A strictly representational account of neutral blocking

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0.1 Talk summary

FOCUS: a unified account of neutral blocking and other forms of neutral harmony

(1) **Harmony and neutral harmony behavior types**

Harmony	$\underline{V_F}$–$V_{[\,]}$–$V_{[\,]}$	→	$\underline{V_F}$–V_F–V_F
Transparency	$\underline{V_F}$–V_G–$V_{[\,]}$	→	$\underline{V_F}$–V_G–V_F
Harmonic blocking	$\underline{V_F}$–V_G–$V_{[\,]}$	→	$\underline{V_F}$–V_G–V_G
Neutral blocking	$\underline{V_F}$–V_G–$V_{[\,]}$	→	$\underline{V_F}$–V_G–V_H

Harmony and neutral harmony behavior types (1)

- HARMONY: Some [F]-non-specified segment $V_{[\ ]}$ undergoes [F]-spreading
- TRANSPARENCY: Some segment $V_{[G]}$ is neither visible to nor active in [F]-harmony
- HARMONIC BLOCKING: Some segment $V_{[G]}$ halts [F]-spreading and initiates a [G]-harmonic span
- * NEUTRAL BLOCKING: Some segment $V_{[G]}$ halts [F]-spreading but does not initiate a harmonic span

Neutral blockers are:

- visible non-recipients of harmony (like *harmonic blockers*)
- inert / inactive non-triggers (like *transparent segments*)

For example: Khalkha or Halh (Mongolian) (Svantesson 1985, Svantesson et al. 2008)

- perseveratory labial harmony: e̱t-eer vs. o̱t-oor
- /u/-neutral blocking: t^ho̱solȝ-ulȝ-ȝe, *t^ho̱solȝ-ulȝ-ȝo
  - /u/ can only be followed by non-round vowels

(2) **Khalkha labial harmony**

NON-ROUND	xeeʤ-ʤe	*xeeʤ-ʤo	‘decorate’-DPST
	et-eer	*et-oor	‘item’-INST
ROUND	og-ʤo	*og-ʤe	‘give’-DPST
	ot-oor	*ot-eer	‘feathers’-INST

(3) **Khalkha neutral blocking /u/**

NON-TRIGGER	tuuʤ-ʤe	*tuuʤ-ʤo	‘jump’-DPST
	ut-eer	*ut-oor	‘day’-INST
NON-TARGET	it-uʤ-ʤe	*it-uʤ-ʤo	‘eat’-CAUS-DPST
	xeeʤ-uʤ-ʤe	*xeeʤ-uʤ-ʤo	‘decorate’-CAUS-DPST
NON-TRANSPARENT	og-uʤ-ʤe	*og-uʤ-ʤo	‘give’-CAUS-DPST
	tʰosoʤ-uʤ-ʤe	*tʰosoʤ-uʤ-ʤe	‘imagine’-CAUS-DPST

Neutral blocking is cross-linguistically common but has received no unified analysis:

- underspecification + feature co-occurrence restrictions (e.g. Chichewâ; Moto 1989; cf. Downing & Mtenje 2017)
- feature co-occurrence restrictions + locality constraints (e.g. Chichewâ; Harris 1994)
- faithfulness + markedness (e.g. Shona; Beckman 1997)
- underspecification + locality constraints (e.g. Oroqen; Dresher & Nevins 2017)
- marked-value relativization + parasitic similarity requirement (e.g. Khalkha; Nevins 2010)
- contrastive-value relativization + locality constraints (e.g. Old Norwegian; Sandstedt 2017)

Commonalities in treatment of neutral blocking:

☞ No single pathway which leads to neutral blocking
  - indirect result of orthogonal/unrelated constraints on harmony processes and/or representations

☞ On average requiring more grammatical machinery than other forms of neutral harmony
  - often ad hoc and weakly motivated (see Downing & Mtenje (2017: pp. 70–89) for a critique of common analyses)

It’s not obvious this is on the right track.

Typologically neutral blocking is not significantly different from other forms of neutral harmony:

- correlated with asymmetric inventory shape
- typologically prevalent and diachronically stable (e.g. Bantu height harmony systems; Hyman 1999)
- is an optional alternative to other forms of neutral harmony
  - E.g. in 7V RTR harmony systems

    Transparent /a/ in Londengese (Hulstaert & Goemaere 1984, Leitch 1996)

Harmonic blocking /a/ in Yoruba (Ọla Orie 2003)

Neutral blocking /a/ in Nkundo (Hulstaert 1961, Leitch 1996)

– co-occurs with other forms of neutral harmony

transparent high front vowels + neutral blocking high back vowels (e.g. Khalkha; Svantesson et al. 2008)

harmonic blocking low vowels + neutral blocking lax mid vowels (e.g. Old Norwegian; Sandstedt 2017)

0.2 Goals and claims

Current Aim:

- To unify the account of neutral blocking with other forms of neutral harmony
  - consistent with the typological prevalence, stability, and variability of neutral blocking patterns

Claim:

- I argue for a privative version of Modified Contrastive Specification (MCS; Dresher 2009)
  - incorporating insights from the Parallel Structures Model of feature geometry (PSM; Morén 2003, Iosad 2017)
- Under this framework, neutral harmony is strictly representationally derived
  - Neutral blockers:

    visibility via the contrastive non-specification for the harmony feature

    inertness feature co-occurrence restrictions

1 Introduction to Modified Contrastive Specification

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

1.1 Two principle components of the MCS approach

1.1.1 Contrastivist Hypothesis

The *Contrastivist Hypothesis* (Hall 2007, Dresher 2009) holds that only those features which serve to distinguish segments in the underlying sound inventory may be phonologically active

An important corollary of the Contrastivist Hypothesis:

- phonological activity informs the representation of phonological contrasts
  - For example: Chicheŵa (Bantu) (Harris 1994, Downing & Mtenje 2017)

(4) **Chicheŵa (Bantu) vowel height harmony** (Harris 1994: p. 514)

		Causative	Applicative	
High	pind-a	pind-its-a	pind-il-a	'bend'
Non-high	lemb-a	lemb-ets-a	lemb-el-a	'write'

The data in (4) provide evidence to the speaker for two features:

- [±high]: high/non-high alternations in caus. [-its] / [-ets] and appl. [-il] / [-el]
- [±low]: non-alternating [+low] /a/ vs. alternating [−low] /i/–/e/

* But is /a/ specified or underspecified for the harmony feature [high]?
  - According to MCS, languages may answer this question differently...

