestures, because they are a locus of hyperarticulation due to a **prosodic μ -gesture**.
- Implication from *OVERLAP constraints in a stringency relation: **unstressed syllables may be singled for transparency, but not a stressed syllable:**
*OVERLAP(μ_{PROM} , Gest_x, Gest_y), *OVERLAP(Gest_x, Gest_y)

4. Analysis of EASG

Full word-domain harmony

- When laxing harmony encompasses the entire word domain, including pretonic vowels, there is not evidence of transparent vowel behavior.
- In words where harmony only reaches the stressed vowel, optionally harmonizing **post-tonic** vowels are sandwiched between final and stressed vowels that display laxing (e.g. [ˈtrɛβɔlɛ^(h)] ~ [ˈtrɛβɔlɛ^(h)] ‘clovers’).
- This “sandwiching” necessitates these vowels’ treatment as undergoers with possible transparency.
- However, optionally laxed **pretonic** vowels are not preceded by an obligatory harmonizing vowel (e.g. [kɔˈmɛmɔ^(h)] ~ [kɔˈmɛmɔ^(h)] ‘we eat’).
- This makes available the possibility that pretonic vowels are not undergoers when they are not realized as lax.
- That is, harmony that extends beyond the stressed syllable simply operates or does not operate, and whether it operates or not is what gives rise to variation in pretonic vowels.

4. Analysis of EASG

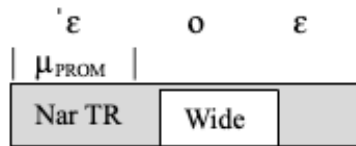
Full word-domain harmony

- Furthermore, if laxing harmony audibly persists to pretonic vowels, then **all** nonhigh vowels overtly display harmony (e.g. [rɛ'kɔhɛɪb^(h)], *[rɛ'kɔheɪb^(h)] 'gather them-MASC').
- This is suggestive that harmony in the full word domain operates without any co-active transparency, in other words, it may not give rise violations of *OVERLAP(Nar TR, Wide TR).
- Under this interpretation, the ranking for words in which harmony operates to pretonic vowels would rank *OVERLAP(Nar TR, Wide TR), LIC(∇V) >> MAX-G.
- This ranking enforces full word-domain harmony and prevents overlap of antagonistic TR gestures, at the cost of MAX-G.

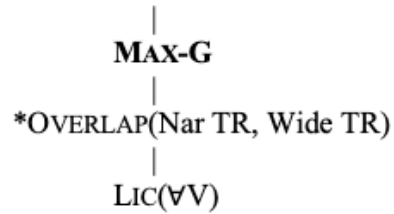
4. Analysis of EASG

A. Spreading to 'σ: transparency

[ˈtɾɛβo|ɛ^(h)]

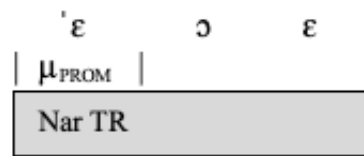


LIC(μ_{PROM}), *OVERLAP(μ_{PROM} , Nar TR, Wide TR)

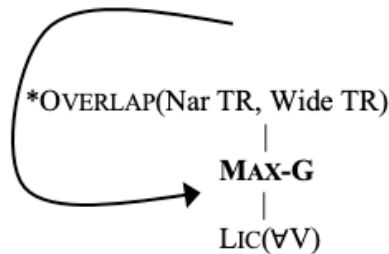


B. Spreading to 'σ: No transparency

[ˈtɾɛβo|ɛ^(h)]

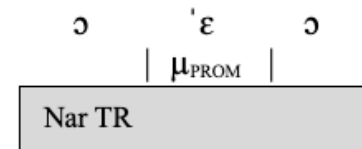


LIC(μ_{PROM}), *OVERLAP(μ_{PROM} , Nar TR, Wide TR)

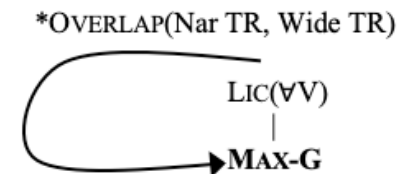


C. Word-domain spreading: No transparency

[kɔ'mɛmɔ^(h)]



