The role of phonological contrastivity in neutral harmony

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Argument

- Asymmetric inventory shape and blocking/skipping in harmony systems are closely linked

- This is predicted by Modified Contrastive Specification (MCS; Dresher, Piggott & Rice 1994; Dresher 2003, 2009)

- *But* the MCS approach fails to produce valid harmony pairs, such as in Yoruba RTR harmony

- Proposal: privative features

1 The role of contrast in harmony

Harmony involves correspondence between all segments bearing a harmonizing feature

(1) **Yoruba (Atlantic-Congo)** (Archangeli & Pulleyblank 1989; Ọla Orie 2001, 2003)
    ATR   ògèdẹ̀   *ɔ̀gɛ̀dɛ̣̀   'incantations'
    RTR   ɔ̀gɛ̀dɛ̣̀   *ògèdẹ̀   'banana'

1.1 Symmetric and asymmetric sound inventories

- Ekiti Yoruba has symmetric ATR/RTR contrasts (Ọla Orie 2003)

- Ifẹ Yoruba lacks RTR high vowels (Archangeli & Pulleyblank 1989; Ọla Orie 2001, 2003)

(2) **Non-low vowel inventory in Ekiti and Ifẹ Yoruba**

	ATR	RTR		ATR	RTR
HIGH	i u	ɪ ʊ	HIGH	i u	▢
MID	e o	ɛ ɔ	MID	e o	ɛ ɔ

| (a) Ekiti Yoruba | (b) Ifẹ Yoruba |

These inventory differences are reflected in harmony behavior.

- Ekiti Yoruba paired mid and high vowels display full harmony

    – [RTR] /ɛ, ɔ, a, ɪ, ʊ/
    – [ATR] /e, o,   i, u/

(3) **RTR/ATR paired Ekiti Yoruba mid vowels**

ATR	olè̱	*ɔlè̱	'thief'
	ògèdè̱	*ɔ̀gèdè̱	'incantations'
RTR	ɔsɛ̱	*osɛ̱	'soap'
	ɔ̀gɛ̀dɛ̱̀	*ògèdɛ̱̀	'banana'

(4) **RTR/ATR Ekiti Yoruba high vowels**

	Ekiti	
ATR	èbúte̱	'harbor'
	eúro̱	'bitter-leaf'
RTR	ɔrúkɔ̱	'name'
	ɛ̀lʊ̀bɔ̱́	'yam flour'

- Ifẹ Yoruba unpaired /i, u/ display neutral harmony

    – [RTR] /ɛ, ɔ, a   /
    – [ATR] /e, o,   i, u/

(5) **RTR/ATR paired Ifẹ Yoruba mid vowels**

ATR	olè̱	*ɔlè̱	'thief'
	ògèdè̱	*ɔ̀gèdè̱	'incantations'
RTR	ɔsɛ̱	*osɛ̱	'soap'
	ɔ̀gɛ̀dɛ̱̀	*ògèdɛ̱̀	'banana'

(6) **RTR/ATR unpaired Ifẹ Yoruba high vowels**

ATR	èbúté̱	*ɛ̀bʊ́té̱	'harbor'
	eúro̱	*ɛ́ʊ́ro̱	'bitter-leaf'
RTR	ɔrúkɔ̱	*orúkɔ̱	'name'
	ɛ̀lùbɔ̱́	*èlùbɔ̱́	'yam flour'

Phonological behavior and contrasts are linked. Judging from the vowel harmony patterns, although both dialects feature four non-low advanced vowels, the phonologically relevant class of [ATR] vowels includes all advanced vowels /i, u, e, o/ in Ekiti Yoruba, but only /e, o/ to the exclusion of /i, u/ in Ifẹ Yoruba.

(7) **Phonologically relevant ATR/RTR vowels in Ekiti and Ifẹ Yoruba**

	ATR		RTR			ATR		RTR	
HIGH	i	u	ɪ	ʊ	HIGH	i	u		
MID	e	o	ɛ	ɔ	MID	e	o	ɛ	ɔ
	(a) Ekiti Yoruba					**(b) Ifẹ Yoruba**			

These examples illustrate that there is a significant relationship between contrast and phonological activity, and harmony and neutral harmony patterns provide a useful diagnostic for discovering feature classes and studying cross-linguistic variation in feature specifications.

1.2 Harmony and neutral harmony variation

The distribution of harmony can however be quite complex, and harmony systems typically do not simply display harmonic versus non-harmonic patterns, as demonstrated by microvariation in unpaired segments across Yoruba dialects.

Neutral harmony variation

- RTR/ATR unpaired high vowels display variation across Yoruba varieties

(8) **Yoruba skipping and blocking**

	Ifẹ Yoruba	Standard Yoruba	
a.	èbúé̱	èbúé̱	port
b.	ògùrò̱	ògùrò̱	stick for stirring
c.	ɔdídɛ̱	odídɛ̱	parrot
d.	ɛ̀lùbɔ̱́	èlùbɔ̱́	yam flour

- **Ifẹ Yoruba**: harmonic skipping: ɛ̀lùbɔ́

- **Standard Yoruba**: harmonic blocking: èlùbɔ́

In descriptive terms, *harmonic* versus *neutral* segments are coarsely defined by their visibility to the harmony process, in other words their capacity to undergo harmony, as described in (9). *Harmony* implies the correspondence or spreading of some feature in some domain. So-called *transparent* segments are those which are in a sense invisible to and skipped by harmonization while *opaque* or *blocker* vowels are those which halt the harmony process.[1]

(9) **Neutral harmony behavior types**

|			
Harmony	$\underline{V_x}$–$V_{[\,]}$–$V_{[\,]}$	$\rightarrow$	$\underline{V_x}$–V_x–V_x
Skipping (harmonic transparency)	$\underline{V_x}$–V_y–$V_{[\,]}$	$\rightarrow$	$\underline{V_x}$–V_y–V_x
Blocking (harmonic opacity)	$\underline{V_x}$–V_y–$V_{[\,]}$	$\rightarrow$	$\underline{V_x}$–V_y–V_y

