Bantu harmony locality variation is autosegmental

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Talk overview

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  - how do we define what should be visible to a process?
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  - traditional autosegmental spreading
    - ☞ predicts exactly the observed typology

Outline

Comparative study: Bantu height harmony

This paper contrasts three closely related languages:

- Chewa (N.31, Chichewa; Downing & Mtenje 2017)
  - spoken in Zambia, Malawi, and Mozambique
- Mbunda (K.15, aka Kimbunda; Gowlett 1970)
  - spoken in Angola and Zambia
- Ndendeule (N.101, aka Kindendeule; Ngonyani 2004)
  - spoken in the Namtumbo district, Ruvuma region of Tanzania

Comparative study: Bantu height harmony

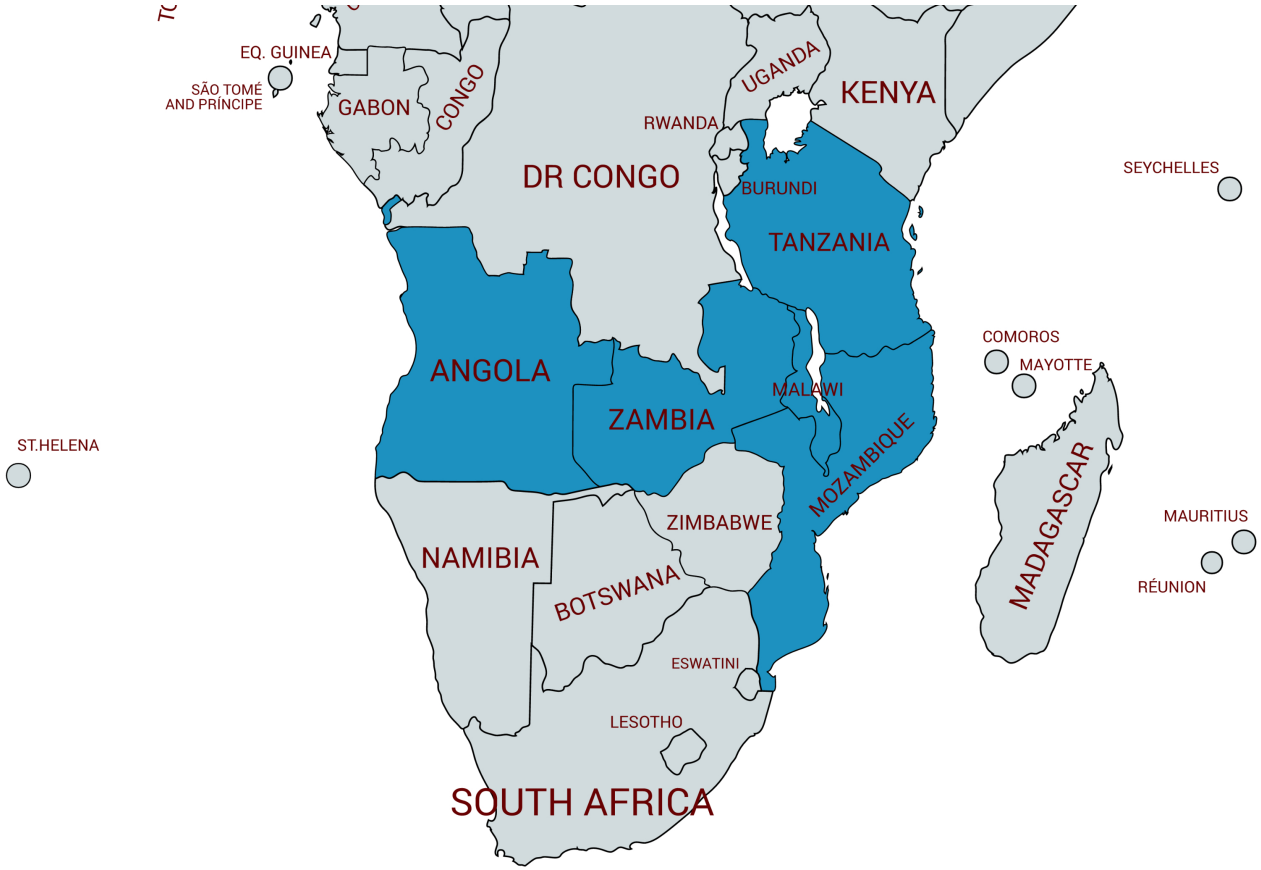

Figure 1: Chewa, Mbunda, and Ndendeule geography

Phonological similarity

All three languages display similar phonological and morphological patterns

- **Today**: [-el, -il] height harmony and non-assimilating low vowels in (1)

(1) **Mbunda height harmony on APPL.-FV. [-el-a, -il-a]**

HIGH	l̲um-il-a	'cultivate'	t̲ung-il-a	'build'
MID	n̲en-el-a	'bring'	o̲c-el-a	'roast'
LOW	kwa̲t-el-a	'hold'		

Bantu locality variation

Harmony variation comes in different kinds

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  - harmony applies roughly within the verbal derivational stem
  - prefixes do not harmonise
  - word-final vowels do not harmonise in Chewa

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Today: representationally generalisable locality exceptions

- e.g. low vowels never harmonise
  - regardless the morphology or position

Variation and representational structure

Fundamental claim:

phonological variation which is generalisable in terms of representations relates to representational structure

Outline

High/non-high harmony patterns

(2) **Non-/high harmony alternations: applicative [-il, -el]**

a) Mbunda (K.15):

lim-il-a	‘cultivate for’	tung-il-a	‘build for’
nen-el-a	‘bring to’	oc-el-a	‘roast for’

b) Ndendeule (N.101):

yib-il-a	‘steal from/for’	tul-il-a	‘skin with/for/on’
yemb-el-a	‘sing for/with’	bol-el-a	‘teach for/with/at’

c) Chewa (N.31):

phík-il-a	‘cook for’	khút-il-a	‘be satisfied with’
tsék-el-a	‘close for’	kók-el-a	‘pull out for’

Labial restrictions on harmony

(3) **Non-/labial height harmony asymmetries: reversive [-ul, -ol]**

a) Mbunda (K.15):

zi̲t-ul-a	‘untie’	ku̲p-ul-a	‘bail out’
te̲k-ul-a	‘draw water’	to̲mb-ol-a	‘uproot’
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b) Ndendeule (N.101):

hi̲b-ul-a	‘unplug’	hu̲mb-ul-a	‘discover’
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c) Chewa (N.31):

pi̲tík-ul-a	‘overturn’	fú̲nth-ul-a	‘loosen’
tsé̲k-ul-a	‘open’	wó̲nj-ol-a	‘spring a trap’
*tsé̲k-ol-a			

Low vowel neutrality

(4) **Low vowels are non-participants**

a) Mbunda (K.15):

sikam-a	‘pay a visit’	tumam-a	‘sit’
jendam-a	‘bow’	okam-a	‘become thin’

b) Ndendeule (N.101):

yig-an-a	‘imitate each other’	tum-an-a	‘send each other’
peng-an-a	‘block each other’	yop-an-a	‘ask each other’

c) Chewa (N.31):

chingam-il-a	‘welcome someone’	lungam-a	‘be righteous’
welam-a	‘bend’	polam-a	‘stoop’

Non-participants are harmonically neutral

Bantu /a/ is an example of **neutral segments**

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Neutral segment:

a segment which categorically fails to harmonise; a non-alternating segment

Low vowel variation

(5) **/a/ harmony in/activity and in/visibility across three Bantu languages**

a) Mbunda (K.15) harmonic blocking /a/:

kwat-el-	'hold'-APPL.	*active*	/a...i/	→	[a...e]
tumam-el-	'sit'-APPL.	*visible*	/u...a...i/	→	[u...a...e]
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b) Ndendeule (N.101) transparent /a/:

kang-il-	'push'-APPL.	*inactive*	/a...i/	→	[a...i]
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Variation in activity and visibility

The behaviour of neutral segments may be summarised along two dimensions

(6) **Ternary contrast in neutral segments' harmony visibility and activity**

	visible	**invisible**
active	Mbunda (K.15) *harmonic blocker*	
inactive	Chewa (N.31) *neutral blocker*	Ndendeule (N.101) *transparent segments*

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Agreement by Correspondence:

- either included (active/visible) or excluded (inactive/invisible) from the correspondence set (Rose & Walker 2004)

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Contrastive relativisation:

- processes may compute all or only contrastive specifications (Nevins 2010; Calabrese 1995, 2005)

Neutral blocking doesn't fit

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- /a/ is inactive (non-triggering) and invisible (non-target)

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Neutral blocking = harmonic blocking + trigger–target simililarity for [low]

- /a/ is visible (blocking) and active (triggering)
  - but [−low] /i, u/ and [+low] /a/ are too dissimilar
  - therefore /a/ fails to trigger harmony
  - resulting in what looks like neutral blocking

Too restrictive and too permissive

Existing approaches are:

- **Too restrictive**:
  - recurringly ruling out commonly attested sound pattern
  - requiring additional constraints, parameters, etc.
  - ☞ accounting for neutral blocking remains a classical problem for theories of the representation and assimilation of vocalic features (Downing & Mtenje 2017)

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Representational preliminaries

I present a new approach based on a novel version of Contrastive Hierarchy Theory (CHT; Sandstedt 2018)

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This approach incorporates insights from emergent and substance-free feature theories (Mielke 2008; Blaho 2008; Iosad 2017)

- i.e. features and class organisation do not exist a priori but must be extracted from the data

Contrastive hierarchies

Fig. 2 provides an abstract example of a contrastive hierarchy

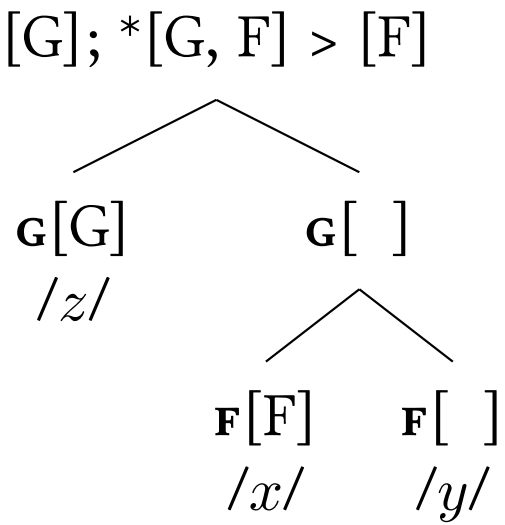
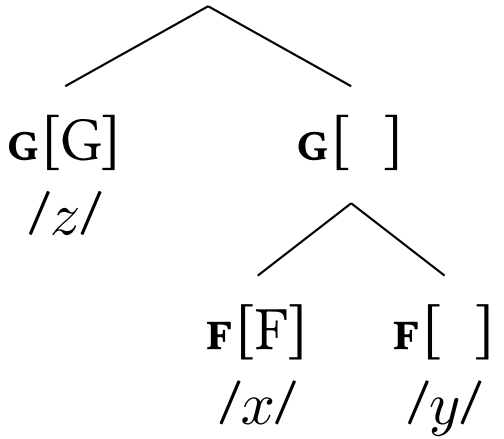
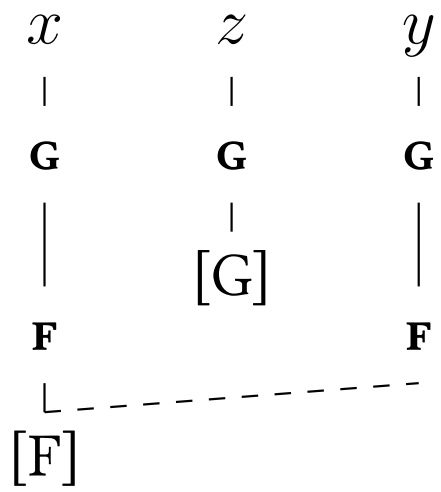


Figure 2: Feature classes and sub-classes in a privative contrastive hierarchy

Feature nodes and locality domains



(a) A two-feature contrastive feature hierarchy



(b) Local [F]-spreading

Figure 3: Local [F]-spreading between contrastively specified triggers and non-specified targets as defined by a hierarchy with ternary F[F], F[ ], and ∅ featural specifications

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Bantu representational diagnostics

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(7) **Descriptive generalisations and representational diagnostics**

a) /e/ displays systematic harmony alternations with /i/

Bantu representational diagnostics

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☞ /e/ is specified [F]; /i/ is contrastively non-specified (non-F)