LIC(μ_{PROM}), *OVERLAP(μ_{PROM} , Nar TR, Wide TR)



Successive demotion of MAX-G

Ranking C

Word-domain harmony, no transparency

Harmony to stressed V, transparent penult (selected by ranking A)

Harmony to stressed V, audibly harmonizing penult, (selected by ranking B)

Word-domain harmony, transparent penult

Word-domain harmony, transparent penult and pretonic V

No harmony

To conserve space, *OVERLAP(μ_{PROM} , Nar TR, Wide TR) is omitted here along with candidates that violate it.

re co he los	LIC (μ_{PROM})	*OVERLAP (Nar-TR, Wide-TR)	LIC ($\nabla \nabla$)	MAX-G
<div style="display: flex; justify-content: space-around; border-bottom: 1px solid black;"> Wide Wide Wide Wide </div> <p>a. [re'køhelo^(h)] ε 'o ε o μ_{PROM} Nar TR</p>				****
<p>b. [re'køhelo^(h)] e 'o e o μ_{PROM} Wide Nar Wide</p>		*!	*	**
<p>c. [re'køhelo^(h)] e 'o ε o μ_{PROM} Wide Nar</p>			*!	***
<p>d. [re'køhelo^(h)] ε 'o e o μ_{PROM} Nar TR Wide</p>		*!		***
<p>e. [re'kohelo^(h)] e 'o e o μ_{PROM} Wide Nar TR Wide</p>		*!*		**
<p>f. [re'kohelo^(h)] e 'o e o μ_{PROM} Wide TR Nar</p>	*!		*!***	*

Ranking C

Word-domain harmony, no transparency

Harmony to stressed V, transparent penult (selected by ranking A)

Harmony to stressed V, audibly harmonizing penult, (selected by ranking B)

Word-domain harmony, transparent penult

Word-domain harmony, transparent penult and pretonic V

No harmony

To conserve space, *OVERLAP(μ_{PROM} , Nar TR, Wide TR) is omitted here along with candidates that violate it.

re co he los	LIC (μ_{PROM})	*OVERLAP (Nar-TR, Wide-TR)	LIC ($\nabla \nabla V$)	MAX-G
<div style="display: flex; justify-content: space-around; border-bottom: 1px solid black;"> Wide Wide Wide Wide </div> <p>a. [re'køhelo^(h)] ε 'ɔ ε ɔ μ_{PROM} Nar TR</p>				****
<p>b. [re'køhelo^(h)] e 'ɔ e ɔ μ_{PROM} Wide Nar Wide</p>		*!	*	**
<p>c. [re'køhelo^(h)] e 'ɔ ε ɔ μ_{PROM} Wide Nar</p>			*!	***
<p>d. [re'køhelo^(h)] ε 'ɔ e ɔ μ_{PROM} Nar TR Wide</p>		*!		***
<p>e. [re'kohelo^(h)] e 'ɔ e ɔ μ_{PROM} Wide Nar TR Wide</p>		*!*		**
<p>f. [re'kohelo^(h)] e 'o e ɔ μ_{PROM} Wide TR Nar</p>	*!		*!***	*

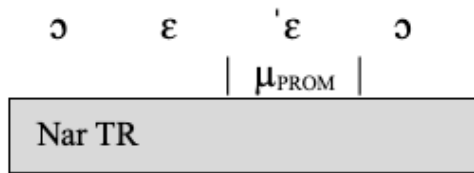
4. Analysis of EASG

Uniform behavior of pretonic vowels and implicational harmony

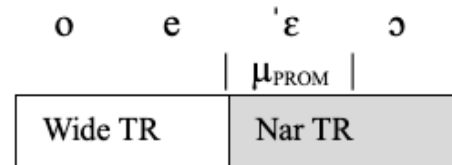
- Recall (4b), vowels in a pretonic sequence uniformly display harmony, or not:

(4b) monoderos [mɔnɛ'ðɛɾɔ^(h)] ~ [mone'ðɛɾɔ^(h)] 'purses'
 *[monɛ'ðɛɾɔ^(h)], *[mɔne'ðɛɾɔ^(h)]

- This pattern is expected, based on the two possible rankings of LIC(∇V) and MAX-G.