2   Modified Contrastive Specification (MCS)

Modified Contrastive Specification (MCS; Dresher, Piggott & Rice 1994; Dresher 2003, 2009)

- formalizes the role phonological representations play in harmony and neutral harmony patterns

  - phonological features specified according to hierarchical divisions of a language's sound inventory

  - variation in neutral harmony are representationally derived
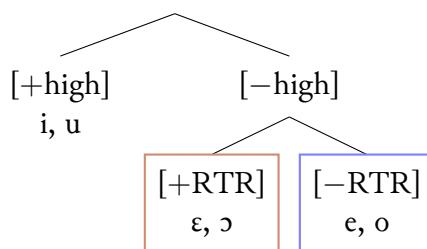
(a) Example feature hierarchy
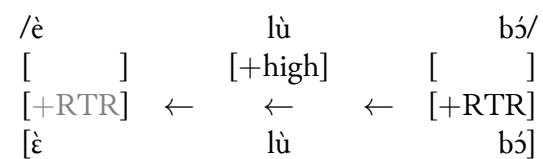
(b) Example high vowel transparency

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[1]Transparency and opacity in this sense are purely descriptive terms of disharmonic surface patterns relating to a segment's visibility to harmony processes, regardless what mechanisms are responsible, and should not be confused with derivational transparency or derivational opacity.

2.1 Successive Division Algorithm

MCS architectural assumptions

Three principle components

1. Contrastivist Hypothesis (Hall 2007, Dresher 2009): only those features which serve to distinguish segments in the underlying sound inventory may be phonologically active

2. Successive Division Algorithm (SDA; Dresher 2009): sound inventories are divided into binary feature classes

3. Feature ordering: the relative hierarchical ranking of features is cross-linguistically variable

- Two alternative ways of applying the SDA to the asymmetric inventory /i ɛ e/ are provided below

Successive Division Algorithm

(Dresher 2009)

1. Begin with *no* feature specifications: assume all sounds are allophones of a single undifferentiated phoneme.

2. If the set is found to consist of more than one contrasting member, select a feature and divide the set into as many subsets as the feature allows for.

3. Repeat step (2) in each subset: keep dividing up the inventory into sets, applying successive features in turn, until every set has only one member.
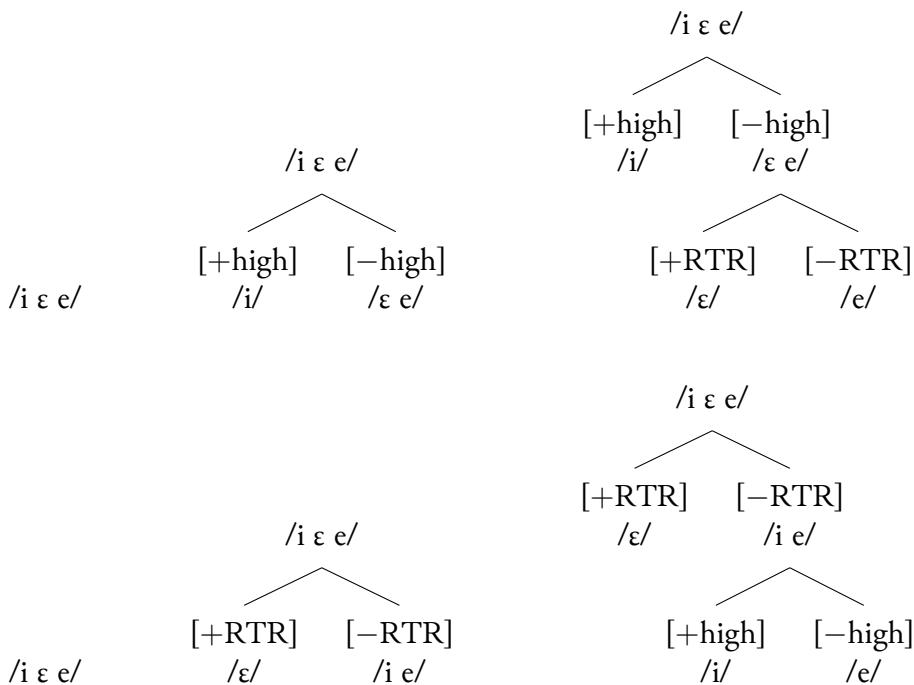
2.2 Yoruba

Representational motivations: phonological activity

- Phonological behavior is influenced by feature scope and vice versa

- high vowels do not undergo [+RTR] harmony

    - attributable either to underspecification or redundant [−RTR] specification

(10) **[RTR] contrasts in Yoruba**
     [RTR]   ɔkɔ̱   husband
     [ATR]   oko̱   farm
     [RTR]   ìgbɛ̱́   excrement
     [ATR]   igbe̱   noise

Yoruba contrastive feature hierarchies

[+high]		i	u
[−high]	[+RTR]	e	o
	[−RTR]	ε	ɔ

[high] > [RTR] (Ifẹ̀ Yoruba)