1.1.2 Successive Division Algorithm: specifying phonological features

Features are specified according to the Successive Division Algorithm (SDA)

- sound inventories are hierarchically divided into binary feature classes
- the relative hierarchical ranking of features is cross-linguistically variable

(5) Successive Division Algorithm (Dresher 2009: p. 16)

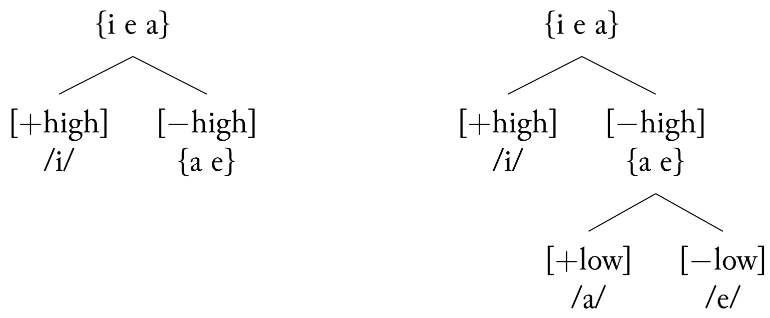
1. Begin with *no* feature specifications: assume all sounds are allophones of a single undifferentiated phoneme.
2. If the set is found to consist of more than one contrasting member, select a feature and divide the set into as many subsets as the feature allows for.
3. Repeat step (2) in each subset: keep dividing up the inventory into sets, applying successive features in turn, until every set has only one member.

Given our simplified Chicheŵa vowel set {i, e, a} and features [±high, ±low]:

☞ SDA predicts two possibilities (6, 7)

(6) **SDA output: [high] > [low]**

{i e a}



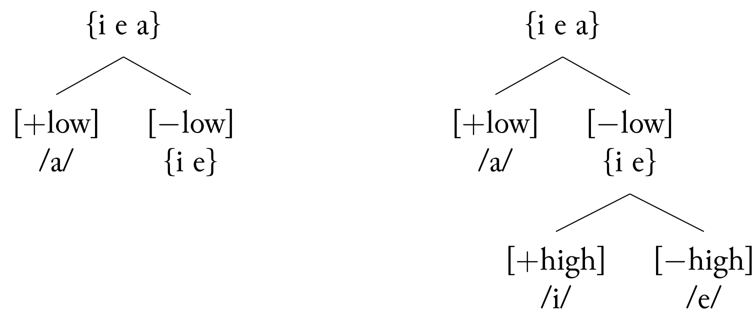
i	e	a

	i	e	a
[high]	+	−	−

	i	e	a
[high]	+	−	−
[low]		−	+

(7) **SDA output: [low] > [high]**

{i e a}



i	e	a

	i	e	a
[low]	−	−	+

	i	e	a
[low]	−	−	+
[high]	+	−	

* Is /a/ specified for the harmony feature [high]?

- Dividing the inventory by [high] before [low] (6)

  /a/ contrastively both [+low] and [−high]

  leaves [+high] /i/ underspecified for [low]

- And vice versa, dividing the inventory by [low] before [high] (7)

  leaves [+low] /a/ underspecified for [high]

  /i/ contrastively both [−low] and [+high]

1.2 Neutral harmony and asymmetric sound inventories

As the above examples illustrate, the SDA predicts cross-linguistic variation in feature specifications (and thereby visibility / activity) in asymmetric inventories

- E.g. /a/ in [±high]-harmony in Bantu
  - neutral (underspecified) in Chichewa̋: ba-**il**-a, *ba-**el**-a
  - harmonic (specified [−high]) in Pende: gu-sas-**el**-a, *gu-sas-**il**-a

(8) **Chichewa̋ neutral /a/ with applicative suffixes** (Harris 1994)

HIGH	pind-il-a	*bend*	put-il-a	*provoke*
NON-HIGH	lemb-el-a	*write*	konz-el-a	*correct*
	bal-**il**-a	*give birth*	*bal-**el**-a	

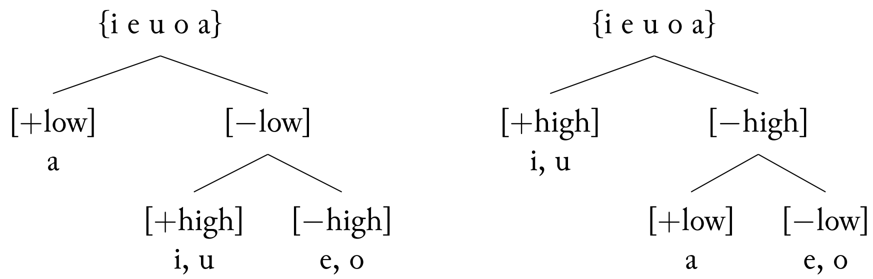
(9) **Pende harmonic /a/ with applicative suffixes** (Niyonkuru 1978, Hyman 1999)

HIGH	gu-díg-íl-a	*vendre pour*	gu-túng-íl-a	*bâtir pour*
NON-HIGH	gu-bemb-el-a	*abandonner pour*	gu-lómb-él-a	*demander pour*
	gu-sas-**el**-a	*hacher pour*	*gu-sas-**il**-a	

Easily accounted for within MCS by simple [high] / [low] feature ordering differences (10)

- **Chichewa̋**: /a/ patterns with non-lowering /i, u/
- **Pende**: /a/ patterns with lowering /e, o/

(10) **Alternative contrastive feature hierarchies of Bantu vowels**



	a	i, u	e, o
[low]	+	−	−
[high]		+	−

	a	i, u	e, o
[high]	−	+	−
[low]	+		−

(a) Chichewa̋: [low] > [high] **(b) Pende: [high] > [low]**

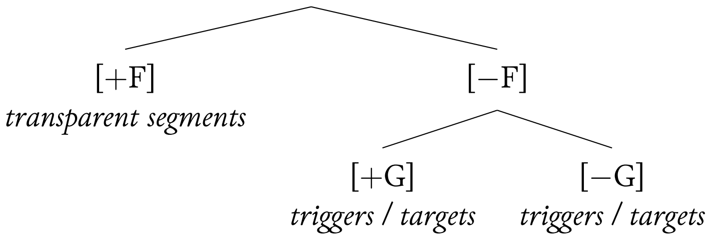
1.3 Harmony typology according to MCS

As the examples above illustrate, MCS predicts a one-to-one correspondence between phonological *visibility* and *activity* (11)

With respect to some phonological process which computes [F], segments are either:

- invisible / inactive transparent segments
- visible / active harmony triggers–targets

(11) **Harmony typology according to MCS**



	transp. seg.	triggers / targets	
[F]	+	−	−
[G]		+	−

(12) **Harmony visibility and activity according to MCS**

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

1.4 The problem posed by neutral blocking

In Chicheŵa, /a/ is underspecified for [high] (i.e. no [−high] harmony: *bal-el-a)

- ergo /a/ should be transparent (invisible) to [high]-harmony (11, 12)
  - cf. MCS treatments of transparency: e.g. Dresher (2013), Ko (2013), Mackenzie (2013)

But /a/ is visible to [high]-harmony in Chicheŵa (13)

- neutral blocking in non-initial positions: kwez-ets-an-il-a, *kwez-ets-an-el-a

(13) **Chicheŵa (Bantu) neutral blocking /a/** (Harris 1994: p. 515)

a.	konz-an-its-a	*konz-an-ets-a	'correct'-RECIP-CAUS-FV
b.	lemb-an-its-a	*lemb-an-ets-a	'write'-RECIP-CAUS-FV
c.	pelekez-an-il-a	*pelekez-an-el-a	'escort'-RECIP-APPL-FV
d.	kwez-ets-an-il-a	*kwez-ets-an-el-a	'raise'-CAUS-RECIP-APPL-FV

Neutral blockers show that there are not just two phonological participation types (visible or invisible; active or inactive) but in fact three (14).