Audibly harmonizing pretonic Vs



No harmony in pretonic Vs

- In words in which harmony operates to pretonic vowels, nonfinal post-tonic vowels will also display harmony, because *OVERLAP(Nar TR, Wide TR) >> MAX-G prevents co-active transparency.

4. Analysis of EASG

Summary: Spreading to the stressed vowel v. full word domain

- Separate constraints drive harmony that reaches the stressed syllable v. pretonic vowels (Jiménez and Lloret 2007, 2020).
- Three different patterns arise from different rankings of MAX-G.
- These rankings give rise to the potential for co-active transparency in harmony to the stressed syllable, but not in harmony for the full-word domain.
- Due to the stringency relation among *OVERLAP constraints, spreading to pretonic vowels, or to the stressed syllable, may never be achieved by co-active transparency that singles out the stressed position.

5. High vowels in EASG harmony

5. High vowels in EASG

- High vowels in EASG harmony also warrant attention, although the discussion is tentative for reasons discussed below.
- Consider the following data:

(11) a. cómicos ['kɔmiko^(h)] 'comic-MASC.PL'
 b. molinos [mo'liɲo^(h)] ~ [mo'liɲo^(h)] 'mills'

- Jiménez & Lloret (2020) consider nonfinal high vowels to be “transparent” to harmony in all positions, with audible laxing in final position.
- Acoustic data shows that final high vowels undergo some degree of opening, but to a lesser extent than mid vowels (Herrero de Haro 2022).

5. High vowels in EASG

Reports regarding the closed versus lax status of final high vowels in the context of s-aspiration or deletion in EAS are variable in the literature (Herrero de Haro 2022).

- Various factors are suggested to come into play, including sociolinguistic variation, regional variation, and different sample sizes across studies.
- Herrero de Haro considers the issues to remain unsettled and require further investigation, including the phonological patterning of high vowels with respect to laxing.

5. High vowels in EASG

Keeping the aforementioned uncertainties in mind, high vowels that are reported as transparent in EASG laxing harmony differ from transparent nonhigh vowels in two ways:

- Transparency in high vowels is not prosodically conditioned but rather is determined by vowel quality, as apparent transparency is true of high vowels in **all** nonfinal syllables, whether stressed or unstressed.
- In the gestural account, high vowels can be treated as undergoers of harmony in all positions with undershoot of the narrow TR gesture due to overlap with a high tongue body position. This scenario does not involve gestural antagonism but rather incompatibility (see Archangeli & Pulleyblank 1994: 172-179).
- A kind of “mechanical” transparency (terminology due to Caitlin Smith).

Further research on the status of EASG high vowels is warranted before firm conclusions can be drawn about the appropriate phonological analysis for these vowels.

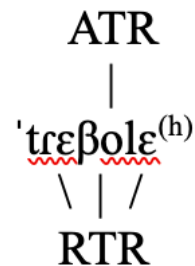
6. Returning to autosegmental representations

6. Returning to autosegmental representations

Recall the unwanted prediction identified at the outset:

1) Transparency only in stressed syllable:
'σ-Faithfulness >> Spreading Imperative >> *SKIP

- Could this problem be addressed if autosegmental feature spreading cannot skip a segment?
- An account that is similar in spirit could posit that a transparent vowel is both [ATR] and [RTR]:



- Perhaps combined with a version of Turbid Representations and/or Containment Theory? (e.g. Goldrick 2001, Prince & Smolensky 2004, Revithiadou 2007, van Oostendorp 2008, Trommer & Zimmermann 2014, Torres-Tamarit et al. 2017, Zimmermann 2017).