[−RTR]	[+high]	i	u
	[−high]	e	o
[+RTR]		ε	ɔ

[RTR] > [high] (Standard Yoruba)
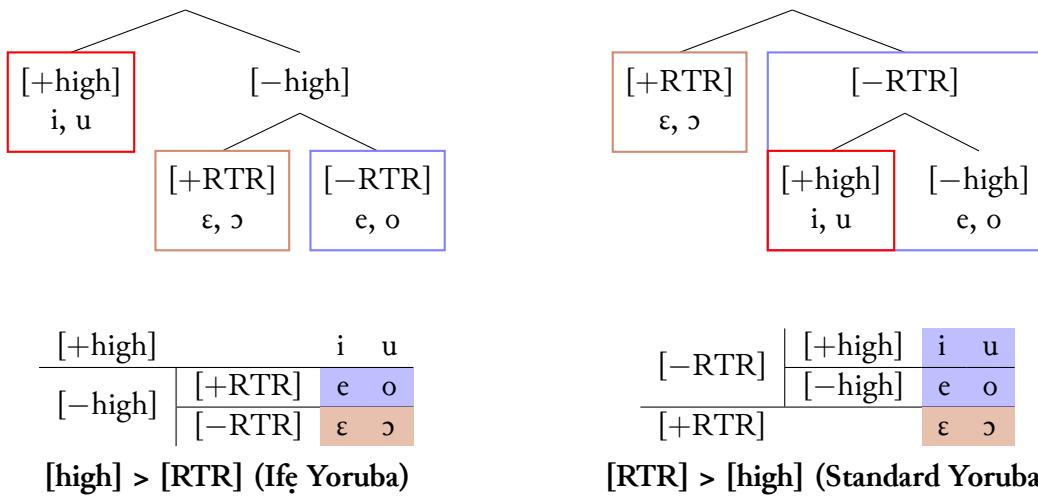
- The MCS approach treats cross-dialectal variation in Yoruba simply as differences in feature categorization

    - [high] > [RTR]: [+high] /i/ underspecified for [RTR]

    - [RTR] > [high]: [+high] /i/ redundantly specified [−RTR], causing blocking

        * Yoruba harmony principle: spread [RTR] leftwards

6

Ifẹ Yoruba transparency

/è   lù   bɔ́/
[−high]   [+high]   [−high]
[+RTR] ←   ←   ← [+RTR]
[ɛ   lù   bɔ́]

	i	ɛ	e
[high]	+	−	−
[RTR]		+	−

Ifẹ Y.: [high] > [RTR]

Standard Yoruba blocking

/è   lù   bɔ́/
[−RTR] ← [−**RTR**] ↚ [+RTR]
[−high]   [+high]
[è   lù   bɔ́]

	ɛ	i	e
[RTR]	+	−	−
[high]		+	−

Standard Y.: [RTR] > [high]
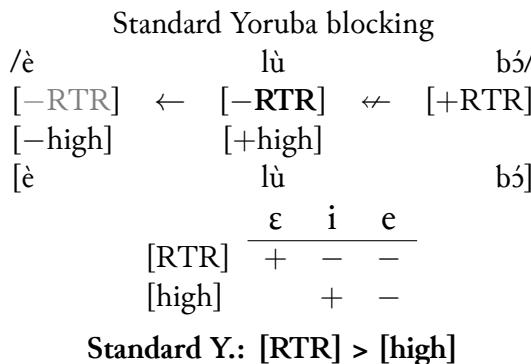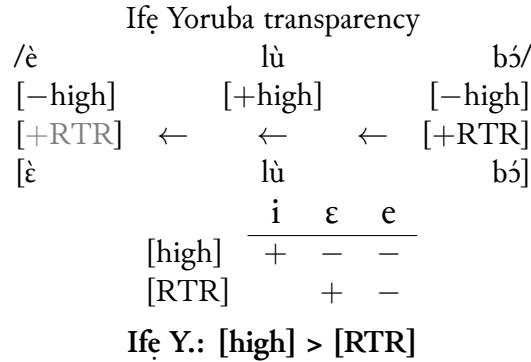
MCS advantages

The MCS approach has a number of qualities that are worth pursuing:

- provides an independent and natural motivation for neutral harmony (necessary outcome of inventory asymmetries)

- makes a narrow set of testable predictions and provides a good typological fit

- allows for a very economical grammatical model of basic harmony patterns

3 Challenges to the MCS approach

Further Yoruba complications

- Yoruba low /a/−*/ə/

    − harmonic (visible) across all Yoruba dialects

(11) **Non-alternating low /a/ (*/ə/)**

ATR	arè	*ərè	crown
	ahoro̱	*əhoro̱	ruins
RTR	àgbὲdὲ		blacksmith
	abɔ̱		female

(12) **Non-alternating low /a/ is harmonic trigger**

ɔba̱	*oba̱	king
ὲpà	*èpà	peanut
ɔ̀yàyà	*òyàyà	cheerfulness
ɛréta̱	*eréta̱	place of ogun worship in Ifẹ

In principle, asymmetries in the behavior of different groups of redundant features like high and low vowels in Ifẹ Yoruba should receive a unified analysis following the MCS approach since the SDA does not omit redundant feature specifications, such as [RTR] on [low] vowels. As illustrated in the full oral vowel contrastive hierarchies in (13), under an MCS approach, [RTR] has narrower scope than [high] in Ifẹ Yoruba but broader scope than [low]. High /i, u/ vowels are therefore invisible to the harmony process while [+low] /a/ is conversely predicted to be a licit trigger of [RTR]-harmony, being within the domain of [RTR].

Ifẹ and Standard Yoruba contrastive feature hierarchies

(13)