(14) **Harmony visibility and activity by neutral harmony type**

	visible	**invisible**
active	harmonic blocking	
inactive	neutral blocking	transparency

1.5 The usual way out

Visible but inactive neutral blockers can be accounted for a combination of representational and grammatical restrictions

- E.g. underspecification / faithfulness / feature co-occurrence constraints + locality/parasitic constraints
  - cf. for example Harris (1994), Nevins (2010), Downing & Mtenje (2017), Dresher & Nevins (2017), Sandstedt (2017)

Problems:

☞ Ad hoc / restatement of the facts

☞ Grammatically more complex

☞ Such techniques face extra problems in languages which display both local blocking and non-local transparency
  - E.g. Khalkha (Mongolian) labial harmony

1.6 Khalkha neutral blocking

Basic patterns:

- Khalkha features both RTR and labial harmony
  - For the sake of simplicity, only labial harmony and ATR vowels (i.e. /i, u, o, e/) are treated here

    See Appendix II for a more complete analysis

- Labial harmony alternations: e.g. /o/ vs. /e/ (15a)

- High vowels /i, u/ are followed by non-round vowels (15b)

(15) **Khalkha labial harmony with high vowel non-triggers**

a.

teeʤ-e	*teeʤ-o	‘gown’-REFL
xeeʤ-ʤe	*xeeʤ-ʤo	‘decorate’-DPST
poor-o	*poor-e	‘kidney’-REFL
og-ʤo	*og-ʤe	‘give’-DPST

b.

piir-e	*piir-o	‘brush’-REFL
šiit-ʤe	*šiit-ʤo	‘decide’-DPST
suuʤ-e	*suuʤ-o	‘tail’-REFL
tuir-ʤe	*tuir-ʤo	‘type’-DPST

- In word-medial positions, /i/ is fully transparent to rounding harmony (16a)
  - Non-local harmony is permitted; no locality restriction on labial harmony
- /u/ cannot be skipped by the harmony procedure and can only be followed by non-round vowels (16b)
  - An unequivocal case of neutral blocking

(16) **Khalkha /i/-transparency and /u/-neutral blocking**

a.

piir-ig-e	*piir-ig-o	‘brush’-ACC-RFL
teeʤ-ig-e	*teeʤ-ig-o	‘gown’-ACC-RFL
poor-ig-o	*poor-ig-e	‘kidney’-ACC-RFL

b.

it-uʤ-ʤe	*it-uʤ-ʤo	‘eat’-CAUS-DPST
xeeʤ-uʤ-ʤe	*xeeʤ-uʤ-ʤo	‘decorate’-CAUS-DPST
og-uʤ-ʤe	*og-uʤ-ʤo	‘give’-CAUS-DPST
t^{h}osoʤ-uʤ-ʤe	*t^{h}osoʤ-uʤ-ʤe	‘imagine’-CAUS-DPST

These patterns have resisted any coherent treatment within MCS (cf. Godfrey 2012, Ko 2013)

☞ The theory is too restrictive

2 A new approach

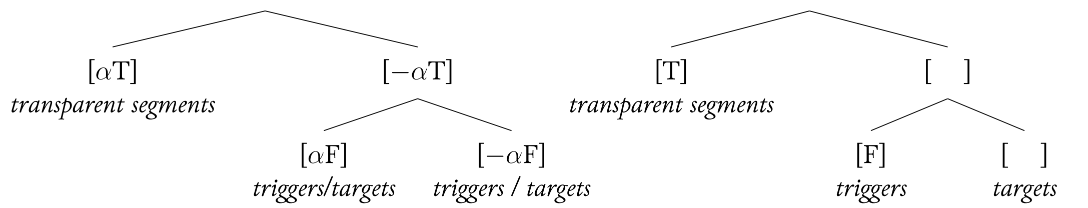
2.1 Feature overspecification

The crux of the problem is the failure to predict *visible* but *inactive* segments

- a predictable outcome of binary feature theory which leads to overspecification
  - there is no way to be visible (specified) while being inactive (underspecified)

☞ privative feature hierarchies provide the correct ternary visibility / activity combinations (17)

(17) **Phonological visibility and activity in binary/privative feature hierarchies**



	visible	invisible
active	*harmonic trigger/target* (specified)	
inactive		*transparent segment* (underspecified)

(a) Binary features

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

(b) Privative features

But privative contrastive feature hierarchies always produce some featureless-segment

- What are viable (visible) harmony targets?
  - Binary feature hierarchies: [±F]-specified segments
  - Privative feature hierarchies: ⁇
- How do we distinguish non-specified targets from underspecified transparent segments?

(18) **Harmony (in)visibility of featureless segments?**

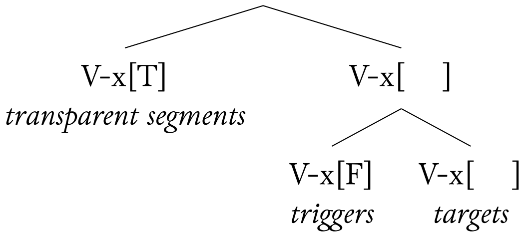
/poor		ig		e/
[lab]	→	→	→	[ ]
[poor		ig		o]

2.2 Defining locality domains within privative MCS

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

- Parallel Structures Model of feature geometry (PSM; Morén 2003, 2007; Iosad 2017)
  - V-manner/place nodes serve as potential landing sites for assimilatory processes

(19) **Ternary feature specifications using PSM feature-nodes**



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

☞ Under privative MCS, all targets are *visible* but *inactive* segments:

- i.e. contrastively non-specified V-x[ ]

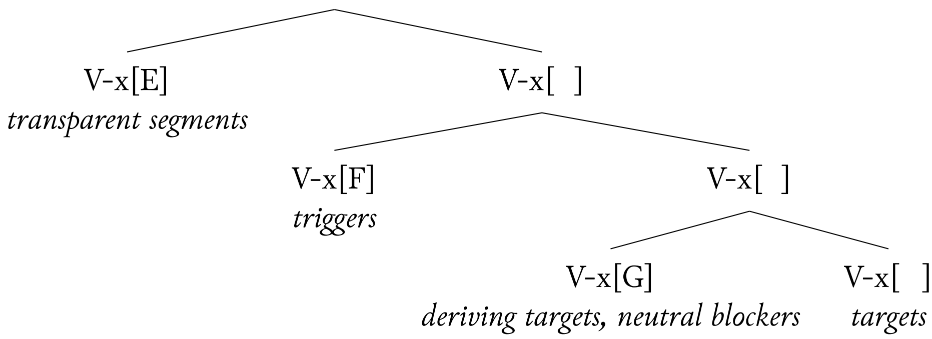
This shifts the question to what makes regular targets and neutral blockers different?