Formalising the representations

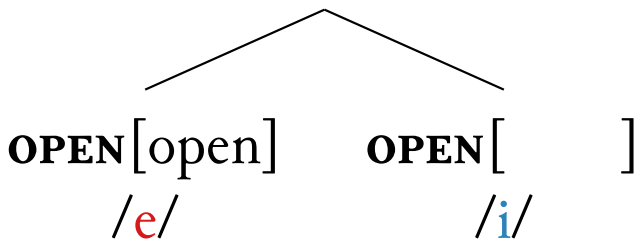

Figure 4: [open] /e/ vs. non-open /i/ contrasts

Bantu representational diagnostics

(7) **Descriptive generalisations and representational diagnostics**

a) /e/ displays systematic harmony alternations with /i/

☞ /e, i/ must be minimally paired for the harmony feature [F]

b) Harmony targets are non-open in neutral harmony contexts

- i.e. [F]-harmony involves active vowel lowering

☞ /e/ is specified [F]; /i/ is contrastively non-specified (non-F)

Bantu representational diagnostics

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- i.e. [F]-harmony involves active vowel lowering

☞ /e/ is specified [F]; /i/ is contrastively non-specified (non-F)

c) /a/ vs. /e i/ contrasts; /a/ fails to undergo [F]-harmony

Bantu representational diagnostics

(4) **Low vowels are non-participants**

a) Mbunda (K.15):

sikam-a	‘pay a visit’	tumam-a	‘sit’
jendam-a	‘bow’	okam-a	‘become thin’

b) Ndendeule (N.101):

yig-an-a	‘imitate each other’	tum-an-a	‘send each other’
peng-an-a	‘block each other’	yop-an-a	‘ask each other’

c) Chewa (N.31):

chingam-il-a	‘welcome someone’	lungam-a	‘be righteous’
welam-a	‘bend’	polam-a	‘stoop’

Bantu representational diagnostics

(7) **Descriptive generalisations and representational diagnostics**

a) /e/ displays systematic harmony alternations with /i/

☞ /e, i/ must be minimally paired for the harmony feature [F]

b) Harmony targets are non-open in neutral harmony contexts

- i.e. [F]-harmony involves active vowel lowering

☞ /e/ is specified [F]; /i/ is contrastively non-specified (non-F)

c) /a/ vs. /e i/ contrasts; /a/ fails to undergo [F]-harmony

Bantu representational diagnostics

(7) **Descriptive generalisations and representational diagnostics**

a) /e/ displays systematic harmony alternations with /i/
   - ☞ /e, i/ must be minimally paired for the harmony feature [F]

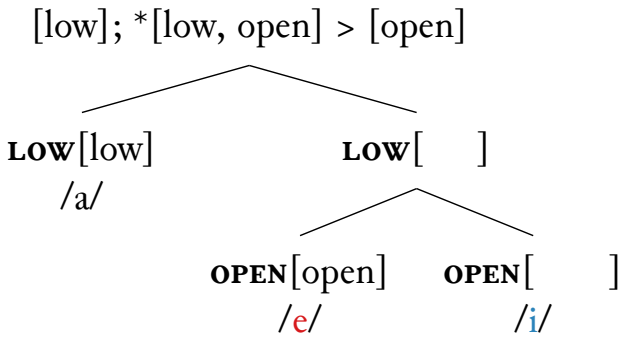
b) Harmony targets are non-open in neutral harmony contexts
   - ▶ i.e. [F]-harmony involves active vowel lowering
   - ☞ /e/ is specified [F]; /i/ is contrastively non-specified (non-F)

c) /a/ vs. /e i/ contrasts; /a/ fails to undergo [F]-harmony
   - ☞ /a/ must be specified for some orthogonal feature [G] which cannot freely co-occur with [F]

Hierarchically organising an asymmetric inventory

Figure 5: Ternary **OPEN**[open], **OPEN**[ ], and ∅ /a/-specifications in three privative contrastive feature hierarchies

Hierarchically organising an asymmetric inventory



[low]		a
(non-low)	[open]	e
	(non-open)	i

(a) ∅ /a/

Figure 5: Ternary **OPEN**[open], **OPEN**[ ], and ∅ /a/-specifications in three privative contrastive feature hierarchies

Hierarchically organising an asymmetric inventory

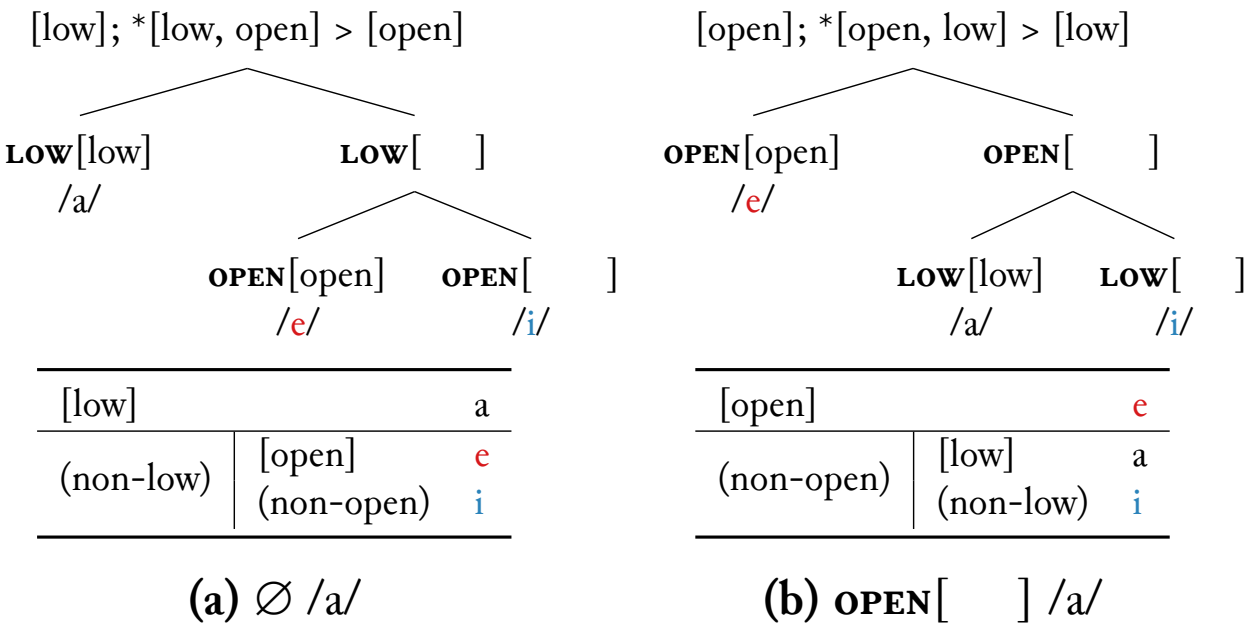


Figure 5: Ternary OPEN[open], OPEN[ ], and ∅ /a/-specifications in three privative contrastive feature hierarchies

Hierarchically organising an asymmetric inventory

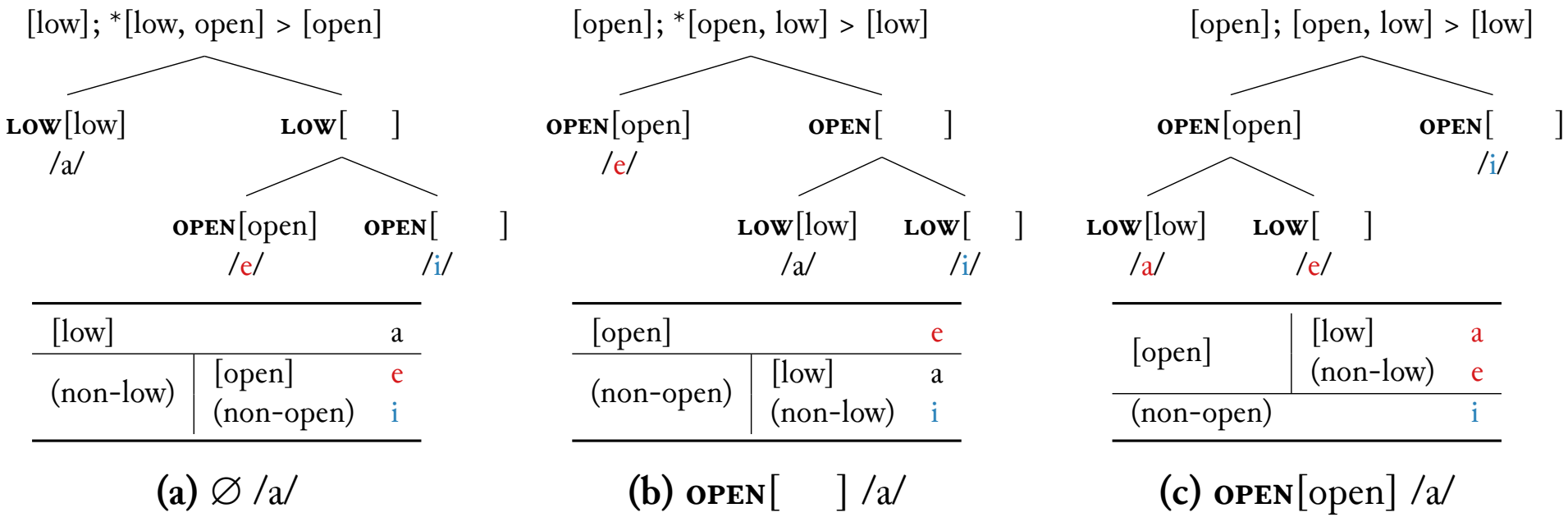


Figure 5: Ternary OPEN[open], OPEN[ ], and ∅ /a/-specifications in three privative contrastive feature hierarchies

Outline

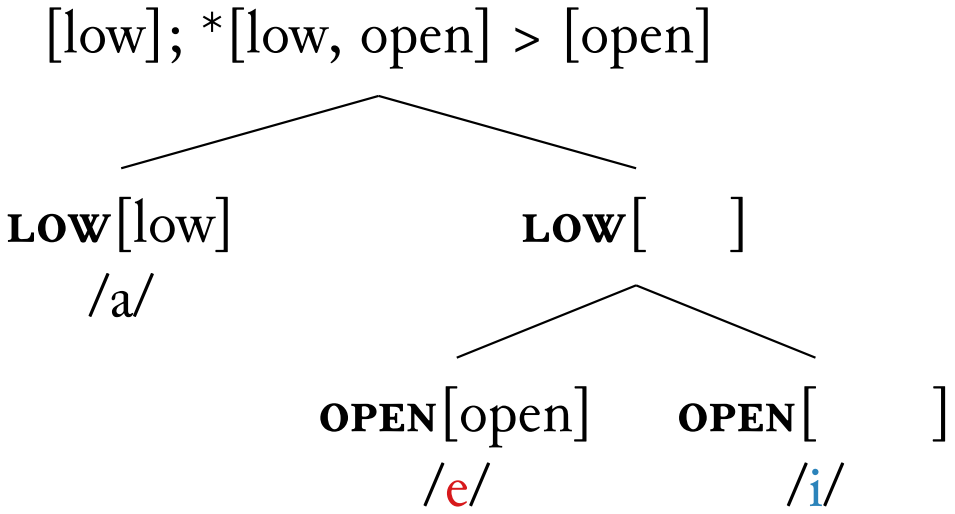
Harmony as feature licensing

The basic insights of Bantu height harmony can be captured by the simple licensing principle in (8)

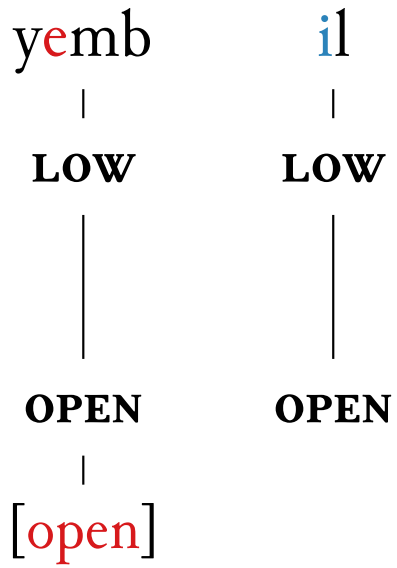
- adapted from Walker (2005) – inspired by Nevins (2010)

(8) LICENSE(NON-INITIAL-V–**OPEN**, [open]):
'Non-initial vowels which are contrastive for [open] should be associated with [open]'