(a) **Ifẹ Yoruba: [high] > [RTR]** (b) **Standard Yoruba: [RTR] > [high]**

8
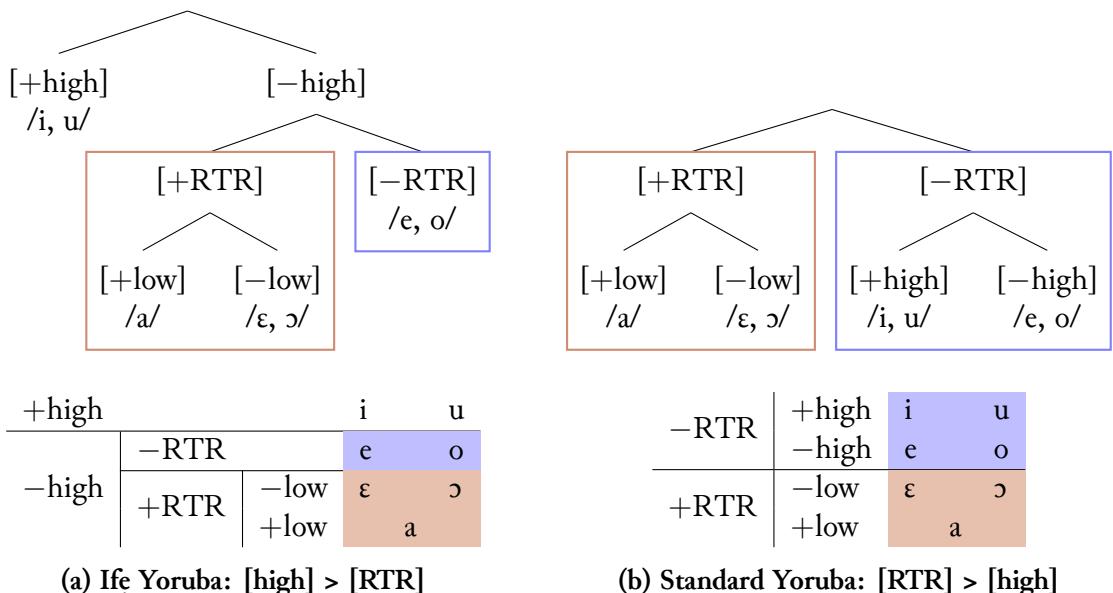
Following an MCS approach, the variation in these Yoruba dialects does not require any difference in the two dialects' harmony grammar. In principle, any feature spreading or correspondence mechanism between [RTR]-contrastive vowels—as defined by the contrastive feature hierarchies in (13)—will produce the Yoruba patterns above. Contrastive feature hierarchies constructed according to the SDA provide therefore a straightforward and limited method for accommodating common neutral harmony patterns while enhancing both representational and grammatical economy.

3.1 Incongruent feature specifications

Contrastive feature hierarchies produce however featurally incompatible harmonic pairs in asymmetric inventories

- E.g. Standard Yoruba mid vowels

(14) **Incongruent binary harmony pairs**

/i, u/	/e, o/	/ɛ, ɔ/	/a/
[−RTR]	[−RTR]	[+RTR]	[+RTR]
[+high]	[−**high**]	[−**low**]	[+low]
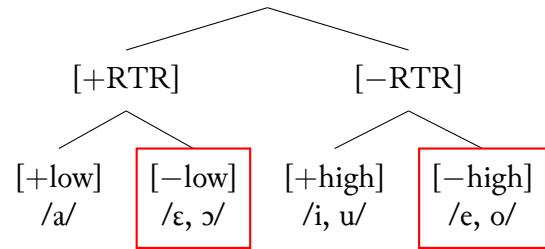
Since [−RTR] /e, o/ vowels lack any [±low] specification, it is not clear under this account why [−RTR] /e/ alternates with [+RTR, −low] [ɛ] instead of [+RTR, +low] [a], e.g. [−RTR] [epo̲] "oil" vs. [+RTR, ±low] [ɛpà̲], *[àpà̲]. Since both low and non-low [+RTR] harmony triggers in Yoruba derive the same harmony output—e.g. [ɛdɔ̲] "liver" and [ɛpà̲] "peanut"—this pattern cannot be analyzed as any kind of [−low] spreading.

Incompatible harmony pairs

(15) **[±RTR] /ɛ, e/ harmonic pairs**

ATR	ebɛ̲	*ibɛ̲	heap of yams
	epo̲	*ipo̲	oil
RTR	ɛdɔ̲	*àdɔ̲	liver
	ɛpà̲	*àpà̲	peanut

(16) **Contrastive hierarchies fail to produce /e/→[ɛ] harmony mapping: Standard Yoruba**

	/è	dɔ/		/è	pà/
[**RTR**]	[+RTR]	← [+RTR]		[+RTR]	← [+RTR]
[**high**]	[−high]			[−high]	
[**low**]		[−low]			[+low]
	[ɛ/*à	dɔ]		[ɛ/*à	pà]

Ifẹ Yoruba features a similar problem

- [−RTR] [e, o] and [+RTR, −**low**] [ɛ, ɔ]

(17) **Incongruent feature specifications in harmonic pairs**

i, u	e, o	ɛ, ɔ	a
[+high]	[−high]	[−high]	[−high]
	[−RTR]	[+RTR]	[+RTR]
		[−low]	[+low]

```
                              ╱╲
                    [+high]        [−high]
                    /i,u/          ╱╲
                              [+RTR]    [−RTR]
                              ╱╲        /e, o/
                        [+low]  [−low]
                          a     /ɛ, ɔ/
```
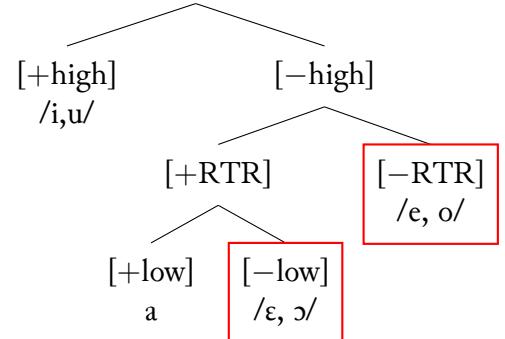
(18) **Contrastive hierarchies fail to produce /e/→[ɛ] harmony mapping: Ifẹ Yoruba**

	/è	dɔ̀/	/è	pà/
[**high**]	[−high]	[−high]	[−high]	[−high]
[**RTR**]	[+RTR] ←	[+RTR]	[+RTR] ←	[+RTR]
[**low**]		[−low]		[+low]
	[ɛ̀/*à	dɔ̀]	[ɛ̀/*à	pà]