2.3 Harmony typology according to privative MCS

The predicted harmony typology is summarized in (20)

* A more detailed description of the predicted harmony typology is provided in Appendix I

(20) **Harmony typology within privative contrastive feature hierarchies**



	transparent	triggers	der.targets/blockers	targets
[E]	[E]	[ ]	[ ]	[ ]
[F]		[F]	[ ]	[ ]
[G]			[G]	[ ]

In relationship to some harmony feature [F]

- **Transp. segments**:
  underspecified for [F]

- **Triggers**:
  contrastively specified V-x[F]

- **Targets**:
  contrastively non-specified V-x[ ]
  - **Regular targets**:
    contrastively non-specified for both V-x[F] and V-x[G]
  - **Deriving targets**:
    asymmetric V-x[G]-specified segments where [F, G] co-occurrence is permitted
  - **Neutral blockers**:
    asymmetric V-x[G]-specified segments where *[F, G] co-occurrence is prohibited

3 Khalkha vowel harmony revisited

3.1 Basic patterns

The basic patterns in (21) provide evidence for three features and four vowels:

- e.g. [labial] / [coronal] / [close]
- {i, o, u, e}

(21) **Khalkha labial harmony patterns**

a. /o, e/ labial harmony: [labial]

xeeʤ-ʤe	*xeeʤ-ʤo	'decorate'-DPST
c^{h}oor-ʤo	*c^{h}oor-ʤe	'decrease'-DPST

b. /i/-transparency: [coronal] > [labial]

teeʤ-ig-e	*teeʤ-ig-o	'gown'-ACC-RFL
poor-ig-o	*poor-ig-e	'kidney'-ACC-RFL

c. /u/-neutral blocking: [labial] > [close]

xeeʤ-uʤ-ʤe	*xeeʤ-uʤ-ʤo	'decorate'-CAUS-DPST
og-uʤ-ʤe	*og-uʤ-ʤo	'give'-CAUS-DPST

Khalkha labial harmony patterns in (21) provide three implications for feature specifications:

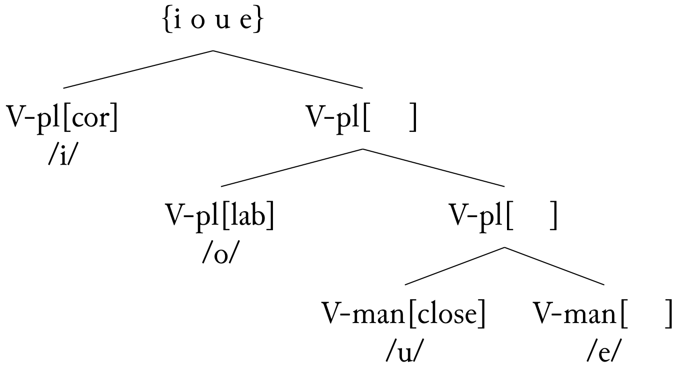
1. Round/non-round alternations provide evidence for some [labial] feature.
2. /i/-transparency indicates that /i/ specified for some feature (e.g. [coronal]) outside the scope of [labial].[1]
3. /u/-neutral blocking in indicates that /u/ is:
   - within the scope of the harmony feature (i.e. [labial] > [close])
   - but incompatible with the harmony feature (i.e. *[labial, close])

[1]There is independent evidence for a [coronal] specification on /i/ which historically induced palatalization of preceding consonants in all Mongolic languages. See Svantesson et al. (2008) for a broader discussion.

☞ Ergo: [coronal] > [labial] > [close] and *[labial, close]

The corresponding contrastive feature hierarchy is given in (22)

(22) **Khalkha advanced vowels contrastive feature hierarchy**



According to the hierarchy in (22):

- /i/ is transparent
- /o/ is a trigger
- /u/ is a neutral blocker
- /e/ is a regular target

3.2 Harmony as a grammatical process

Assumptions:

- Non-initial (inflectional) vowels are non-specified for [labial]
- Some harmony mechanism spreads [labial] rightwards from root-initial to non-initial positions (23)

(23) **Basic labial harmony**

	/c^{h}oor		ʤe/		/xeeʤ	ʤe/
[coronal]	[ ]		[ ]		[ ]	[ ]
[labial]	[lab]	→	[lab]		[ ]	[ ]
[close]			[ ]		[ ]	[ ]
	[c^{h}oor		ʤo]		[xeeʤ	ʤe]

Transparency is a straightforward effect of [labial] underspecification

(24) **/i/-transparency**

	/poor		ig		e/
[coronal]	[ ]		[cor]		[ ]
[labial]	[lab]	→	→	→	[lab]
[close]					[ ]
	[poor		ig		o]

Labial harmony in (25) would apply to the target /u/

- but would result in an illicit output (*[labial, close])
- resulting in neutral blocking

(25) **/u/-neutral blocking: *[labial, close]**

	/o̲		uɮ		ɮe/
[coronal]	[ ]		[ ]		[ ]
[labial]	[lab]	→	[~~lab~~]	↛	[ ]
[close]			[cl]		[ ]
	[o̲		uɮ		ɮe]

Under this account, variation in segments' (neutral) harmony behaviors are strictly representationally derived according to differences in feature specification and feature co-occurrence constraints

4 Concluding remarks

Summary

- Neutral blocking is typologically common, stable, and patterns like other forms of neutral harmony
- But accounting for neutral harmony remains a resistant problem within many harmony frameworks
- I have argued for a new approach:
  - using a privative version of Modified Contrastive Specification (Dresher 2009)
  - incorporating Parallel Structures Model feature-nodes (Morén 2003, 2007)
- Under this approach, neutral harmony is strictly representationally derived
- Makes use of two important components
  1. inventory size and shape defined by features and feature co-occurrence constraints
  2. feature specifications are determined according to the Successive Division Algorithm
     - variation in contrastive feature specifications are responsible for asymmetries in segment visibility / activity in harmony systems

Advantages of this framework:

- **Descriptional adequacy**: unifies the account of basic harmony and neutral harmony types
  - E.g. transparency, triggers, harmonic blockers, deriving targets, regular targets, and neutral blockers
- **Economical**: does not assume any additional grammatical machinery

- **Motivated**: neutral harmony and harmony complexity are derived from independent factors
  - inventory size and symmetry
- **Restricted**: does not predict any unattested harmony patterns
- **Predictive**: inventory asymmetries predict neutral harmony
  - the possibilities are limited by the complexity / shape of the language's sound inventory

5 Appendix I: Privative MCS revisions

5.1 Representational assumptions

The theory sets quite restrictive limits on feature systems (cf. Dresher 2018)

- I assume emergent, substance-free, privative features

5.1.1 Privativity and dominance/recessiveness in harmony systems

Privative features are motivated by dominant/recessive asymmetries displayed by harmony features (Casali 2003)

- E.g. Old Norwegian vowel height harmony (Sandstedt 2017)
  - Mid vowels: active (specified)
    lowering: /drep-inn/ → [drep-enn]
  - High vowels: inactive (non-specified)
    no raising: /iːs-enn/ → [iːs-enn], *[iːs-inn]

(26) **Lowering non-high triggers – inert high targets in Old Norwegian** (Sandstedt n.d.)