Example harmony derivations



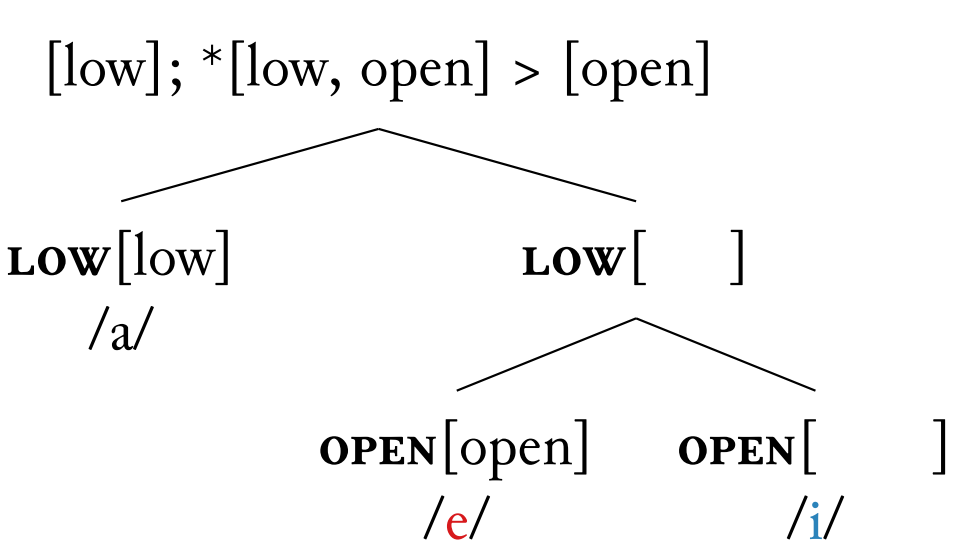
(a) Ndendeule contrastive hierarchy



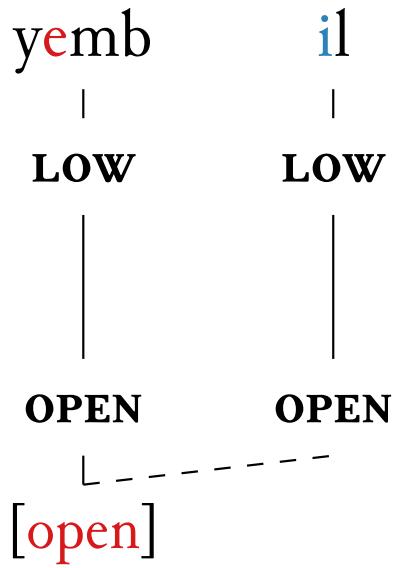
(b) Harmony derivations

Figure 6: Harmony as feature spreading

Example harmony derivations



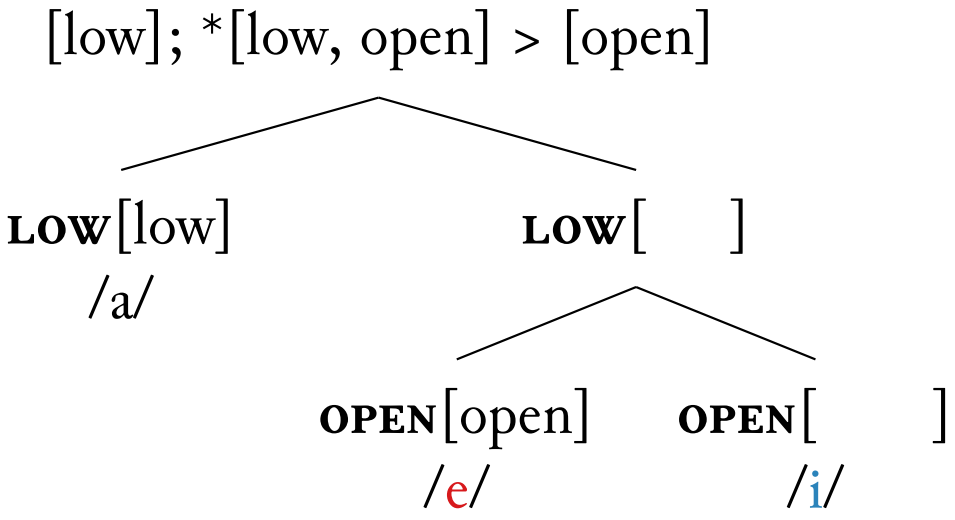
(a) Ndendeule contrastive hierarchy



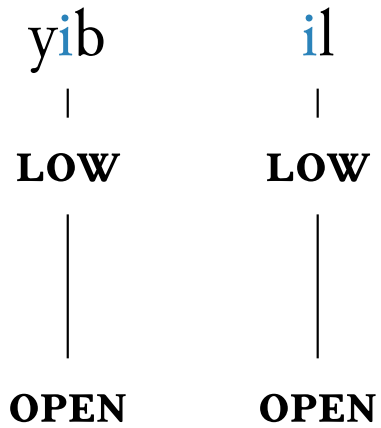
(b) Harmony derivations

Figure 6: Harmony as feature spreading

Example harmony derivations



(a) Ndendeule contrastive hierarchy



(b) Harmony derivations

Figure 6: Harmony as feature spreading

Outline

Outline

Ndendeule transparency

(5) **/a/ harmony in/activity and in/visibility across three Bantu languages**

a) Mbunda (K.15) harmonic blocking /a/:

kwat-el-	'hold'-APPL.	*active*	/a...i/	→	[a...e]
tumam-el-	'sit'-APPL.	*visible*	/u...a...i/	→	[u...a...e]
okam-el-	'become thin'-APPL.		/o...a...i/	→	[o...a...e]

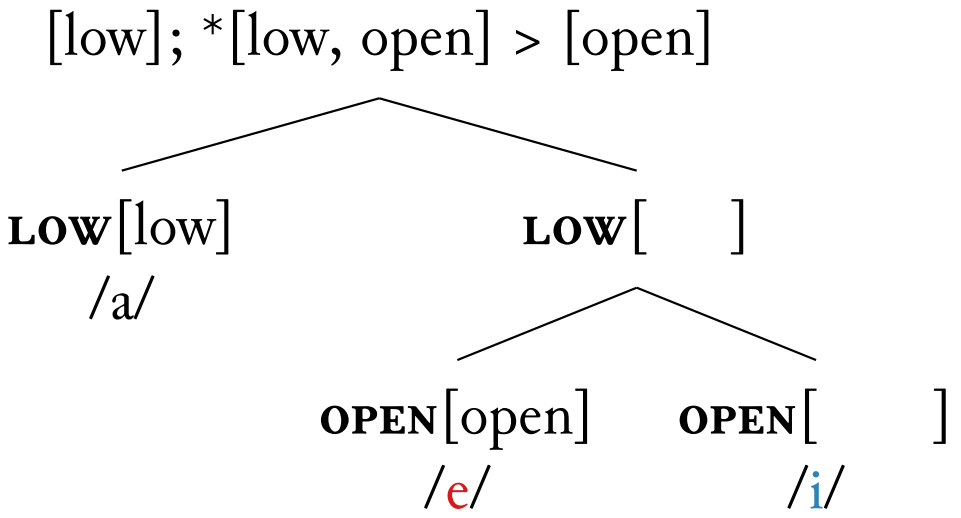
b) Ndendeule (N.101) transparent /a/:

kang-il-	'push'-APPL.	*inactive*	/a...i/	→	[a...i]
hiɣal-il-	'become white'-APPL.	*invisible*	/i...a...i/	→	[i...a...i]
koβal-el-	'stumble'-APPL.		/o...a...i/	→	[o...a...e]

c) Chewa (N.31) neutral blocking /a/:

vál-il-	'get dressed'-APPL.	*inactive*	/a...i/	→	[a...i]
chinga-il-	'welcome someone'-APPL.	*visible*	/i...a...i/	→	[i...a...i]
polam-il-	'stoop'-APPL.		/o...a...i/	→	[o...a...i]

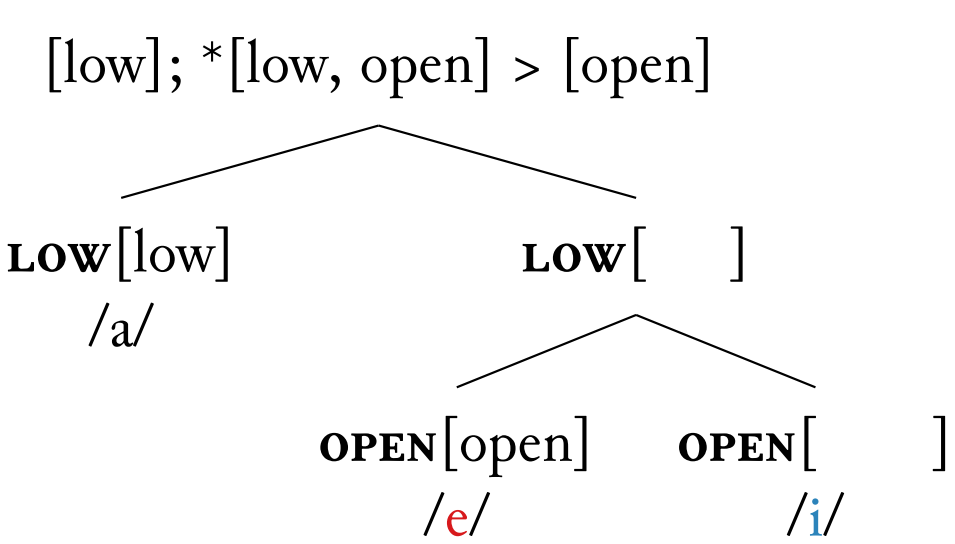
Ndendeule vowels



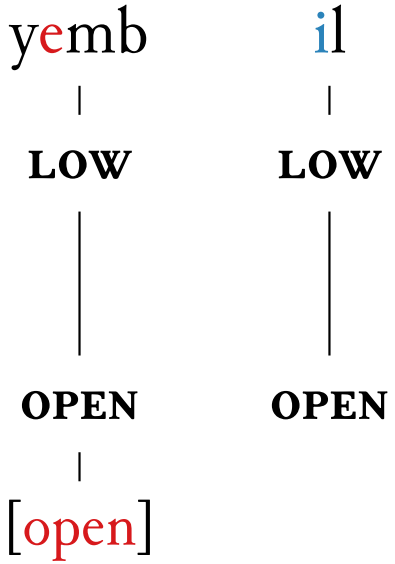
/a/	/e/	/i/
LOW[low]	LOW[ ]	LOW[ ]
∅	OPEN[open]	OPEN[ ]

Figure 7: Ndendeule height contrasts with non-contrastively underspecified non-open /a/

Ndendeule transparency via underspecification



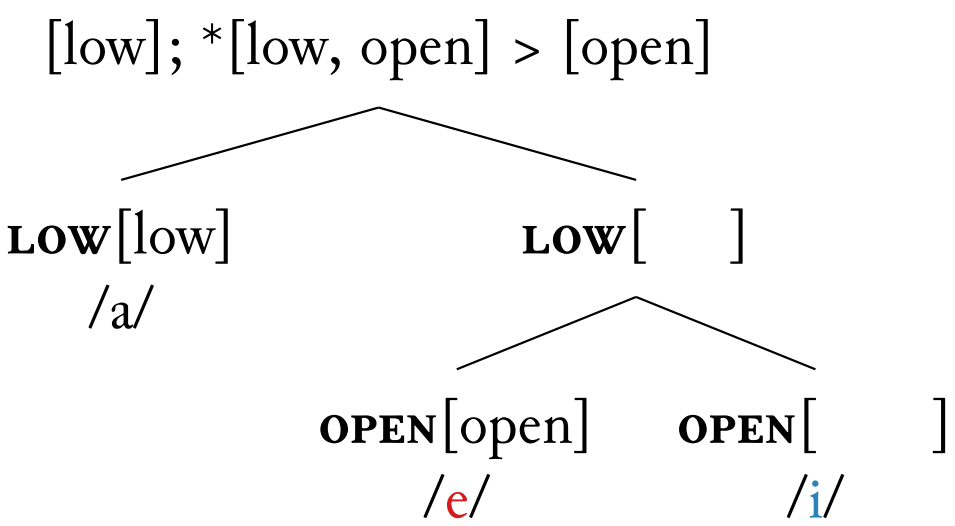
(a) Ndendeule contrastive hierarchy



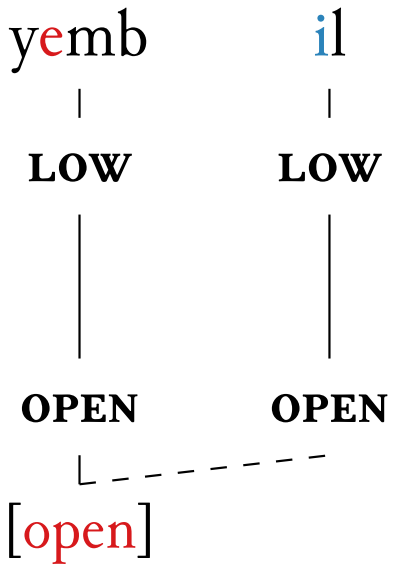
(b) Harmony derivations

Figure 8: Local [open]-spreading and transparency of non-contrastively underspecified /a/