Harmonic pairing is inherently faulty

- see also Dresher's (2013) depiction of Anywa (Nilotic) dental harmony

- see also Hall & Hall's (2016) analysis of Pulaar (Atlantic-Congo) ATR harmony

The celebrated advantage of capturing asymmetric harmony systems necessarily leads to incomplete/incompatible harmony outputs

4   MCS method revisions

The problem in other words

- [−RTR] /e, o/ have no specification for [low]

- [+RTR] /ɛ, ɔ/ should not as well

Binary contrastive feature hierarchies inevitably lead to a kind of feature overspecification

(19) **Incongruent binary harmony pairs**

/i, u/	/e, o/	/ɛ, ɔ/	/a/
[−RTR]	[−RTR]	[+RTR]	[+RTR]
[+high]	[−**high**]	[−**low**]	[+low]

(/e, o/ [−high] and /ɛ, ɔ/ [−low] boxed together)

```
              /\
         [+RTR]    [−RTR]
          /\        /\
    [+low] [−low] [+high] [−high]
     /a/   /ɛ, ɔ/  /i, u/  /e, o/
```

(/ɛ, ɔ/ and /e, o/ each in red boxes)
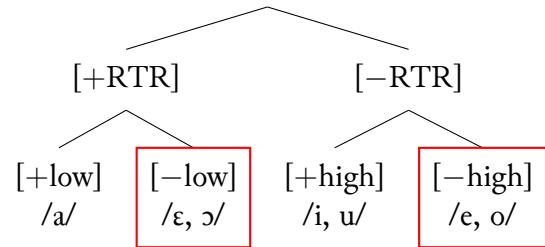
Privative contrastive feature hierarchies produce correct harmony pairings

(20) **Congruent privative harmony pairs**

/i, u/	/e, o/	/ɛ, ɔ/	/a/
[ ]	[ ]	[RTR]	[RTR]
[high]	[ ]	[ ]	[low]

(/e, o/ [ ] and /ɛ, ɔ/ [ ] boxed together)

```
              /\
         [ RTR]    [    ]
          /\        /\
    [ low] [    ] [ high] [    ]
     /a/   /ɛ, ɔ/  /i, u/  /e, o/
```

(/ɛ, ɔ/ and /e, o/ each in red boxes)
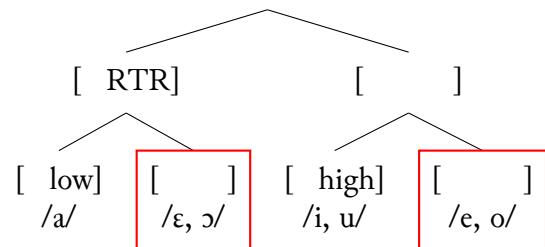
4.1 Privative features

The use of privative rather than binary features in Modified Contrastive Specification makes slightly different predictions about harmony patterns. Binary contrastive feature hierarchies predict a one-to-one relationship between phonological activity and visibility. Anything that in any way interacts with a phonological process which computes [F] must be specified for [F] (and thereby a potential trigger as well as target).

Binary feature hierarchy harmony typology

```
            /\
      [αT]   [−αT]
 transparent segments /\
                 [αF]   [−αF]
            triggers/targets triggers / targets
```
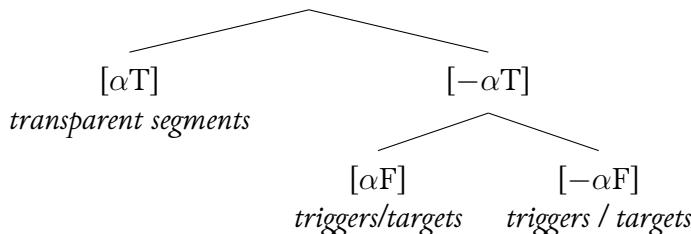
(21) **Harmony visibility and activity**

|          | visible | invisible |
|----------|---------|-----------|
| **active** | *harmonic trigger/target* (specified) | |
| **inactive** | | *transparent segments* (underspecified) |

Privative contrastive feature hierarchies however produce a ternary contrast, distinguishing specified (triggers) and non-specified and therewith inactive but visible segments (targets).

**Privative feature hierarchy harmony typology**

```
            ╱╲
         ╱     ╲
      [T]        [   ]
  transparent    ╱╲
   segments   ╱     ╲
           [F]      [   ]
         triggers   targets
```
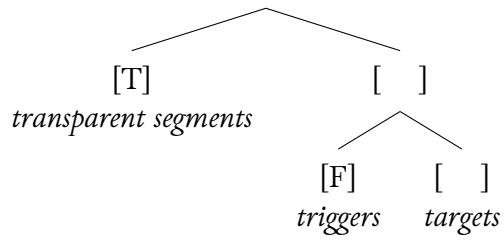
(22) **Harmony visibility and activity**

	visible	**invisible**
active	*trigger* (specified)	
inactive	*target* (non-specified)	*transparent segment* (underspecified)

Locality domains using privative feature hierarchies

What are viable (visible) harmony targets?

- Binary feature hierarchies: harmony targets [±F]-specified segments

- Privative feature hierarchies: ?