Lowering of	/-inn/	PRET.PART.	drep-enn	'kill'	orð-enn	'become'
			sviːk-inn	'betray	bund-inn	'bind'
No raising of	/-enn/	DEFINITE	oːs-enn	'outlet'	konong-enn	'king'
			iːs-enn	'ice'	hug-enn	'mind'

5.2 Building inventories

The theory sets quite restrictive limits on inventories

- Two phonological features will minimally produce a three segment inventory and maximally four (27)

(27) **Possible [RTR] / [close] feature combinations for {ɛ, e, i} inventory**

1) no constraints		2) *[RTR, close]	
[RTR]	ɛ	[RTR]	ɛ
[ ]	e	[ ]	e
[close]	i	[close]	i
[(RTR), close]	(ɪ)		

While it's commonly assumed that harmony processes are typically structure-preserving insofar as asymmetric contrasts generally fail to undergo harmony (cf. Kiparsky & Pajusalu 2006)

- cross-dialectal/cross-linguistic variation shows that visible unpaired segments may or may not be compatible with the harmony feature, displaying harmony allophony or not, respectively
  - That is, independent of inventory shape, languages may vary in whether feature co-occurrences are permitted or prohibited
  - For example, Ekiti Yoruba vs. Standard Yoruba (Atlantic-Congo) or Dholuo vs. Anywa (Nilotic)

5.2.1 (Non-)structure-preserving harmony

Yoruba RTR harmony (Pulleyblank 1996, Ọla Orie 2003)

- paired /e, o/–/ɛ, ɔ/ vs. unpaired /i, u/–*/ɪ, ʊ/
  - Standard Yoruba: structure preserving: /u/ → *[ʊ]

    paired mid vowels: ègè̱ 'dirge' vs. ɛ̀gɛ̱́ 'cassava'

    unpaired high vowels: èbúté̱ 'harbor' vs. ɛ̀lùbɔ̱́, *ɛ̀lʊ̀bɔ̱ 'yam flour'

  - Ekiti Yoruba: non-structure preserving harmony: /u/ → [ʊ]

    paired mid vowels: ègè̱ 'dirge' vs. ɛ̀gɛ̱́ 'cassava'

    unpaired high vowels: èbúté̱ 'harbor' vs. ɛ̀lʊ̀bɔ̱, *ɛ̀lùbɔ̱́ 'yam flour'

Nilotic dental harmony (Tucker 1994, Reh 1996; Mackenzie 2009, 2016)

- paired /t, d/–/t̪, d̪/ vs. unpaired /n/
  - Dholuo: structure preserving: /n/ → *[n̪]

    paired obstruents: tedo 'to cook' vs. t̪ed̪o 'to forge'

    unpaired nasal: tɪn 'all' vs. t̪uno, *t̪un̪o 'breast'

  - Anywa: non-structure preserving harmony: /n/ → [n̪]

    paired obstruents: tūud 'pus' vs. t̪ùd̪ 'ropes'

    unpaired nasal: núudó 'to press something down' vs. n̪ùd̪ò, *nùd̪ò 'to lick'

5.2.2 What motivates neutral blocking (i.e. structure-preserving harmony)?

The Yoruba and Nilotic examples above illustrate that any phonological framework must be capable of handling both [F, G]-co-occurring and *[F, G]-barring varieties.

- But what motivates one over the other?

— E.g. Bantu height harmony

  - Both harmonic (e.g. Pende) and neutral blocking (e.g. Chicheŵa) varieties are attested
  - but neutral blocking systems vastly outnumber harmonic blocking ones (Hyman 1999)

☞ Privative MCS suggests such asymmetries may be motivated by representational markedness

For any asymmetric inventory:

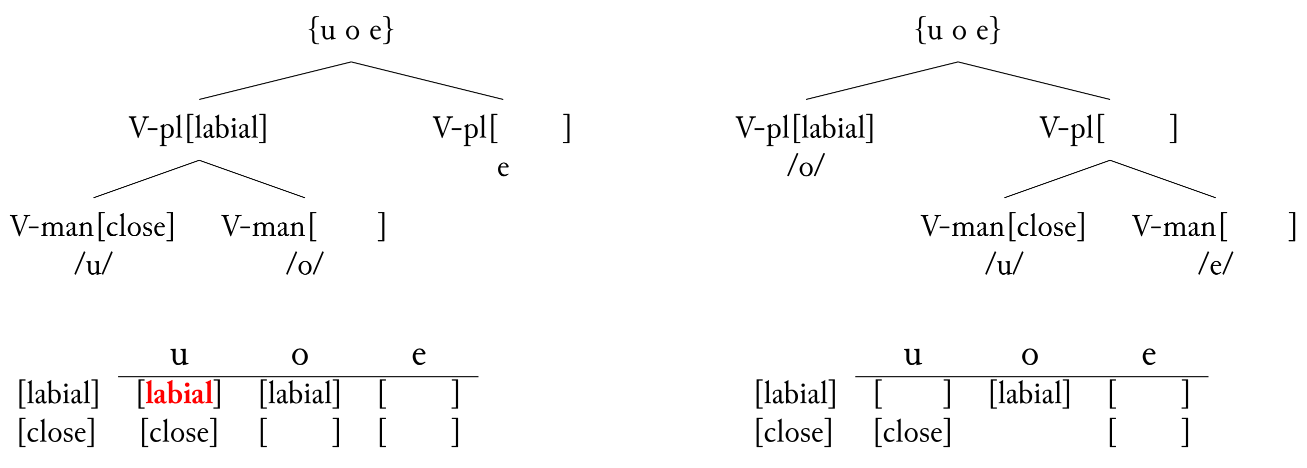
- E.g. Khalkha {u o e} with two features [labial]/[close]
  - If features are allowed to co-occur, the result is more complex representations (28)

    No constraints: [labial, close] /u/

    ***[labial, close]:** [close] /u/

☞ Ergo, feature co-occurrence constraints may be motivated by less marked representations
  - and neutral blocking is the side-effect

(28) **Feature co-occurrence and representational markedness**



(a) [labial, close]: complex representations

(b) *[labial, close]: simplex representations

5.3 Specifying phonological features in privative MCS

Under this revised approach, the SDA assigns not only feature specifications but feature-nodes (29)

- "To be within the scope of feature [F]" = have the corresponding [F]-place/manner node

(29) **Revised Successive Division Algorithm** (Adapted from Hall 2007: p. 31)

a. The input to the algorithm is an inventory (I) of one or more segments that are not yet featurally distinct from one another.

b. If I is found to contain more than one member, then it is divided into two (non-empty) subinventories: a marked set M, to which is assigned V-x[F], and its unmarked complement set $\bar{M}$, to which is assigned V-x[ ].

c. M and $\bar{M}$ are then treated as the input to the algorithm; the process continues until all phonemes are featurally distinct, which is trivially the case when I contains only one phoneme.