Ndendeule transparency via underspecification



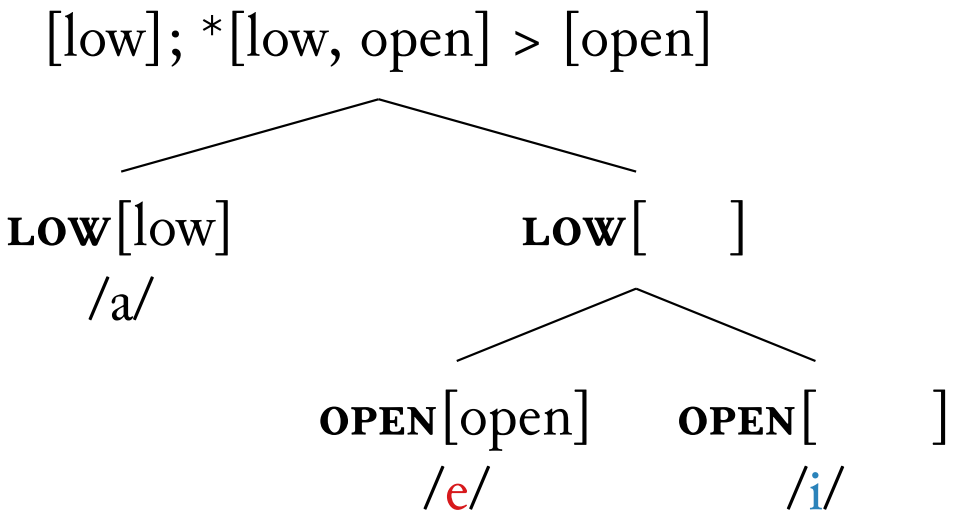
(a) Ndendeule contrastive hierarchy



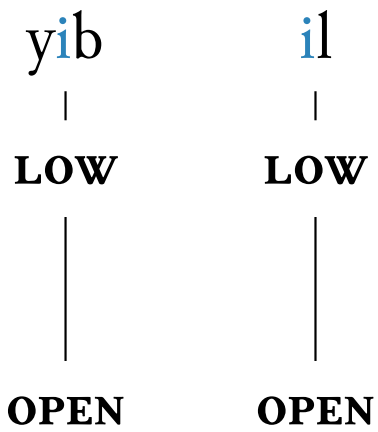
(b) Harmony derivations

Figure 8: Local [open]-spreading and transparency of non-contrastively underspecified /a/

Ndendeule transparency via underspecification



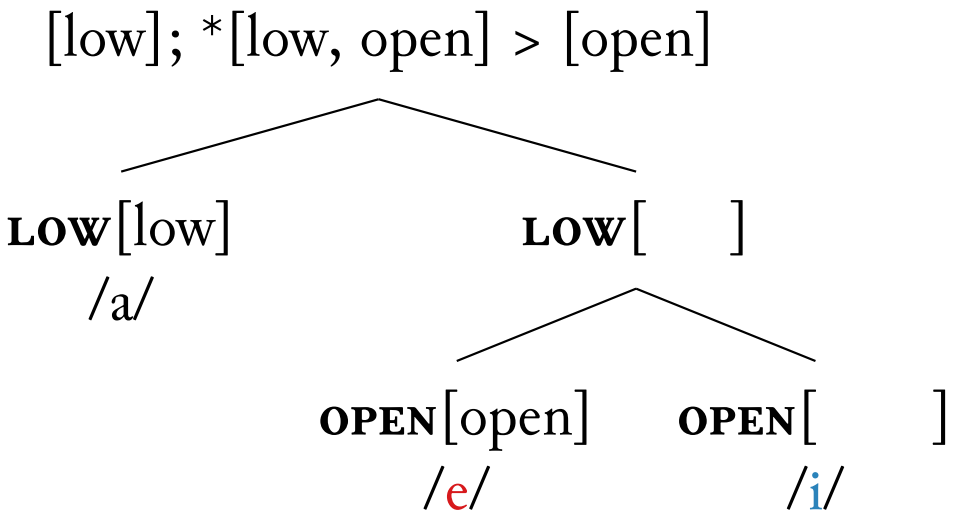
(a) Ndendeule contrastive hierarchy



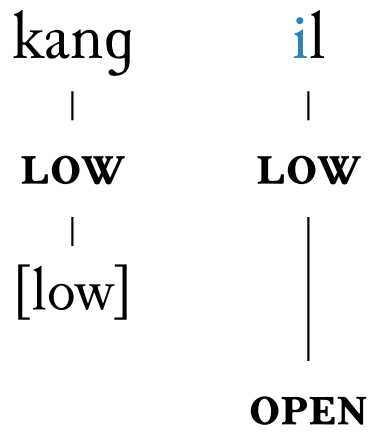
(b) Harmony derivations

Figure 8: Local [open]-spreading and transparency of non-contrastively underspecified /a/

Ndendeule transparency via underspecification



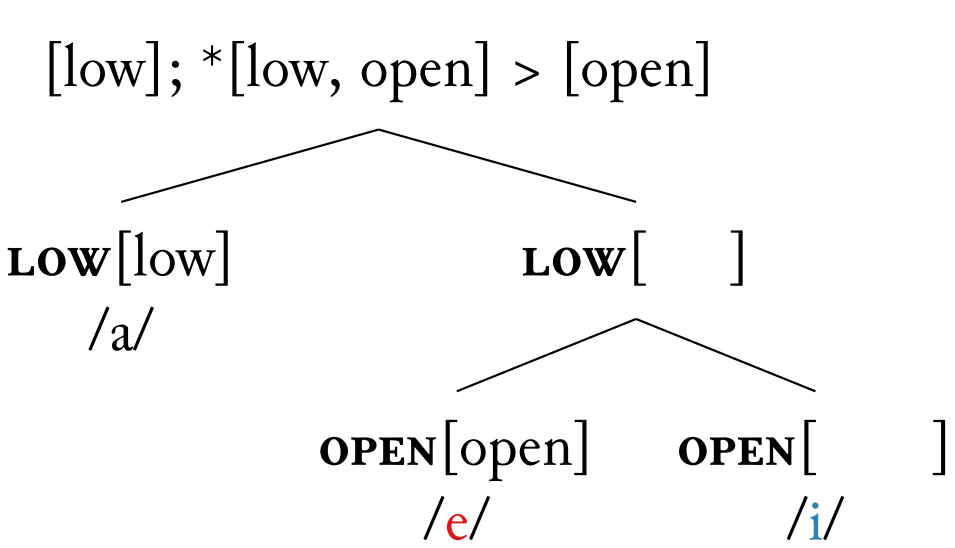
(a) Ndendeule contrastive hierarchy



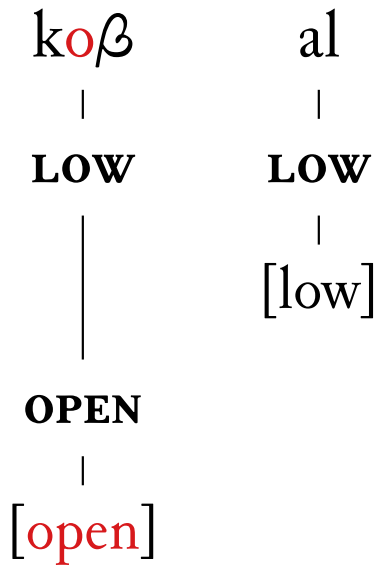
(b) Harmony derivations

Figure 8: Local [open]-spreading and transparency of non-contrastively underspecified /a/

Ndendeule transparency via underspecification



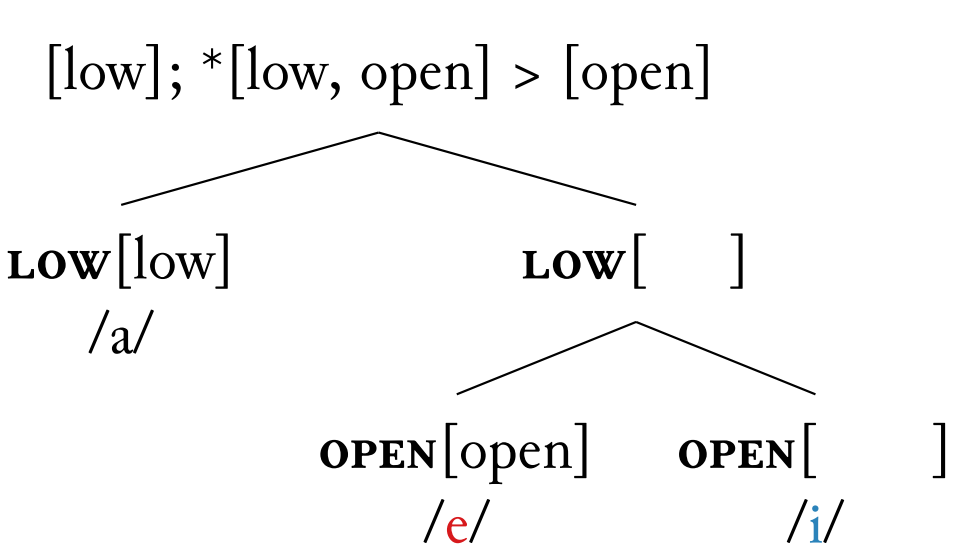
(a) Ndendeule contrastive hierarchy



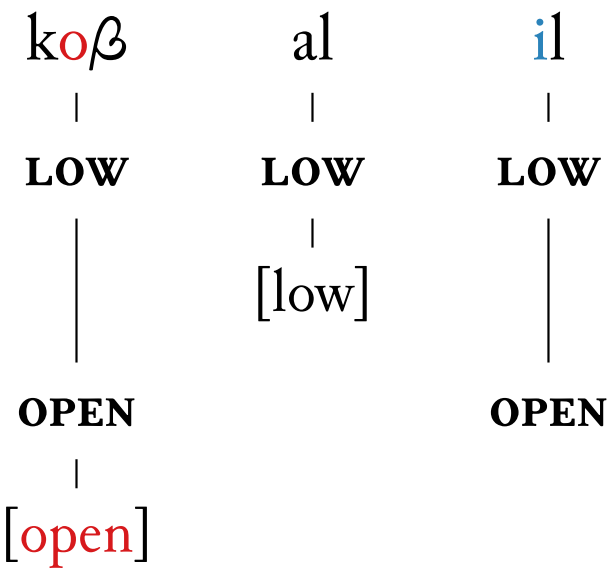
(b) Harmony derivations

Figure 8: Local [open]-spreading and transparency of non-contrastively underspecified /a/

Ndendeule transparency via underspecification



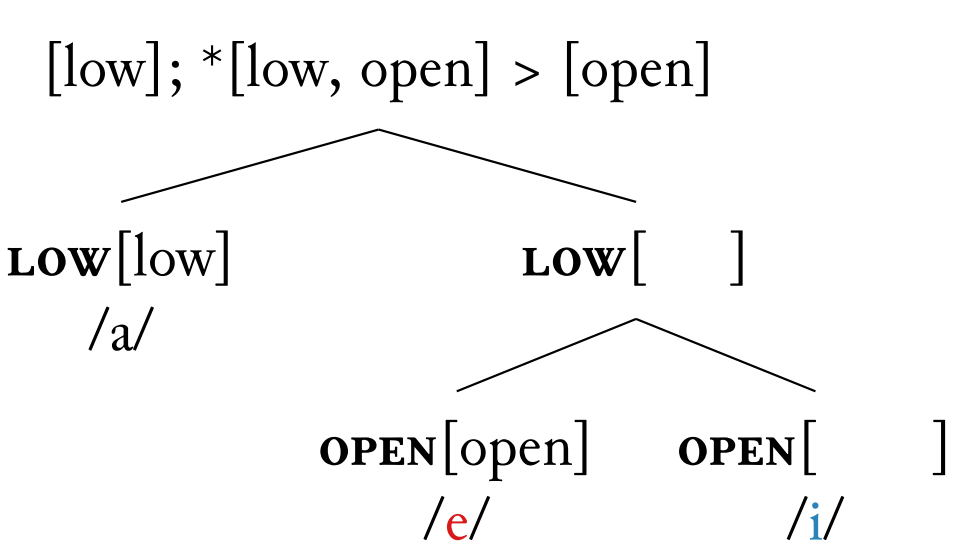
(a) Ndendeule contrastive hierarchy



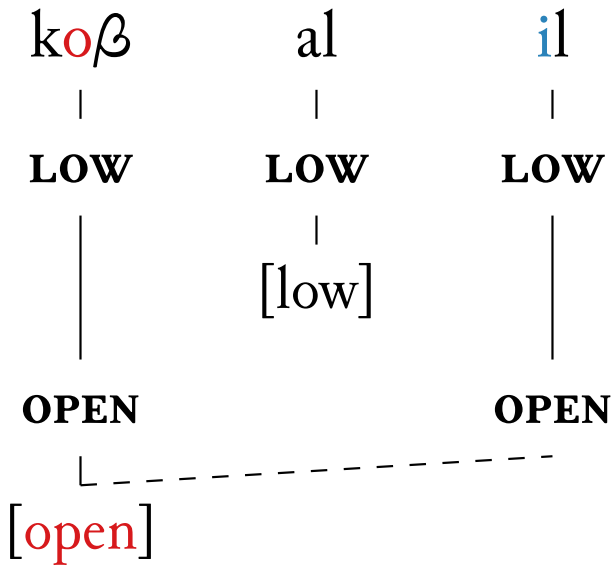
(b) Harmony derivations

Figure 8: Local [open]-spreading and transparency of non-contrastively underspecified /a/