(23) **Harmony visibility of featureless segments**

	/è	dɔ/		/è	pà/
[RTR]	[ ]	← [RTR]		[ ]	← [RTR]
[low]		[ ]			[low]
	[ɛ	dɔ]		[ɛ	pà]

Feature nodes

Privative feature hierarchies require some mechanism to distinguish non-specified (visible) from underspecified (invisible) segments

- Parallel Structures Model of feature geometry (Morén 2003, Iosad 2017)

    - V-manner/place nodes serve as potential landing sites for assimilatory processes

```
                    ┌──────────┴──────────┐
              V-x[T]                    V-x[   ]
        transparent segments            ┌────┴────┐
                                   V-x[F]       V-x[   ]
                                   triggers      targets
```
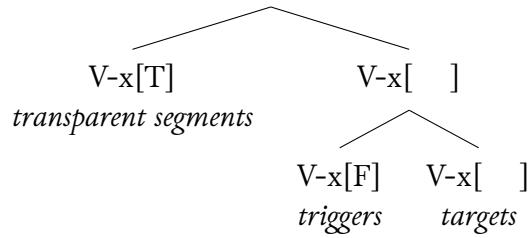
(24) **Harmony segments**

	trigger	target	transparent segment
[F]	V-x[F]	V-x[ ]	

MCS revisions summary

Binary feature hierarchies

- harmonic (visible) and transparent (invisible) segments

- featurally incongruent harmony pairs in asymmetric inventories

Privative feature hierarchies

- harmonic (visible) and transparent (invisible) segments

- correct harmony pairing

- locality domains defined by PSM feature nodes

4.2   Yoruba revisited

Harmony principles (based on Dresher 2013, 2015)

- **Yoruba vowel harmony**: Spread [RTR] leftwards

- **Distributional assumptions**: Non-final (non-low) vowels are underlyingly [RTR]-non-specified

Representations

- **Ifẹ Yoruba:**   [high] > [RTR]

- **Standard Yoruba:**   [RTR] > [high]

```
        ┌────────┴─────────┐
  V-man[high]          V-man[   ]
     /i,u/            ┌────┴─────┐
               V-man[RTR]     V-man[   ]
               ┌───┴───┐        /e, o/
         V-man[low] V-man[  ]
            /a/      /ɛ, ɔ/
```

[high] > [RTR] (Ifẹ Yoruba)

```
        ┌─────────┴──────────┐
  V-man[RTR]              V-man[   ]
  ┌────┴────┐          ┌─────┴──────┐
V-man[low] V-man[  ] V-man[high] V-man[   ]
   /a/      /ɛ, ɔ/    /i, u/      /e, o/
```
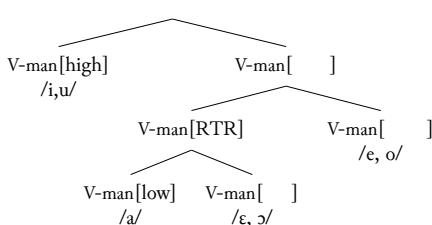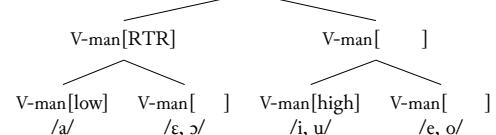
[RTR] > [high] (Standard Yoruba)

Yoruba mid vowel harmony

In both Ifẹ and Standard Yoruba

- mid vowels display both surface RTR and ATR harmony

(5) **RTR/ATR pairedYoruba mid vowels**

ATR	olè̜	*ɔlè̜	'thief'
	ògèdè̜	*ɔ̀gèdè̜	'incantations'
RTR	ɔsɛ̜	*osɛ̜	'soap'
	ɔ̀gɛ̀dɛ̜	*ògèdɛ̜	'banana'

Dominant/recessive harmony

All harmony systems are asymmetric; ATR harmony comes for free

- /ògèdè/→[ògèdè] "incantations"

- /ògèdɛ̀/→[ɔ̀gɛ̀dɛ̀] "banana"

(25) **RTR harmony among mid vowels**

	/ò		gè		dɛ̀/
[RTR]	[RTR]	←	[RTR]	←	[RTR]
[high]	[ ]		[ ]		[ ]
	[ɔ		gɛ̀		dɛ̀]

(26) **ATR harmony involves no feature spreading**

	/ò	gè	dè/
[RTR]	[ ]	[ ]	[ ]
[high]	[ ]	[ ]	[ ]
	[ò	gè	dè]

4.3   Harmony and neutral harmony typology

Non-alternating harmony triggers

- Yoruba low /a/–*/ə/

    – harmonic across all Yoruba dialects

(11) **Non-alternating low /a/ (*/ə/)**

ATR   arè̱   *ərè̱   crown
      ahoro̱   *əhoro̱   ruins

RTR   àgbèdɛ̱   blacksmith
      abɔ̱   female

(12) **Non-alternating low /a/ is harmonic trigger**

ɔba̱   *oba̱   king
ɛpà̱   *èpà̱   peanut
ɔ̀yàyà̱   *òyàyà̱   cheerfulness
ɛrɛ́ta̱   *erɛ́ta̱   place of ogun
               worship in Ifẹ

"Harmonic blocking"

Under a privative MCS account, there is no such thing as harmonic blocking

- non-RTR vowels have no ATR feature to spread (27)

(27) **Non-alternating /a/ in ATR harmony**

	/a	ho		ro/	
[RTR]	[RTR]	[	]	[	]
[low]	[low]				
[high]		[	]	[	]
	[a	ho		ro]	

Yoruba [RTR] /a/ is a regular harmonic trigger

- /erɛ́ta/→[ɛrɛ́ta] "place of ogun worship in Ifẹ"

(28) **/a/ as RTR harmony trigger**

	/er		ét		a/
[RTR]	[RTR]	←	[RTR]	←	[RTR]
[low]					[low]
[high]	[	]	[	]	
	[ɛr		ɛ́t		a]

Transpareny (skipping) and blocking

Ifẹ and Standard Yoruba differ in the behavior of high vowel visibility

(8) **Skipping and blocking high vowels in Yoruba**

	Ifẹ	Standard	
ATR	èbúté	èbúté	'port'
	ògùrò	ògùrò	'stick for stirring'
RTR	ɔdídɛ	odídɛ	'parrot'
	ɛlùbɔ́	èlùbɔ́	'yam flour'

Transpareny (skipping) in Ifẹ Yoruba

Transparency is a straightforward effect of underspecification

- [high] > [RTR]

(29) **Word-medial high vowel ATR harmony**

```
          /è         bú         te/
[high]  [    ]     [high]     [    ]
[RTR]   [    ]                [    ]
        [è         bú         te]
```