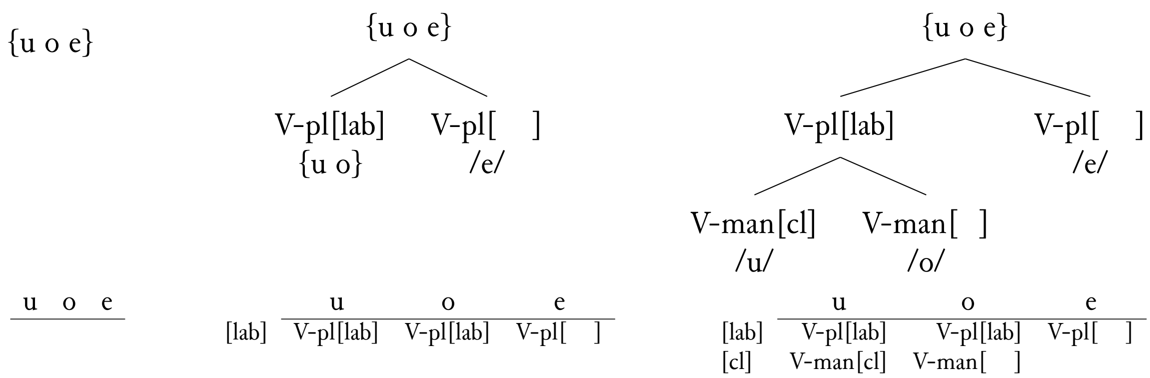
5.3.1 Privative SDA in review

The application of the SDA is not significantly different from before.

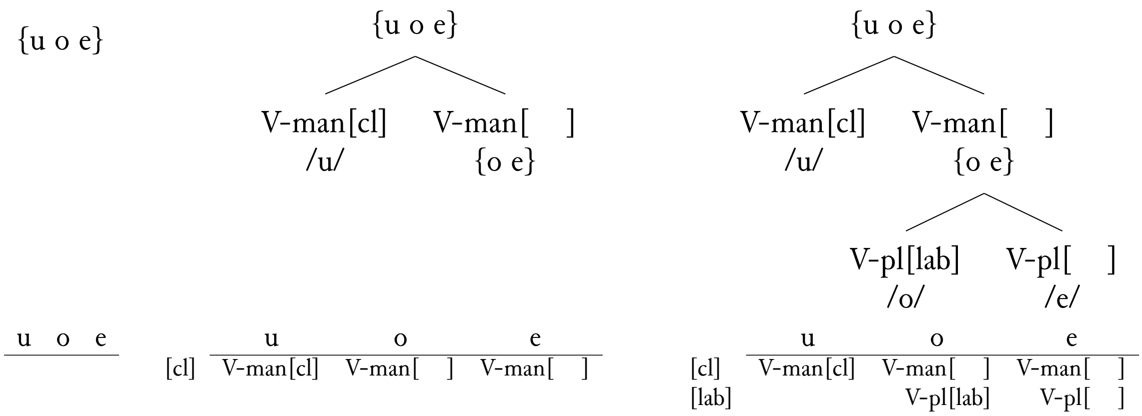
For example, given the simplified asymmetric Khalkha inventory {u, o, e} and two features (e.g. [close] / [labial] without co-occurrence constraints):

- the revised SDA predicts two alternatives:
  - [close] within the scope of [labial] (30)
  - [labial] within the scope of [close] (31)
- See Section 5.5 for an exploration of the full predicted outputs given all feature rankings with and without feature co-occurrence constraints

(30) **Privative SDA output: [labial] > [close]**



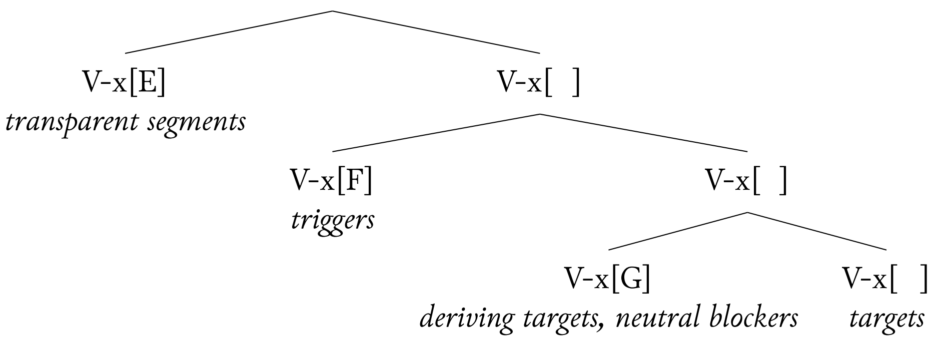
(31) **Privative SDA output: [close] > [labial]**



5.4 Harmony typology according to privative MCS

Given the variation in inventories and variation in the application of the SDA, privative MCS predicts broadly the harmony typology in (32), repeated from (20).

(32) **Harmony typology within privative contrastive feature hierarchies**



	transparent	triggers	der.targets/blockers	targets
[E]	[E]	[ ]	[ ]	[ ]
[F]		[F]	[ ]	[ ]
[G]			[G]	[ ]

Locality domains—that is, what are visible harmony targets—are defined by PSM feature nodes. Underspecified segments—that is, *transparent segments*, which are outside the scope of the harmony feature—have no corresponding harmony feature node and are invisible to harmony processes (33).

(33) **Transparent skipping of [F]-underspecified segments**

	/$V_{[F]}$		$V_{[E]}$		$V_{[\ ]}$/
[E]	V-x[ ]		V-x[E]		V-x[ ]
[F]	V-x[F]	→	→	→	V-x[F]
[G]					V-x[ ]
	[$V_{[F]}$		$V_{[E]}$		$V_{[F]}$]

Segments categorized within the scope of the harmony feature bear the corresponding harmony feature node: *triggers* are specified V-x[F] and *targets* are non-specified V-x[ ]. Unpaired segments dominated by some orthogonal feature within the scope of the harmony feature will either be *deriving targets* (34) or *neutral blockers* if the language disallows *[F, G] co-occurrence (35). In other words, neutral blockers bear the harmony feature node V-x[ ] and are therefore visible harmony targets, but the application of harmony—which is an iterative process—would produce an illicit result (*[F, G]), ceasing the spread of harmony.