Ndendeule transparency via underspecification



(a) Ndendeule contrastive hierarchy



(b) Harmony derivations

Figure 8: Local [open]-spreading and transparency of non-contrastively underspecified /a/

Outline

Ndendeule transparency

(5) **/a/ harmony in/activity and in/visibility across three Bantu languages**

a) Mbunda (K.15) harmonic blocking /a/:

kwat-el-	'hold'-APPL.	*active*	/a...i/	→	[a...e]
tumam-el-	'sit'-APPL.	*visible*	/u...a...i/	→	[u...a...e]
okam-el-	'become thin'-APPL.		/o...a...i/	→	[o...a...e]

b) Ndendeule (N.101) transparent /a/:

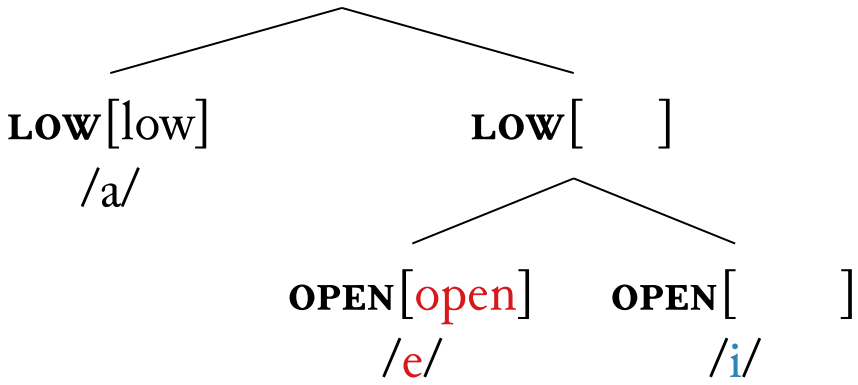
kang-il-	'push'-APPL.	*inactive*	/a...i/	→	[a...i]
hiɣal-il-	'become white'-APPL.	*invisible*	/i...a...i/	→	[i...a...i]
koβal-el-	'stumble'-APPL.		/o...a...i/	→	[o...a...e]

c) Chewa (N.31) neutral blocking /a/:

vál-il-	'get dressed'-APPL.	*inactive*	/a...i/	→	[a...i]
chinga-il-	'welcome someone'-APPL.	*visible*	/i...a...i/	→	[i...a...i]
polam-il-	'stoop'-APPL.		/o...a...i/	→	[o...a...i]

Ndendeule vs. Chewa vowel classes

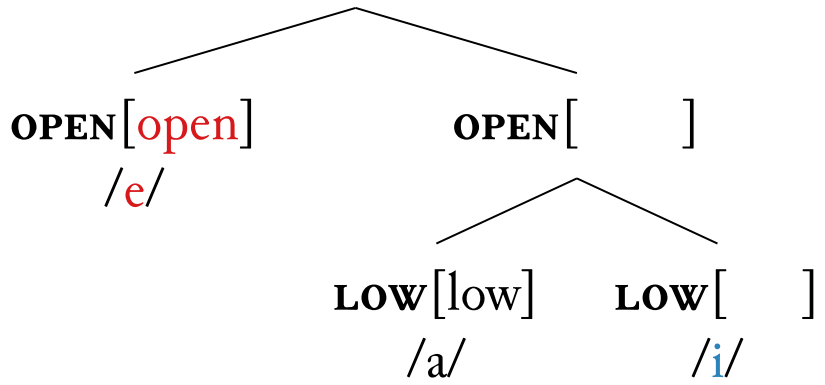
[low]; *[low, open] > [open]



/a/	/e/	/i/
LOW[low]	LOW[ ]	LOW[ ]
∅	OPEN[open]	OPEN[ ]

(a) Ndendeule: [low] > [open]

[open]; *[open, low] > [low]



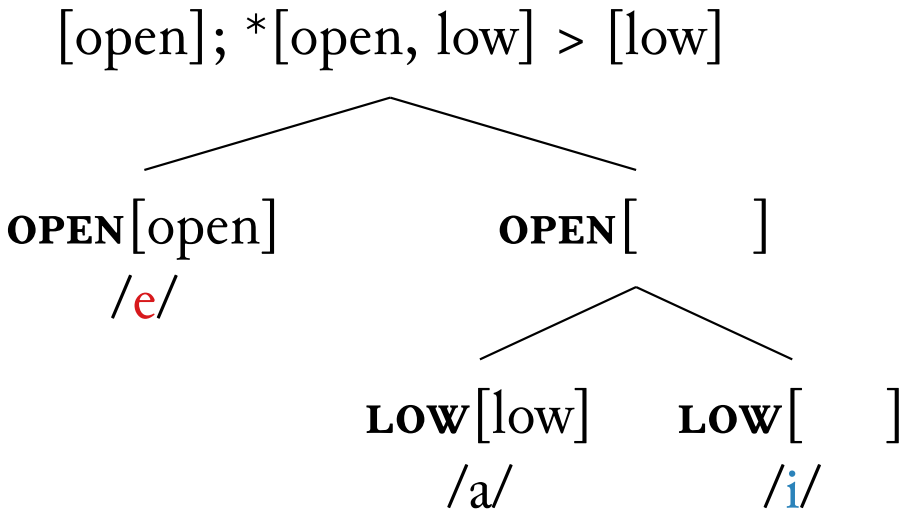
/a/	/e/	/i/
OPEN[ ]	OPEN[open]	OPEN[ ]
LOW[low]	∅	LOW[ ]

(b) Chewa: [open] > [low]

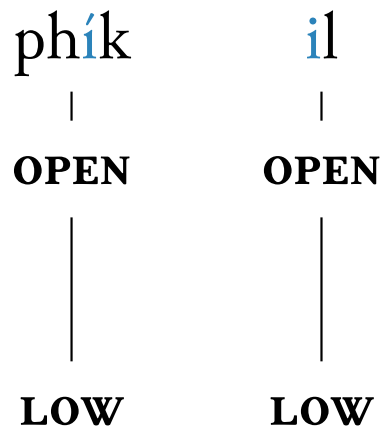
Figure 9: Ndendeule and Chewa contrastive feature hierarchies