(30) **Word-medial high vowel RTR transparency**

```
          /è         lù         bɔ́/
[high]  [    ]     [high]     [    ]
[RTR]   [RTR]  ←   ←    ←   [RTR]
        [ɛ̀         lù         bɔ́]
```

Neutral blocking in Standard Yoruba

- * see appendix for more thorough discussion of the problems neutral blocking pose for Binary Modified Contrastive Specification

Standard Yoruba categorizes [high] within the scope of [RTR]

- [RTR] > [high]: high vowels are visible harmony targets

Standard Yoruba lacks retracted high vowel counterparts

- *[RTR, high] /ɪ, ʊ/—invalid [RTR] harmony output

- results in neutral blocking

(31)   **Word-medial high vowel ATR harmony**

	/è		bú		te/
[RTR]	[ ]		[×]		[ ]
[high]	[ ]		[high]		[ ]
	[è		bú		te]

(32)   **(*[RTR, high]) neutral blocking in Standard Yoruba**

	/è		lù		bɔ́/
[RTR]	[ ]		[×]	↚	[RTR]
[high]	[ ]		[high]		
	[è		lù		bɔ́]

Harmony analysis summary

    Harmony principle:

- Spread [RTR] leftwards

Representations:

- **Ifẹ Yoruba**:   [high] > [RTR]

- **Standard Yoruba**: [RTR] > [high]

Harmony patterns

- [RTR] harmony: ɔ̀gɛ̀dɛ̀ "banana", òkèdè̱ "incantations"

- Harmonic blocking: ahoro̱ "ruins", ɔ̀yàyà̱ "cheerfulness"

- Neutral blocking (Standard Yoruba): èlùbɔ̱́ "yam flour"

- Transparency (Ifẹ Yoruba): ɛ̀lùbɔ̱́ "yam flour"

4.4   Conclusions

Binary Modified Contrastive Specification

- provides a natural motivation for neutral harmony

- provides an overall good typological fit

- allows for a very economical grammatical model of basic harmony patterns

- * featurally incompatible harmony pairing

- predictable by-product of the use of binary features

* cannot accommodate neutral blocking

- see appendix for further discussion of neutral blocking

Privative Modified Contrastive Specification

- featurally congruent harmony pairing

- require feature nodes to define locality domains

- natural motivation for dominant/recessive style asymmetries in harmony systems

- captures neutral as well as harmonic blocking

5 Appendix: Neutral blocking

In this talk I have focussed on the harmony pairing problem in Binary Modified Contrastive Specification, but the use of binary features also results in a related effect on the viability of harmony targets to trigger harmony which misses important harmony generalizations. As presented above, binary contrastive hierarchies predict broadly only two harmony types determined by visibility to the harmony feature, as repeated in (33).

(33) **Harmony behaviors as defined by binary contrastive feature hierarchies**

$$[\alpha T] \qquad [-\alpha T]$$

$[\alpha T]$
transparent segments

$[-\alpha T]$

$[\alpha F]$
triggers/targets

$[-\alpha F]$
triggers / targets
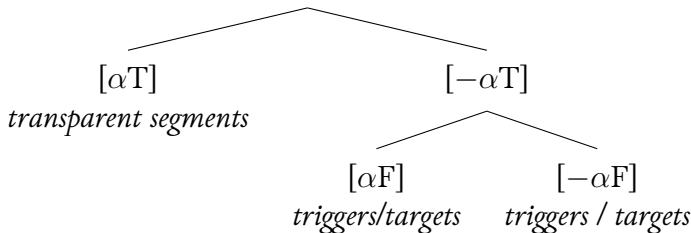
This architecture proposes that segments are either *neutral* (invisible)—dominated by some orthogonal feature T (for *transparent*) outside the scope of and underspecified for the harmony feature F—or *harmonic* (visible)—dominated by and therefore specified for the feature F—but this prohibits neutral blocking; a process where a segment can halt the harmony process but does not condition harmony itself. A simple and common example of neutral blocking is illustrated by low vowels in many Bantu height harmony systems (Hyman 1999). For example, Shona features left to right (perseveratory) height harmony where non-high vowels /e, o/ cause high vowel lowering, but as seen in (35e–h) /a/ fails to initiate vowel lowering. According to Binary MCS,

this indicates that [low] must be ordered before [high] as in (34) such that /a/ has no [−high] feature to spread.[2]

(34) **Contrastive features in Shona**

```
              _____
             /            \
        [+low]           [−low]
         /a/             /     \
                        /       \
                  [+high]     [−high]
                   /i, u/       /e, o/
```
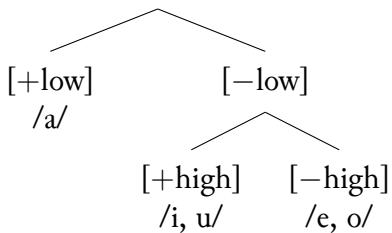
(35) **Shona (Bantu) height harmony and neutral /a/** (Beckman 1997: pp. 1–2)
a.	ipira	*ipera	be evil for
b.	bvumisa	*bvumesa	make agree
c.	perera	*perira	end in
d.	omesa	*omisa	cause to get dry
e.	shambisa	*shambesa	make wash
f.	pamhisa	*pamhesa	make do again
g.	cheyamisa	*cheyamesa	make be twisted
h.	pofomadzira	*pofomadzera	blind for

Thus, like the Ifẹ Yoruba high vowel examples above, /a/ is non-contrastive with respect to the harmony feature and therefore does not initiate harmonic lowering, but this account does not explain why /a/ cannot be skipped by the harmony procedure (e.g. *cheyamisa*, *cheyamesa*). Since /a/ has no [±high] feature specification, blocking in this context is not predicted to be possible; /a/ should behave transparently in Shona just like high vowels in Ifẹ Yoruba. In fact binary contrastive feature hierarchies never predict neutral blocking to be possible. Because phonological visibility is identified with activity/contrastivity (Dresher 2017: p. 46), harmony visibility (e.g. blocking) implies contrastivity for the harmony feature, and being contrastive (specified) for the harmony feature should ensure the ability to initiate harmony. In other words, contrastive hierarchies predict only harmonic blocking (e.g. $/\underline{V_x}–V_y–V_{[\,]}/ \rightarrow [\underline{V_x}–V_y–V_y]$) and never neutral blocking (e.g. $/\underline{V_x}–V_y–V_{[\,]}/ \rightarrow [\underline{V_x}–V_y–V_z]$).