(34) **Deriving targets**

	$/V_{[F]}$		$V_{[G]}$		$V_{[\ ]}/$
[E]	V-x[ ]		V-x[ ]		V-x[ ]
[F]	V-x[F]	→	V-x[F]	→	V-x[F]
[G]			V-x[G]		V-x[ ]
	$[V_{[F]}$		$V_{[F, G]}$		$V_{[F]}]$

(35) **Neutral blockers halt spreading: *[F, G]**

	$/V_{[F]}$		$V_{[G]}$		$V_{[\ ]}/$
[E]	V-x[ ]		V-x[ ]		V-x[ ]
[F]	V-x[F]	→	V-x[~~F~~]	↛	V-x[ ]
[G]			V-x[G]		V-x[ ]
	$[V_{[F]}$		$^*V_{[F, G]}$		$V_{[\ ]}]$

Finally, contrastively non-specified V-x[ ] segments—that is, segments within the scope of the harmony feature but not specified [F]—are normal harmony targets.

5.5 Possible outputs of SDA

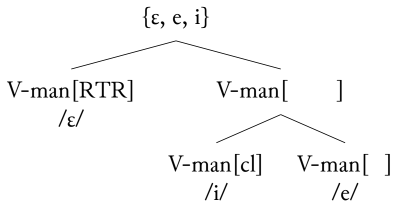
The four possible outputs of the SDA using privative features and each representation's corresponding harmony behavior-types are provided below. Examples using simplified three vowel inventories and two features with and without feature co-occurrence constraints are provided for rounding (Khalkha-style), height (Bantu-style), and RTR (Yoruba-style) harmony systems.

To summarize these figures, consider the RTR harmony examples in Fig. 8. This framework sets very tight restrictions on harmony behaviors. Transparency is a straightforward effect of underspecification. For example, the feature ordering [close] > [RTR] will produce /i/-transparency regardless co-occurrence constraints (Fig. 8bd). The feature ordering [RTR] > [close] makes /i/ a visible harmony target. Whether /i/ can undergo harmony or not depends on the absence or presence of a *[RTR, close] co-occurrence restriction, respectively (Fig. 8ac). Using this schema, with enough evidence from neutral harmony patterns, we can unambiguously work out the representations of any given harmony language.

This predicted typology is nicely summarized by microvariation in Yoruba RTR harmony, including high vowel allophony in Ekiti Yoruba (Fig. 8a), transparency in Ifẹ Yoruba (Fig. 8b/d), and neutral blocking in Standard Yoruba (Fig. 8c) (Ọla Orie 2003, Nevins 2010).

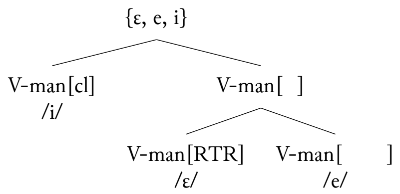
5.5.1 RTR harmony

Figure 8: Possible outputs of SDA assuming [RTR]/[close] with and without co-occurrence constraints



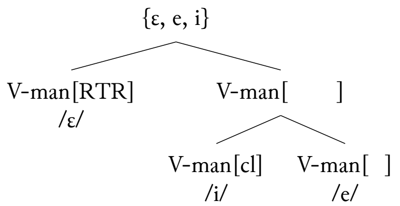
ε	V-man[RTR]	*trigger*
e	V-man[RTR, V-man[cl]]	*target*
i	V-man[RTR, V-man[cl]]	*deriving target*

(a) [RTR] > [close]



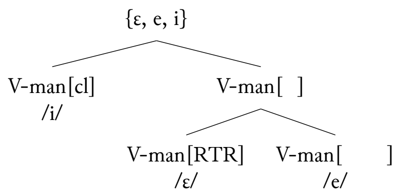
ε	V-man[cl, V-man[RTR]]	*trigger*
e	V-man[cl, V-man[RTR]]	*target*
i	V-man[cl]	*transparent*

(b) [close] > [RTR]



ε	V-man[RTR]	*trigger*
e	V-man[RTR, V-man[cl]]	*target*
i	V-man[~~RTR~~, V-man[cl]]	*neutral blocker*

(c) [RTR] > [close]; *[RTR, cl]

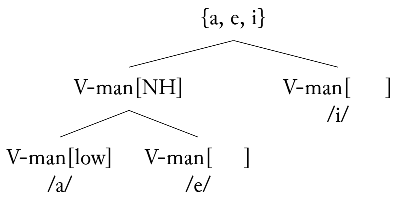


ε	V-man[~~cl~~, V-man[RTR]]	*trigger*
e	V-man[cl, V-man[RTR]]	*target*
i	V-man[cl]	*transparent*

(d) [close] > [RTR]; *[cl, RTR]

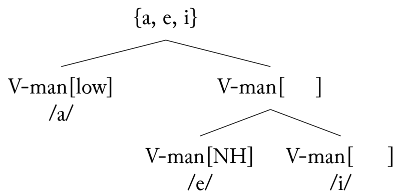
5.5.2 Height harmony

Figure 9: Possible outputs of SDA assuming [non-high]/[low] with and without co-occurrence constraints



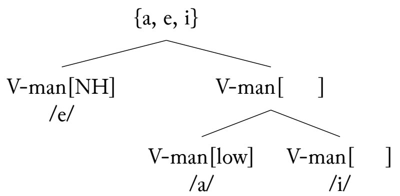
e	V-man[NH, V-man[low]]	*trigger*
i	V-man[NH]	*target*
a	V-man[NH, V-man[low]]	*trigger (harm. blocker)*

(a) [NH] > [low]



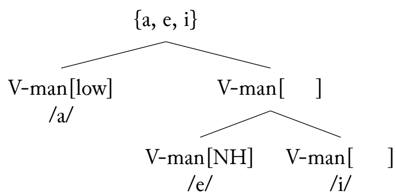
e	V-man[low, V-man[NH]]	*trigger*
i	V-man[low, V-man[NH]]	*target*
a	V-man[low]	*transparent*

(b) [low] > [NH]



e	V-man[NH]	*trigger*
i	V-man[NH, V-man[low]]	*target*
a	V-man[~~NH~~, V-man[low]]	*neutral blocker*

(c) [NH] > [low]; *[NH, low]

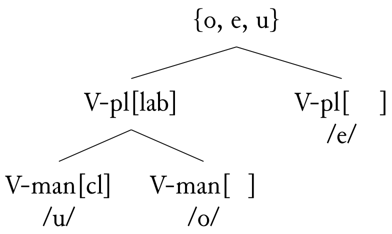


e	V-man[~~low~~, V-man[NH]]	*trigger*
i	V-man[low, V-man[NH]]	*target*
a	V-man[low]	*transparent*

(d) [low] > [NH]; *[low, NH]

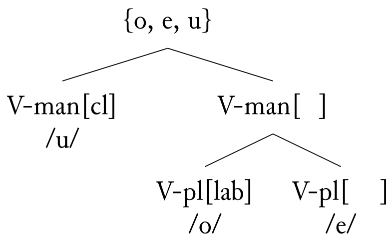
5.5.3 Labial harmony

Figure 10: Possible outputs of SDA assuming [labial]/[close] with and without co-occurrence constraints