Chewa height harmony

Chewa height harmony



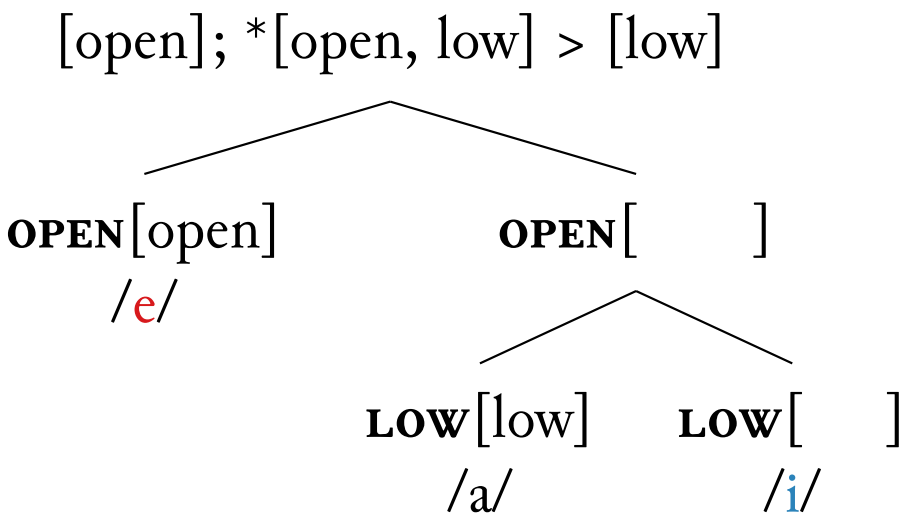
(a) Chewa contrastive hierarchy



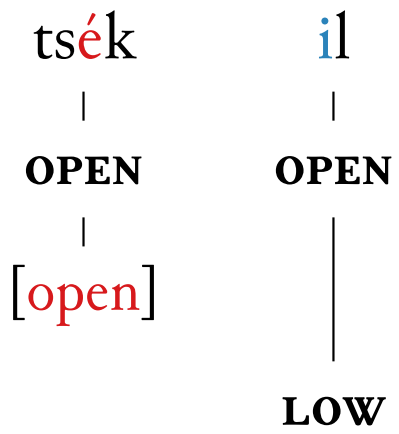
(b) Harmony derivations

Figure 10: Chewa harmony feature spreading

Chewa height harmony



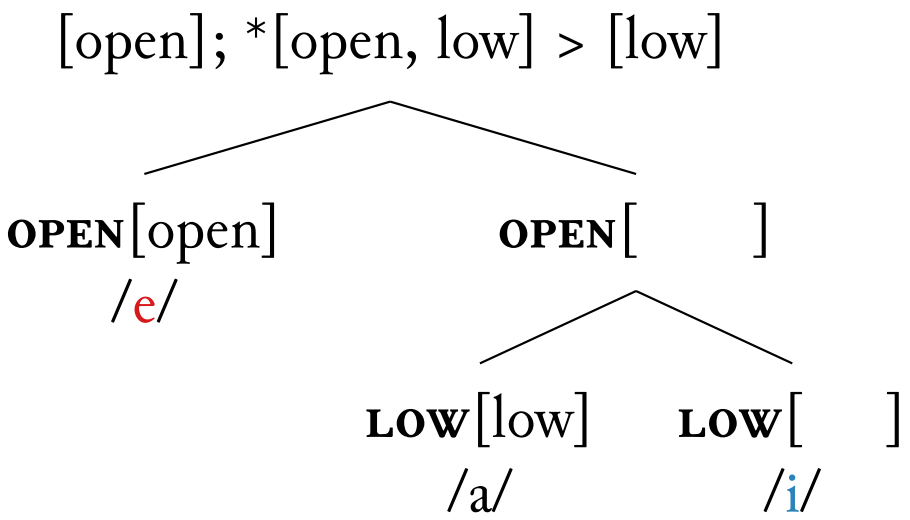
(a) Chewa contrastive hierarchy



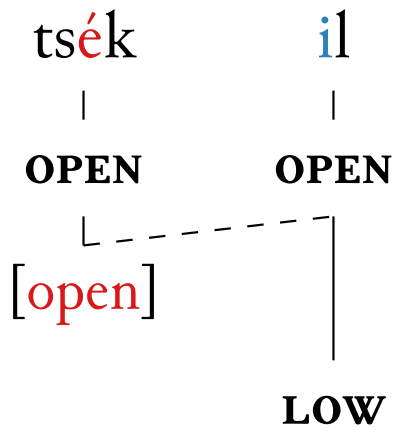
(b) Harmony derivations

Figure 10: Chewa harmony feature spreading

Chewa height harmony



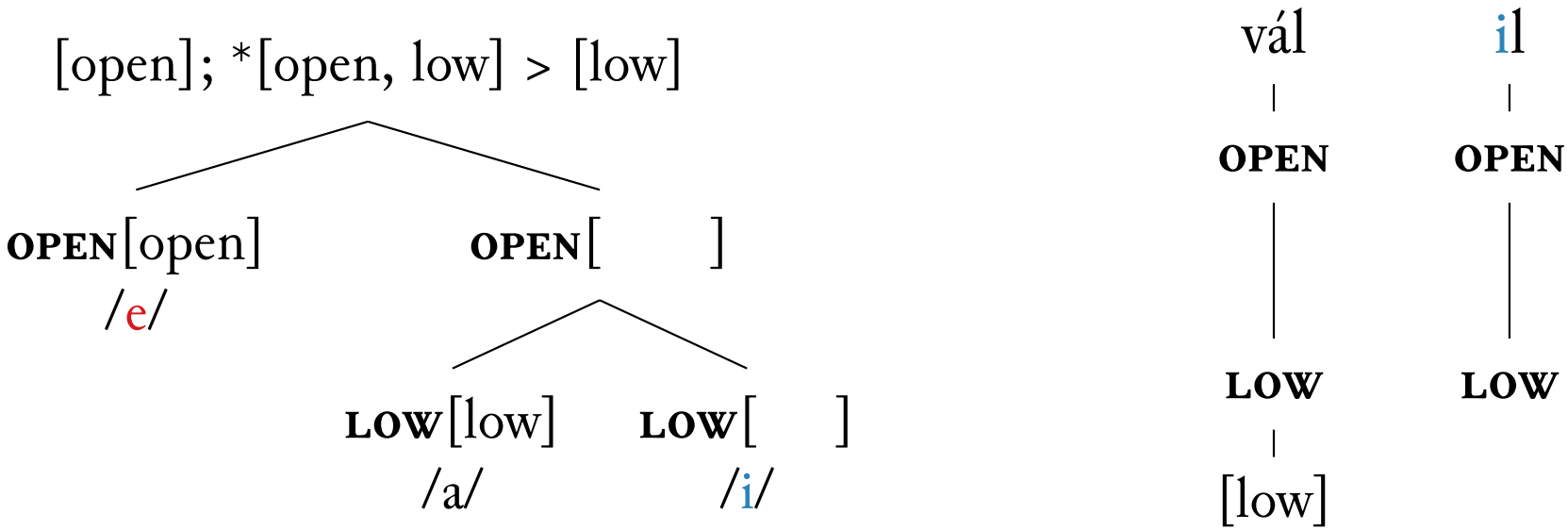
(a) Chewa contrastive hierarchy



(b) Harmony derivations

Figure 10: Chewa harmony feature spreading

Chewa neutral blocking

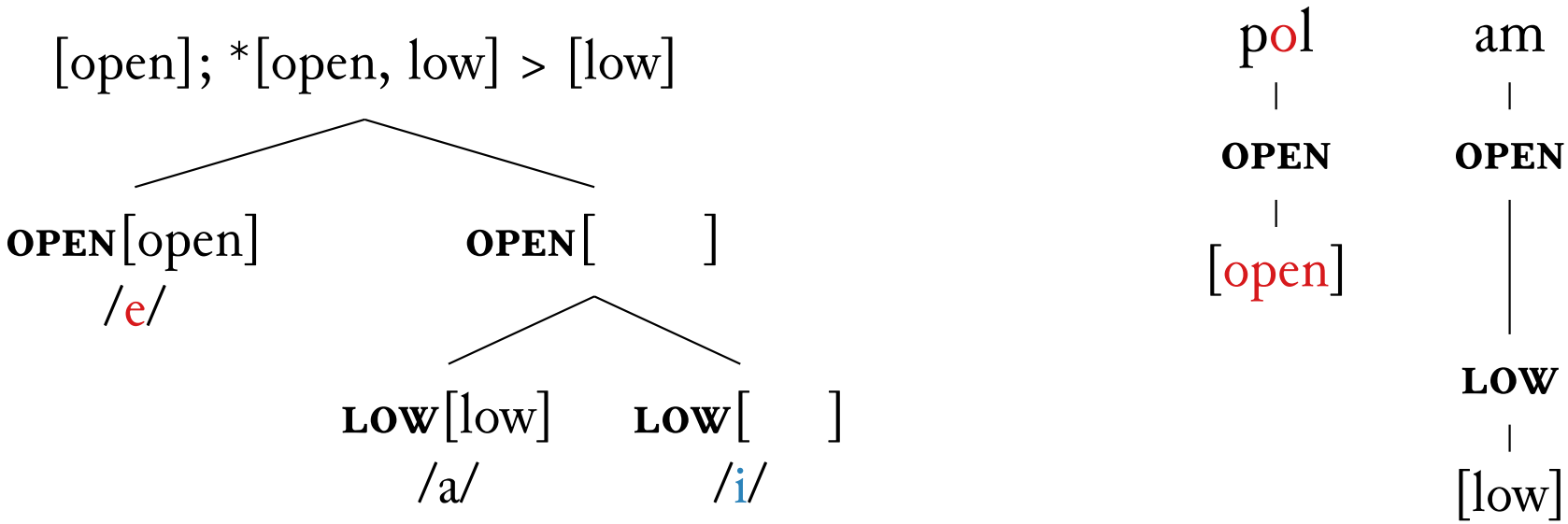


(a) Chewa contrastive hierarchy

(b) Harmony derivations

Figure 11: /a/-inactivity but visibility via contrastive non-specification

Chewa neutral blocking

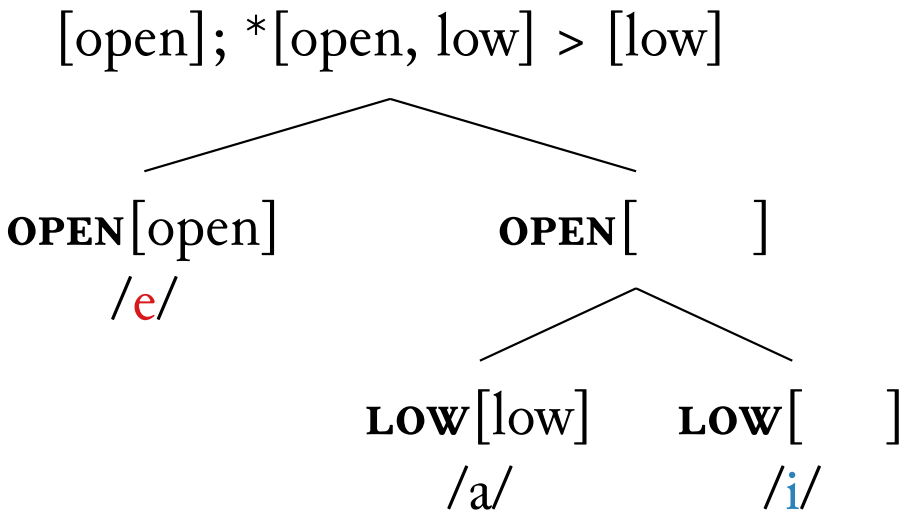


(a) Chewa contrastive hierarchy

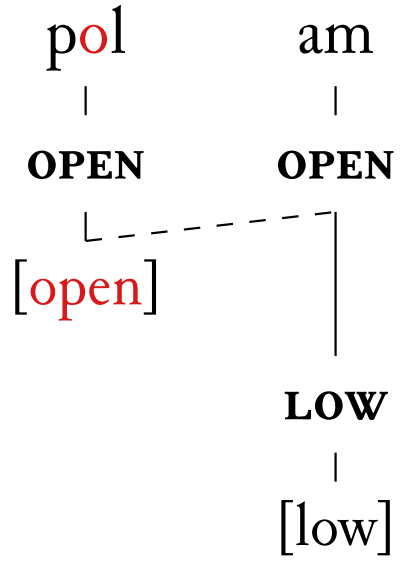
(b) Harmony derivations

Figure 11: /a/-inactivity but visibility via contrastive non-specification

Chewa neutral blocking



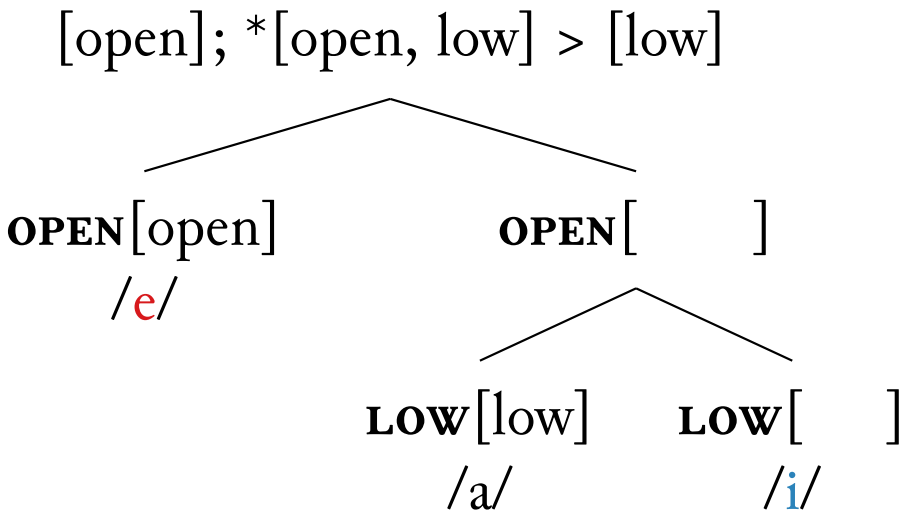
(a) Chewa contrastive hierarchy



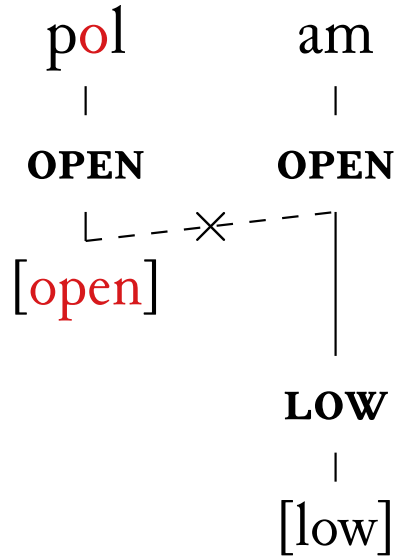
(b) Harmony derivations

Figure 11: /a/-inactivity but visibility via contrastive non-specification

Chewa neutral blocking



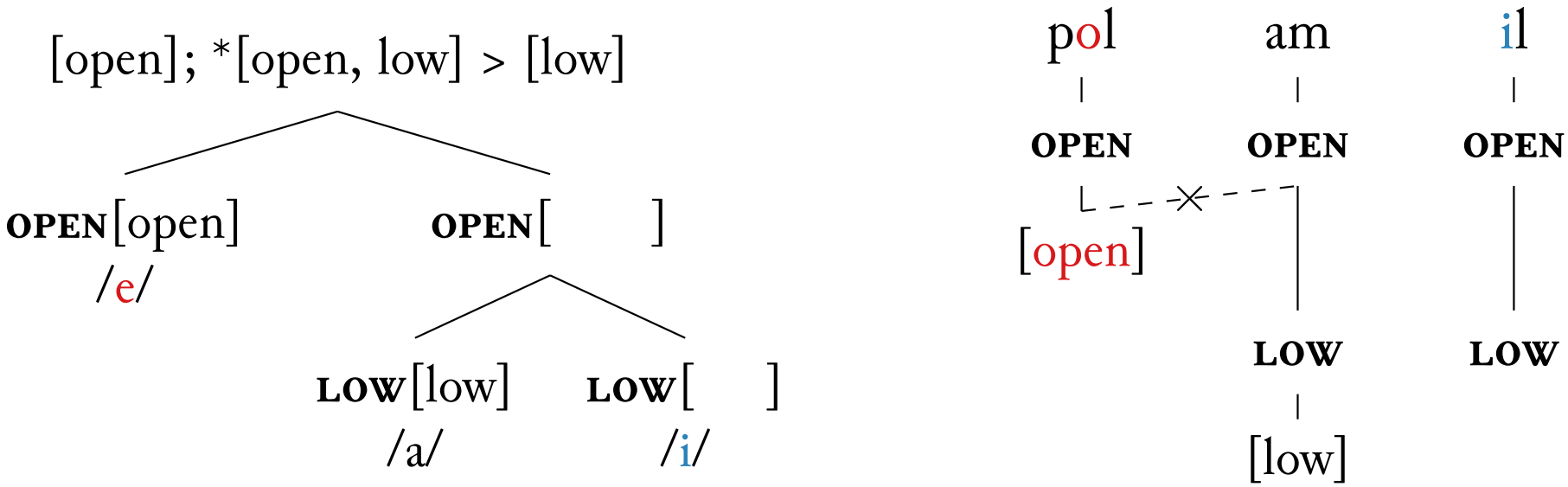
(a) Chewa contrastive hierarchy



(b) Harmony derivations

Figure 11: /a/-inactivity but visibility via contrastive non-specification

Chewa neutral blocking



(a) Chewa contrastive hierarchy

(b) Harmony derivations

Figure 11: /a/-inactivity but visibility via contrastive non-specification

Outline

Ndendeule transparency

(5) **/a/ harmony in/activity and in/visibility across three Bantu languages**

a) Mbunda (K.15) harmonic blocking /a/:

kwat-el-	'hold'-APPL.	*active*	/a...i/	→	[a...e]
tumam-el-	'sit'-APPL.	*visible*	/u...a...i/	→	[u...a...e]
okam-el-	'become thin'-APPL.		/o...a...i/	→	[o...a...e]

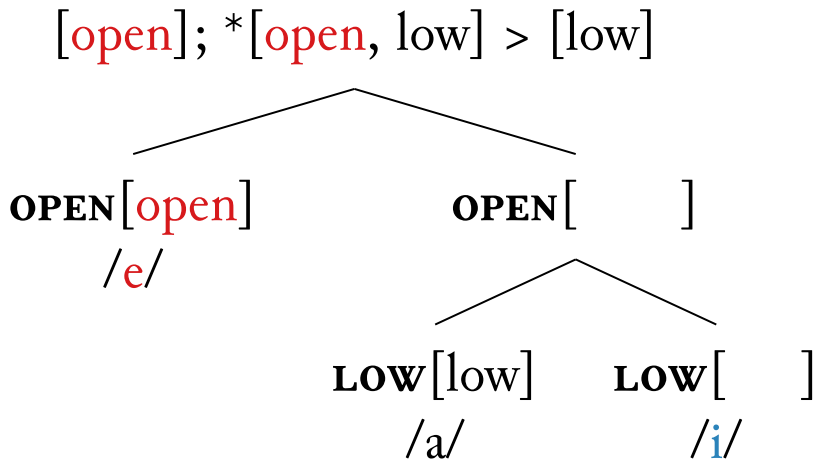
b) Ndendeule (N.101) transparent /a/:

kang-il-	'push'-APPL.	*inactive*	/a...i/	→	[a...i]
hiɣal-il-	'become white'-APPL.	*invisible*	/i...a...i/	→	[i...a...i]
koβal-el-	'stumble'-APPL.		/o...a...i/	→	[o...a...e]

c) Chewa (N.31) neutral blocking /a/:

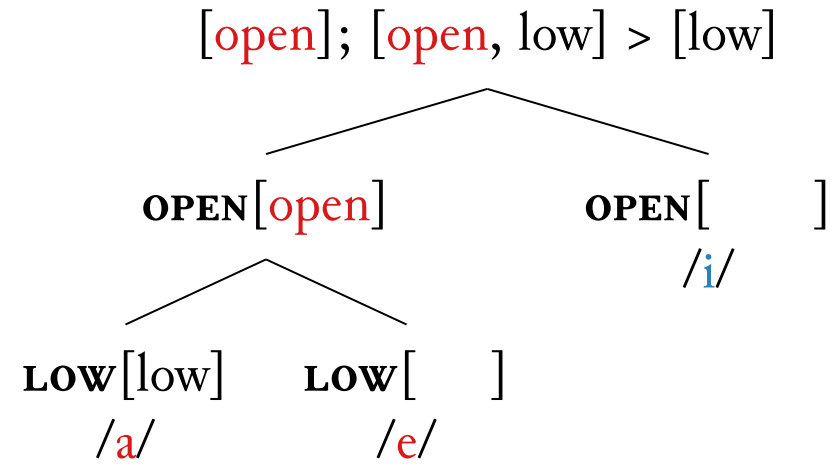
vál-il-	'get dressed'-APPL.	*inactive*	/a...i/	→	[a...i]
chinga-il-	'welcome someone'-APPL.	*visible*	/i...a...i/	→	[i...a...i]
polam-il-	'stoop'-APPL.		/o...a...i/	→	[o...a...i]

Chewa vs. Mbunda vowel classes



/a/	/e/	/i/
OPEN[ ]	OPEN[open]	OPEN[ ]
LOW[low]	∅	LOW[ ]

(a) Chewa: *[open, low]



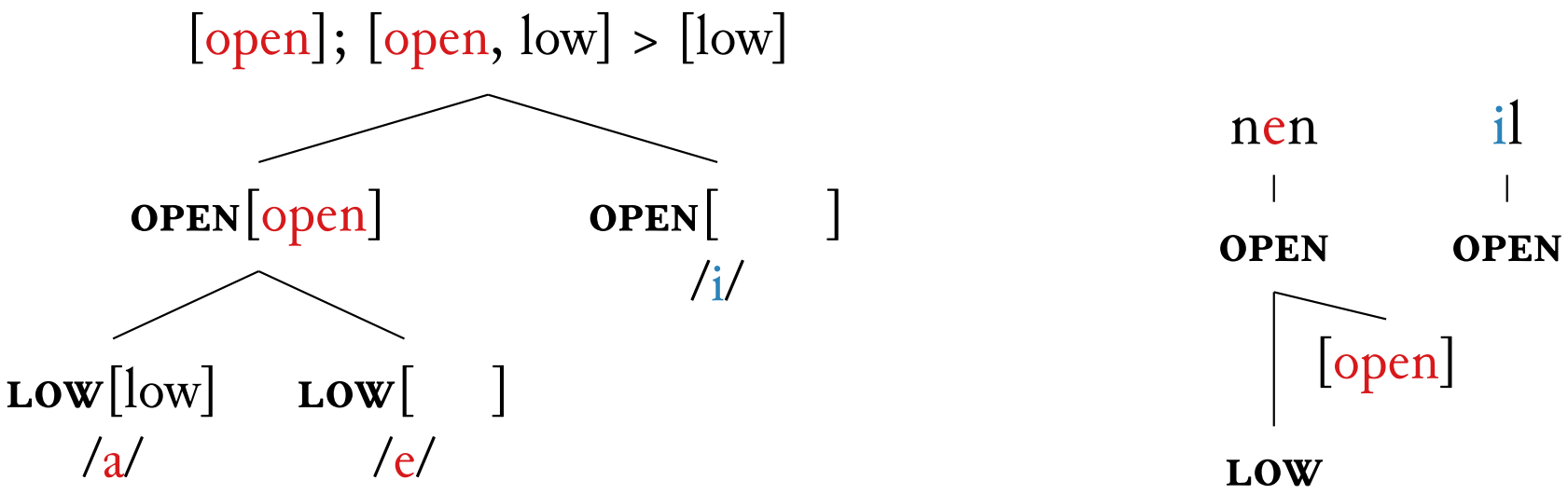
/a/	/e/	/i/
OPEN[open]	OPEN[open]	OPEN[ ]
LOW[low]	∅	LOW[ ]

(b) Mbunda: [open, low]

Figure 12: Chewa and Mbunda contrastive feature hierarchies

Mbunda height harmony

Mbunda height harmony



(a) Mbunda contrastive hierarchy

(b) Harmony derivations

Figure 13: Mbunda harmony feature spreading

Mbunda height harmony

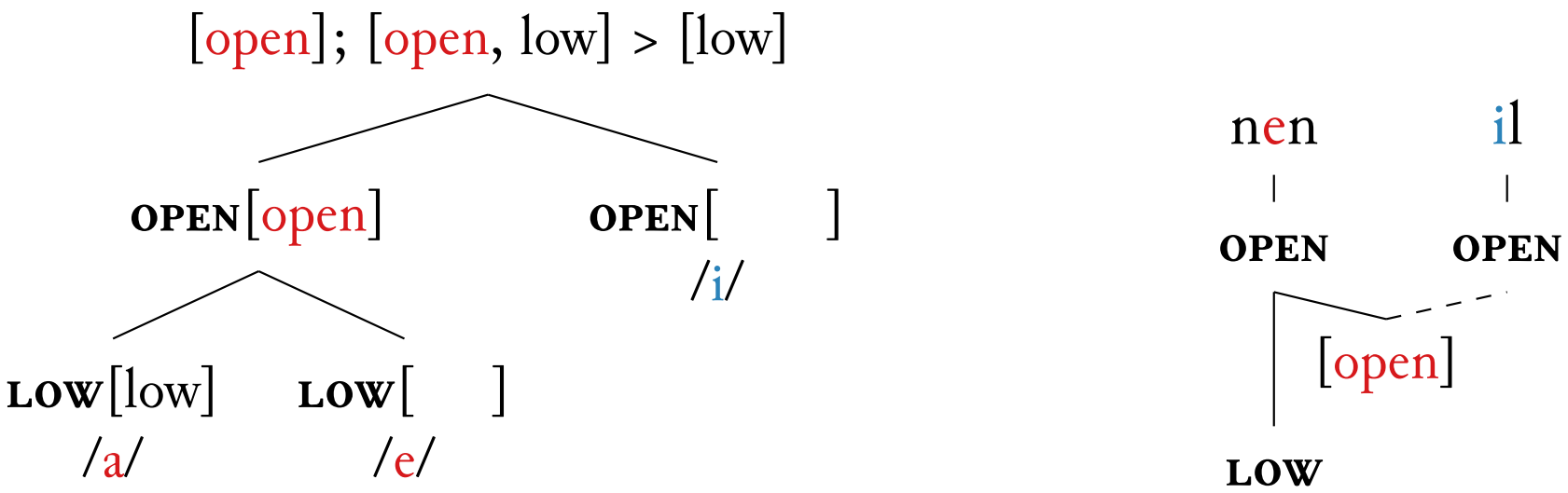


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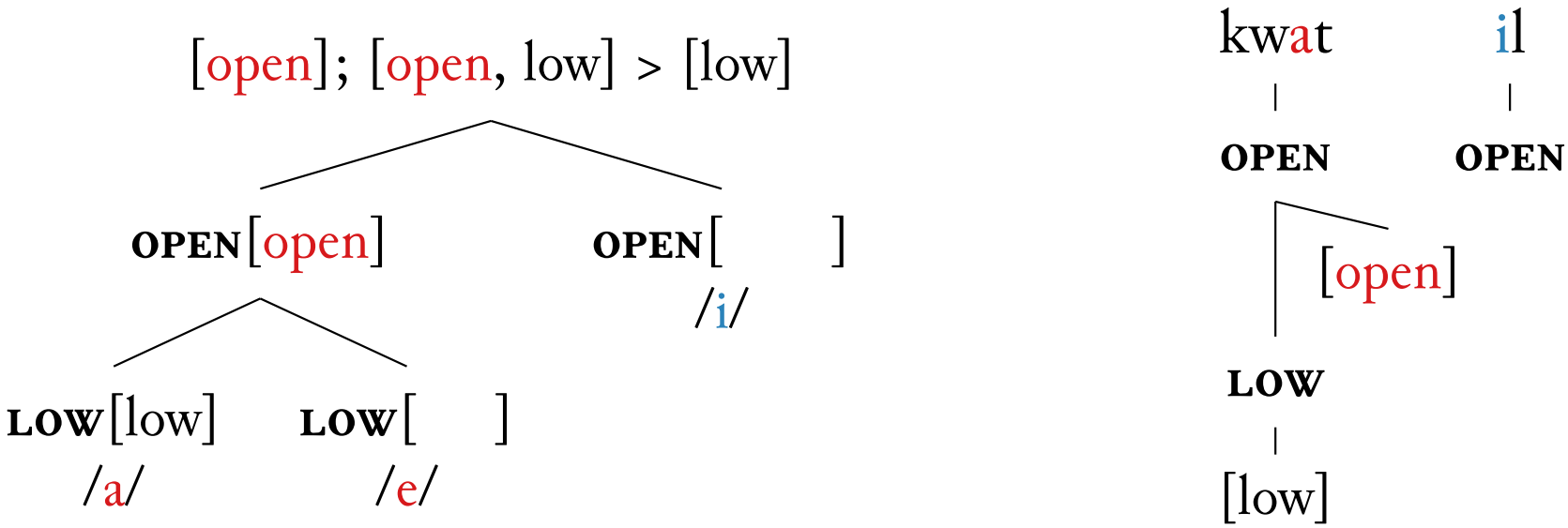
Figure 13: Mbunda harmony feature spreading