The assumption that neutrality implies non-contrastivity and non-visibility as proposed by Binary MCS could be saved by assuming that vowel harmony is restricted to adjacent syllables in Shona, effectively turning transparent/non-visible vowels into neutral blockers—a technique Dresher & Nevins (2017) propose for neutral blocking in Oroqen (Tungusic) labial harmony—but this approach is falsified by harmony systems which feature clear cases of both transparency

---

[2]Like many Eastern and Southern Bantu languages, Shona features penultimate lengthening as a reflex of predictable stress placement which for simplicity's sake is omitted here (Hyman 2009; Beckman 1997: p. 36, note 11).

and neutral blocking simultaneously; e.g. transparent /i/ and neutral blocking /u, ʊ/ vowels in Khalkha (Mongolic) labial harmony (Svantesson et al. 2008). Khalkha features left to right (perseveratory) overlapping labial and RTR harmony. For simplicity sake, I will consider only neutrality to labial harmony using ATR vowels in the simplified inventory in (38). In Khalkha, round vowels cause the 'direct past' /-ʤe/ suffix to round to [-ʤo] as shown in (36a).

(36)   **Khalkha labial harmony high vowel non-triggers**
      a.   it̠-ʤe   *it̠-ʤo   'eat'-DPST
              xee̠ʤ-ʤe   *xee̠ʤ-ʤo 'decorate'-DPST
              og̠-ʤo   *og̠-ʤe   'give'-DPST
              cʰoo̠r-ʤo   *cʰoo̠r-ʤe 'decrease'-DPST

      b.   šii̠t-ʤe   *šii̠t-ʤo   'decide'-DPST
              uc̠-ʤe   *uc̠-ʤo   'see'-DPST
              tuu̠ʤ-ʤe   *tuu̠ʤ-ʤo 'jump'-DPST

High vowels are neutral with respect to labial harmony, never initiating vowel rounding (36b), and in word-medial positions /i/ is fully transparent to rounding harmony and is followed by both round and non-round vowels (37a). These patterns indicate that [high] must be ordered outside the scope of [labial] as in (38) such that /u/ has no labial feature to spread and /i/ is not visible to the rounding process. But this is contradicted by the patterns in (37b) which show that /u/ cannot be skipped by the harmony procedure and can only be followed by non-round vowels.

(37)   **Khalkha /i/-transparency and /u/-neutral blocking**
      a.   pii̠r-ig-e   *pii̠r-ig-o   'brush'-ACC-RFL
              tee̠ʤ-ig-e   *tee̠ʤ-ig-o   'gown'-ACC-RFL
              poo̠r-ig-o   *poo̠r-ig-e   'kidney'-ACC-RFL

      b.   it̠-uʤ-ʤe   *it̠-uʤ-ʤo   'eat'-CAUS-DPST
              xee̠ʤ-uʤ-ʤe *xee̠ʤ-uʤ-ʤo 'decorate'-CAUS-DPST
              og̠-uʤ-ʤe   *og̠-uʤ-ʤo   'give'-CAUS-DPST

/i/-transparency demonstrates that non-local harmony *is* permitted in Khalkha, and /u/-blocking demonstrates that segments may be phonologically visible without otherwise being harmonically active (cf. *poo̠r-ig-o* and *og̠-uʤ-ʤe*, **og̠-uʤl-ʤo*). This is a clear instance of neutral blocking for which binary contrastive feature hierarchies cannot supply a complete account; see Ko (2013) and Godfrey (2012) for two attempts to reconcile these patterns with Binary MCS.

(38) **Contrastive features in Khalkha (Mongolic)**

```
              _____
             /           \
      [+high]            [−high]
       /i, u/             /    \
                         /      \
                  [+labial]    [−labial]
                     /o/          /e/
```
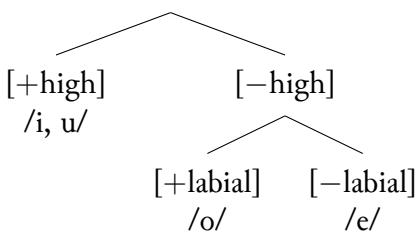
In terms of triggering or being targeted by harmonic correspondence, the neutral blocking patterns in Shona height harmony and Khalkha labial harmony reveal that there are not just two (visible or invisible; active or inactive) patterns as predicted, but in fact three. This survey illustrates that while phonological visibility is a precondition for active feature spreading, the reverse is not the case (39). It is possible to be visible without any overt activity.

(39) **Harmony visibility and activity**

	visible	invisible
active	harmonic blocking	
inactive	neutral blocking	transparency

Both feature-pairing and neutral blocking patterns highlight a certain imprecision in the Binary MCS approach to harmony processes. In many harmony systems, contrastive hierarchies as currently defined cannot produce featurally-paired harmonic alternates or visible but non-triggering harmony targets (neutral blockers). As with the harmony pairing problem, I argue that this is not a fault of contrastive hierarchy architecture per se but a result of the use of binary features which in effect produce overspecified segments. In asymmetric inventories, feature overspecification predictably produces featurally-incongruent harmonic alternations and rules out visible but inactive harmony targets, which are avoided by privative contrastive feature hierarchies.

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