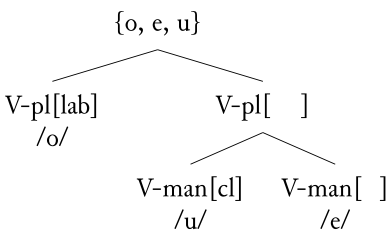
o	V-pl[lab, V-man[cl]]	*trigger*
e	V-pl[lab]	*target*
u	V-pl[lab, V-man[cl]]	*trigger (harm. blocker)*

(a) [lab] > [cl]



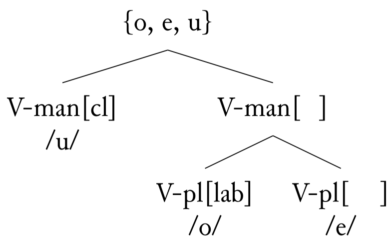
o	V-man[cl, V-pl[lab]]	*trigger*
e	V-man[cl, V-pl[lab]]	*target*
u	V-man[cl]	*transparent*

(b) [cl] > [lab]



o	V-pl[lab]	*trigger*
e	V-pl[lab, V-man[cl]]	*target*
u	V-pl[~~lab~~, V-man[cl]]	*neutral blocker*

(c) [lab] > [cl]; *[lab, cl]



o	V-man[~~cl~~, V-pl[lab]]	*trigger*
e	V-man[cl, V-pl[lab]]	*target*
u	V-man[cl]	*transparent*

(d) [cl] > [lab]; *[cl, lab]

6 Appendix II: A practical guide

This section provides a more complete analysis of Khalkha overlapping RTR and labial harmony

- and therewith a practical illustration to how an MCS harmony analysis is carried out

The full Khalkha vowel inventory is provided in (36).

(36) **Full Khalkha vowel inventory**

i	u
	ʊ
e	o
a	ɔ

The basic labial and RTR harmony patterns are presented in (37).

(37) **Khalkha basic RTR harmony patterns**

a. Overlapping RTR and labial harmony: [labial] / [RTR]

et-eer	*et-oor	'item'-INST
ot-oor	*ot-eer	'feathers'-INST
at-aar	*at-ɔɔr	'devil'-INST
ɔt-ɔɔr	*ɔt-aar	'star'-INST
ut-eer	*ut-oor	'day'-INST
ʊt-aar	*ʊt-ɔɔr	'willow'-INST
it-eer	*it-oor	'strength'-INSTi

b. /i/-transparency: [coronal] > [labial] / [RTR]

teeɮ-ig-e	*teeɮ-ig-o	'gown'-ACC-RFL
poor-ig-o	*poor-ig-e	'kidney'-ACC-RFL
cʰaːs-ig-aː	*cʰaːs-ig-ɔː	'paper'-ACC-REFL
xɔɔɮ-ig-ɔ	*xɔɔɮ-ig-a	'food'-ACC-REFL

c. /u/-neutral blocking of labial harmony: [labial] > [close]; *[labial, close]

xeeɮ-uɮ-ɮe	*xeeɮ-uɮ-ɮo	'decorate'-CAUS-DPST
it-uɮ-ɮe	*it-uɮ-ɮo	'eat'-CAUS-DPST
og-uɮ-ɮe	*og-uɮ-ɮo	'give'-CAUS-DPST
uc-uɮ-ɮe	*uc-uɮ-ɮo	'see'-CAUS-DPST

d. /u/-RTR harmony participation: [RTR, close]

jaw-ʊɮ-ɮa	*jaw-uɮ-ɮe	'go'-CAUS-DPST
ɔr-ʊɮ-ɮa	*ɔr-uɮ-ɮe	'enter'-CAUS-DPST
xʊnʲ-ʊɮ-ɮa	*xunʲ-uɮ-ɮe	'pleat'-CAUS-DPST

6.1 Harmony diagnostics

Khalkha RTR and labial harmony diagnostics:

1. What are harmony participants and triggers?
    - labial harmony: /o, ɔ/ vs. /e, a/
    - RTR harmony: /ɔ, a, ʊ/ vs. /o, e, u/
2. What are harmony non-participants?
    - labial harmony: /i, u, ʊ/
    - RTR harmony: /i/
3. Are non-participants visible to the harmony process?
    - labial harmony:
        - /u, ʊ/: **yes** – e.g. og-uɮ-ɮe, *og-uɮ-ɮo

          i.e. [labial] > [close]
        - /i/: **no** – e.g. poor-**i**g-o, *poor-**i**g-e

i.e. [cor] > [labial]

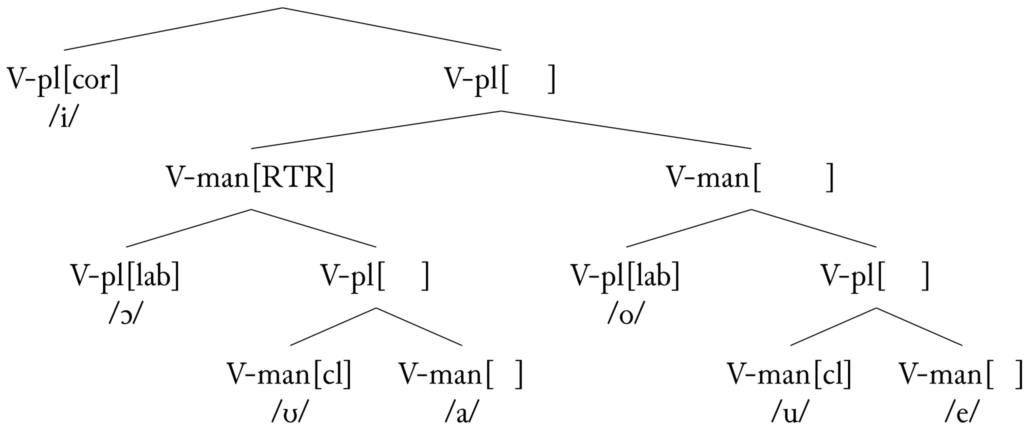
- RTR harmony:
  - /i/: **no** – e.g. c^haas-**i**g-a, *c^haas-**i**g-e

    i.e. [cor] > [RTR]

4. Is harmony parasitic?
   - RTR harmony: clearly not (i.e. [RTR] > [lab] > [close])
     - Parasitism is an effect of feature scope asymmetries
     - Ergo [RTR] has broad scope

Solution by deduction: [coronal] > [RTR] > [labial] > [close]; *[labial, close] (38)

(38) **Complete Khalkha contrastive feature hierarchy**



According to the hierarchy in (38):

- **RTR harmony**:
  - /i/ is transparent
  - /ɔ, ʊ, a/ are triggers
  - /o, u, e/ are regular targets
- **Labial harmony**:
  - /i/ is transparent
  - /ɔ, o/ are triggers
  - /u, ʊ/ are neutral blockers
  - /a, e/ are regular targets

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