Mbunda harmonic blocking

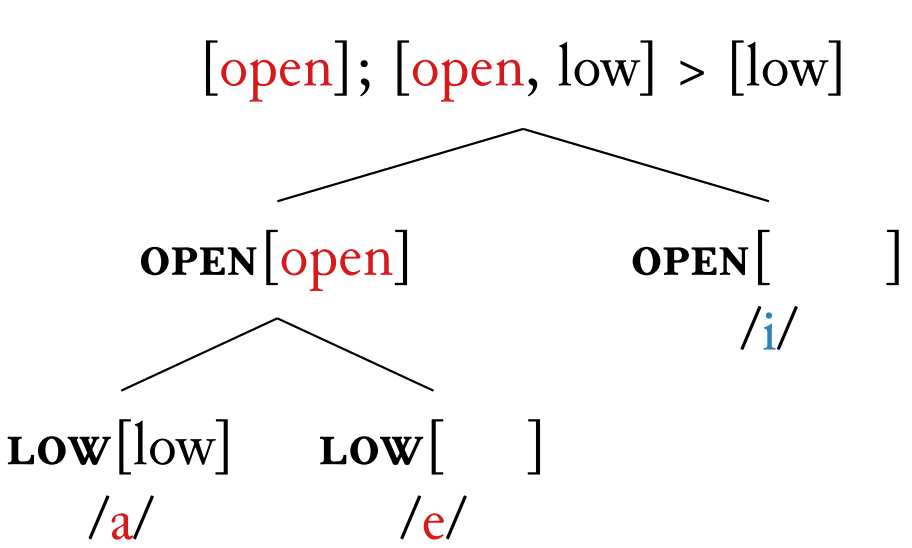


(a) Mbunda contrastive hierarchy

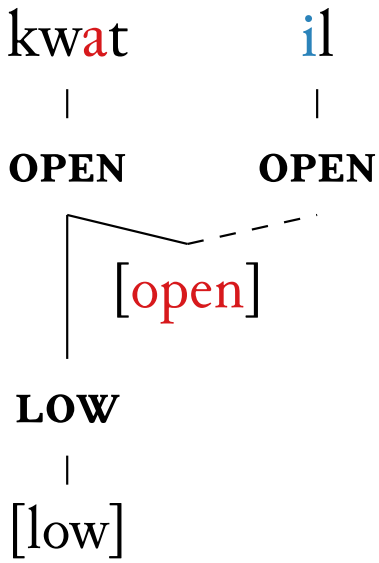
(b) Harmony derivations

Figure 14: /a/-activity and visibility via contrastive specification

Mbunda harmonic blocking



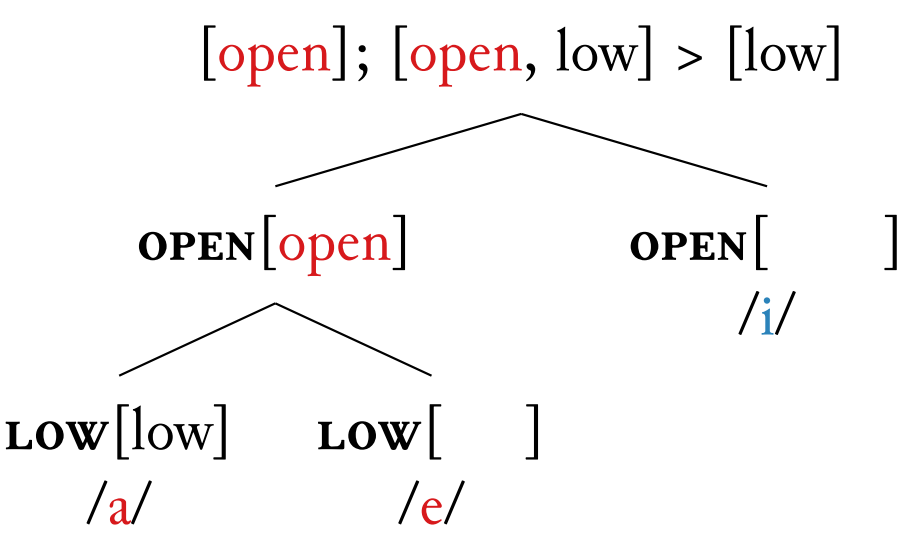
(a) Mbunda contrastive hierarchy



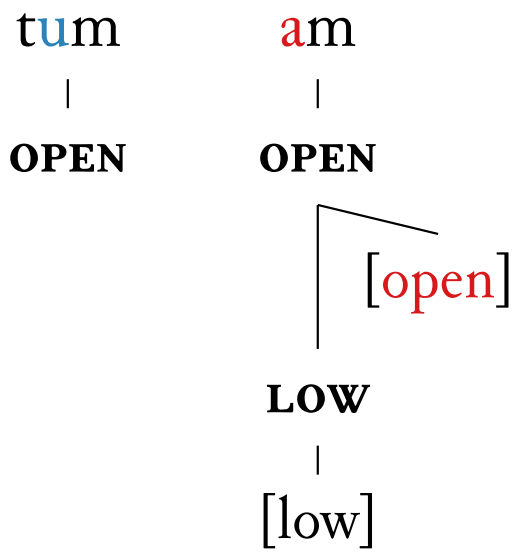
(b) Harmony derivations

Figure 14: /a/-activity and visibility via contrastive specification

Mbunda harmonic blocking



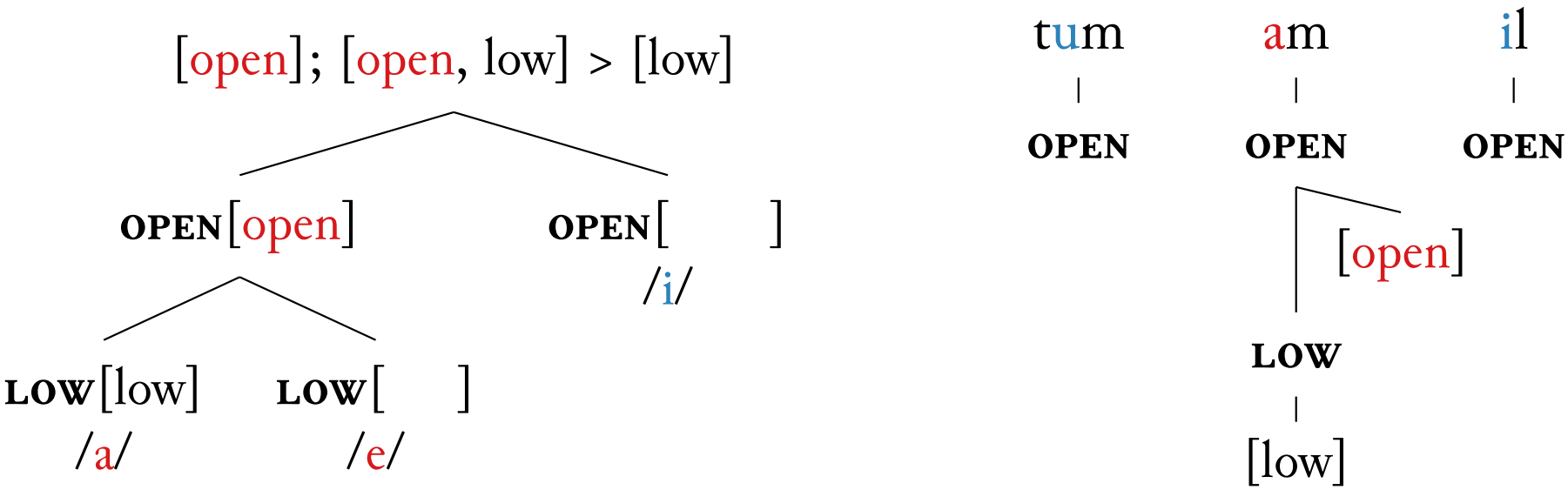
(a) Mbunda contrastive hierarchy



(b) Harmony derivations

Figure 14: /a/-activity and visibility via contrastive specification

Mbunda harmonic blocking

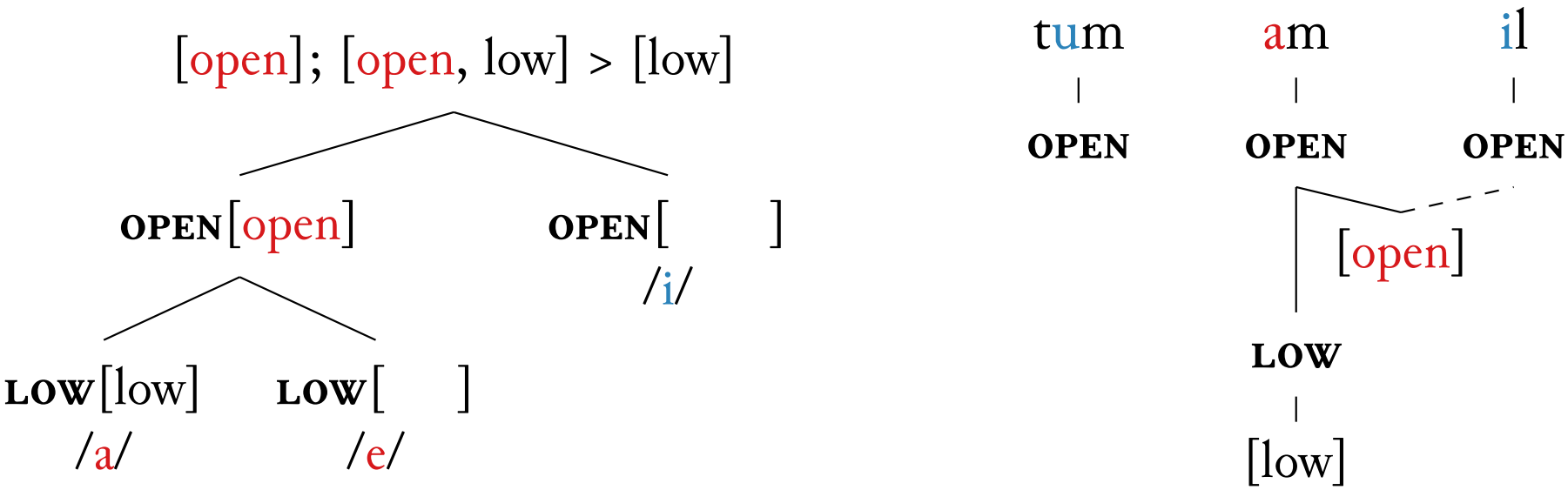


(a) Mbunda contrastive hierarchy

(b) Harmony derivations

Figure 14: /a/-activity and visibility via contrastive specification

Mbunda harmonic blocking



(a) Mbunda contrastive hierarchy

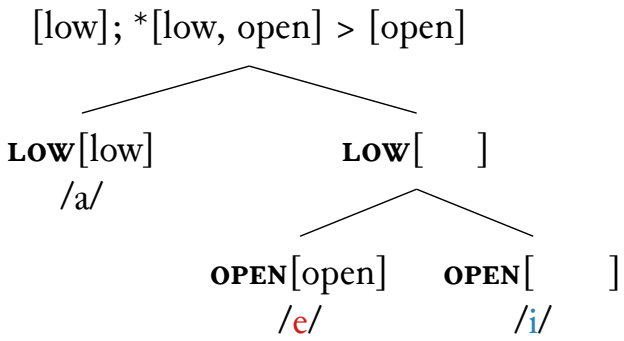
(b) Harmony derivations

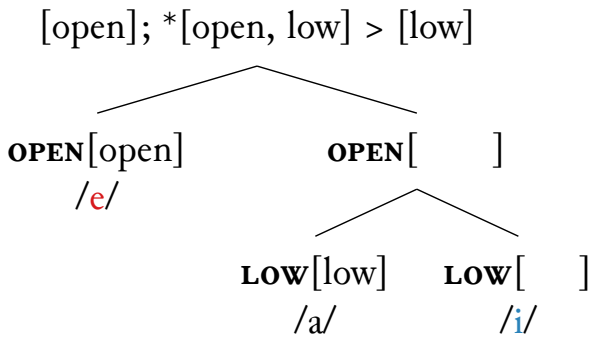
Figure 14: /a/-activity and visibility via contrastive specification

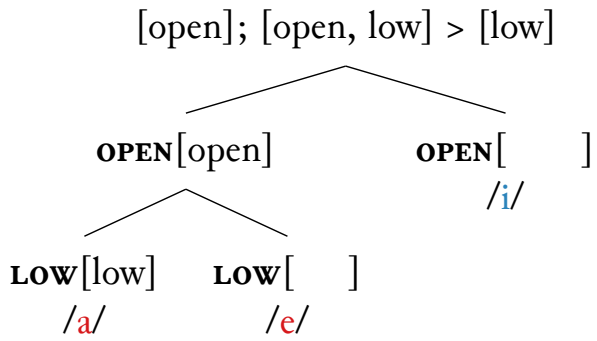
Outline

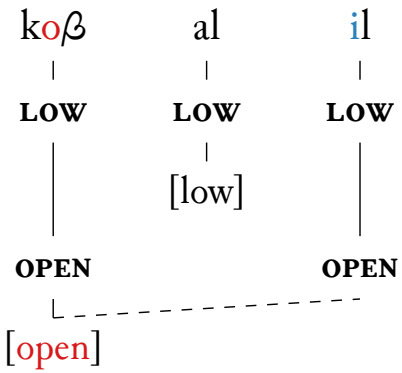
Neutral harmony summary

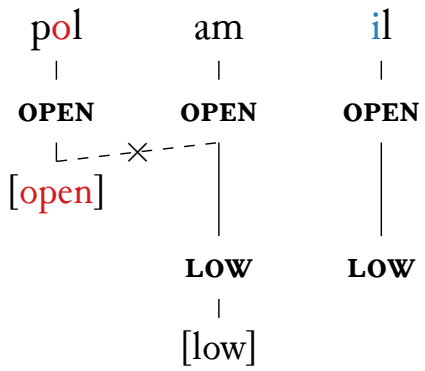
(9) Summary /a/-neutrality patterns

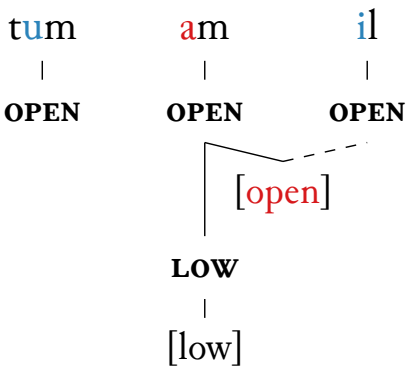












(a) Ndendeule: [koβal-el]
transparency

(b) Chewa: [polam-il]
neutral blocking

(c) Mbunda: [tumam-el]
harmonic blocking

Outline

Conclusions

- Harmony languages display a ternary distinction with respect to neutral segments
  - transparency (e.g. Ndendeule, N.101)
  - harmonic blocking (e.g. Mbunda, K.15)
  - neutral blocking (e.g. Chewa, N.31)

Conclusions

2. CHT which incorporates privative features and feature-nodes
   - predicts three ways to categorise asymmetric contrasts while maintaining a harmonic pairing

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   - predicts three ways to categorise asymmetric contrasts while maintaining a harmonic pairing
   - produces different class shapes and ternary feature specifications
     - contrastive specification (e.g. **OPEN**[open] /a/ in Mbunda)
     - contrastive non-specification (e.g. **OPEN**[ ] /a/ in Chewa)
     - non-contrastive underspecification (e.g. ∅ /a/ in Ndendeule)

Conclusions

3. A simple feature licensing procedure applied to the representations predicted by CHT
   - produces exactly the observed typology of harmony and neutral patterns
     - nothing more and nothing less

Good explanatory mileage

The CHT approach:

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- provides the first fully unified account of harmony neutrality across harmony systems
  - harmony as an operation is grammatically identical
  - ☞ locality variation is only an emergent effect of alternative organisations of feature classes

Thanks for listening!