6. Returning to autosegmental representations

Key insights offered by the gestural analysis

- Goal-based nature of blended gestures provides a formal understanding of how co-active gestures can give rise to transparency.
- Predicts potential for partial transparency in the world's languages, which is arguably attested (Smith 2020a, b).
- Spatial properties of μ_{PROM} -gestures (hyperarticulation) brings understanding to why gestural overlap is avoided in a stressed vowel.

7. Conclusion

7. Conclusion

This talk has focused on a positional asymmetry with respect to transparency

- Unstressed vowels may be singled out for transparency but not stressed vowels.

It has aimed to predict this asymmetry by developing an analysis in gestural phonology with some key interconnected assumptions

- Gestures are the atomic units of phonological representation.
- Spreading does not skip segments; transparency arises through co-active opposing gestures.
- A prosodic μ -gesture, associated with the stressed vowel, causes hyperarticulation, which disfavors co-active antagonistic gestures, formalized with constraints in a stringency relation $*\text{OVERLAP}(\mu_{\text{PROM}}, \text{Gest}_X, \text{Gest}_Y)$, $*\text{OVERLAP}(\text{Gest}_X, \text{Gest}_Y)$.
- These constraints can drive asymmetric transparency in unstressed vowels but not in a stressed vowel.

The representations of gestural phonology thus shed light on positional privilege and transparency through the interaction of μ -gestures with a treatment of transparent segments as undergoers of harmony.

In the future, experimental investigation of EASG and other languages could test these proposals.

Thank you!

Acknowledgments: Thanks to Ryan Bennett and Caitlin Smith for comments on this work.

Appendix: Positional faithfulness

Appendix II: Positional faithfulness

Recall harmonic bounding relationship

transparent penult

audibly harmonizing penult

transparent stressed V - harmonically bounded by (a)

no harmony

	tre bo les Wide Wide Wide	LIC (μ_{PROM})	*OVERLAP (μ_{PROM} , Nar-TR, Wide-TR)	MAX-G	*OVERLAP (Nar-TR, Wide-TR)	LIC ($\forall V$)
a. ['treβole ^(h)] 'ε o ε μ_{PROM} Nar TR Wide				**	*	
b. ['treβole ^(h)] 'ε ɔ ε μ_{PROM} Nar TR				***!		
c. ['treβole ^(h)] 'e ɔ ε μ_{PROM} Wide Nar TR			*!	**	*	
d. ['treβole ^(h)] 'e o ε μ_{PROM} Wide TR Nar		*!		*		**

Appendix II: Positional faithfulness

- For the harmonic bounding relation to hold between (a) and (c), it is necessary that positional faithfulness for the stressed vowel not favor (c) over (a).
- Positional faithfulness for this position is important for harmony patterns in which the stressed syllable is the trigger for harmony, and thus must retain its underlying gesture.
- However, positional faithfulness can be framed so as to not be satisfied by (c), i.e. when there are co-active antagonistic gestures in a stressed syllable. This could be achieved by an IDENT-G- μ_{PROM} constraint.⁶

(12) IDENT-IO-[TR]- μ_{PROM}

If a vowel is in the locus of a μ_{PROM} -gesture in the output, assign a violation if it is not concurrently active with the same TR gestures as those in the input.

⁶This departs from a version of positional faithfulness that employs MAX -G (Smith 2018).

Appendix II: Positional faithfulness

Harmonic bounding relationship remains

	tre bo les Wide Wide Wide	LIC (μ_{PROM})	*OVERLAP (μ_{PROM} , Nar-TR, Wide-TR)	IDENT-[TR]- μ_{PROM}	MAX-G	*OVERLAP (Nar-TR, Wide-TR)	LIC ($\forall V$)
transparent penult	a. ['treβole ^(h)] 'ε o ε μ_{PROM} Nar TR Wide			*	**	*	
audibly harmonizing penult	b. ['treβole ^(h)] 'ε ɔ ε μ_{PROM} Nar TR			*	***!		
transparent stressed V - harmonically bounded by (a)	c. ['treβole ^(h)] 'e ɔ ε μ_{PROM} Wide Nar TR		*!	*	**	*	
no harmony	d. ['treβole ^(h)] 'e o ε μ_{PROM} Wide TR Nar	*!			*		**