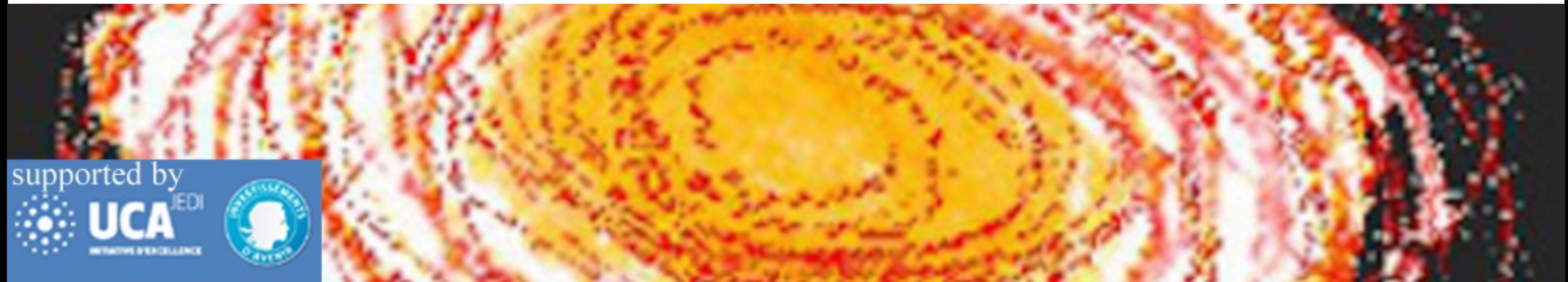


Eastern Generative Grammar (EGG)

EGG 2021 online, 26 July to 6 August



Foundations of Contrastive Hierarchy Theory

B. Elan Dresher

Class 4: Diachronic phonology with contrastive hierarchies

Contrast and phonological change

“Once a phonological change has taken place, the following questions must be asked:

What exactly has been modified within the phonological system?

...has the structure of individual oppositions [contrasts] been transformed? Or in other words, has the place of a specific opposition been changed...?”



In an article first published in 1931, Roman Jakobson proposed that diachronic phonology must look at contrast shifts (Jakobson 1962 [1931]).

This program could not be carried out in early generative phonology because there was no clear way to represent ‘the structure of individual oppositions’.

Contrast shift and phonological change

But now we can do it! Contrastive hierarchies have been fruitfully applied to phonological change in a variety of languages.

Some studies utilizing a version of CHT are listed below.

Diachronic studies using contrastive feature hierarchies include:

Zhang (1996) and Dresher & Zhang (2005) on Manchu; Barrie (2003) on Cantonese; Rohany Rahbar (2008) on Persian; Dresher (2009: 215–225) on East Slavic; Ko (2010, 2011, 2018) on Korean, Mongolic, and Tungusic; Compton & Dresher (2011) on Inuit; Gardner (2012), Roeder & Gardner (2013), and Purnell & Raimy (2013) on North American English vowel shifts; Harvey (2012) on Ob-Ugric (Khanty and Mansi); Oxford (2012, 2015) on Algonquian; Voeltzel (2016), Schalin (2017), and Sandstedt (2018) on Scandinavian; and Krekoski (2017) on Chinese tonal systems.

Eastern Generative Grammar (EGG)

Thursday 29 July 2021



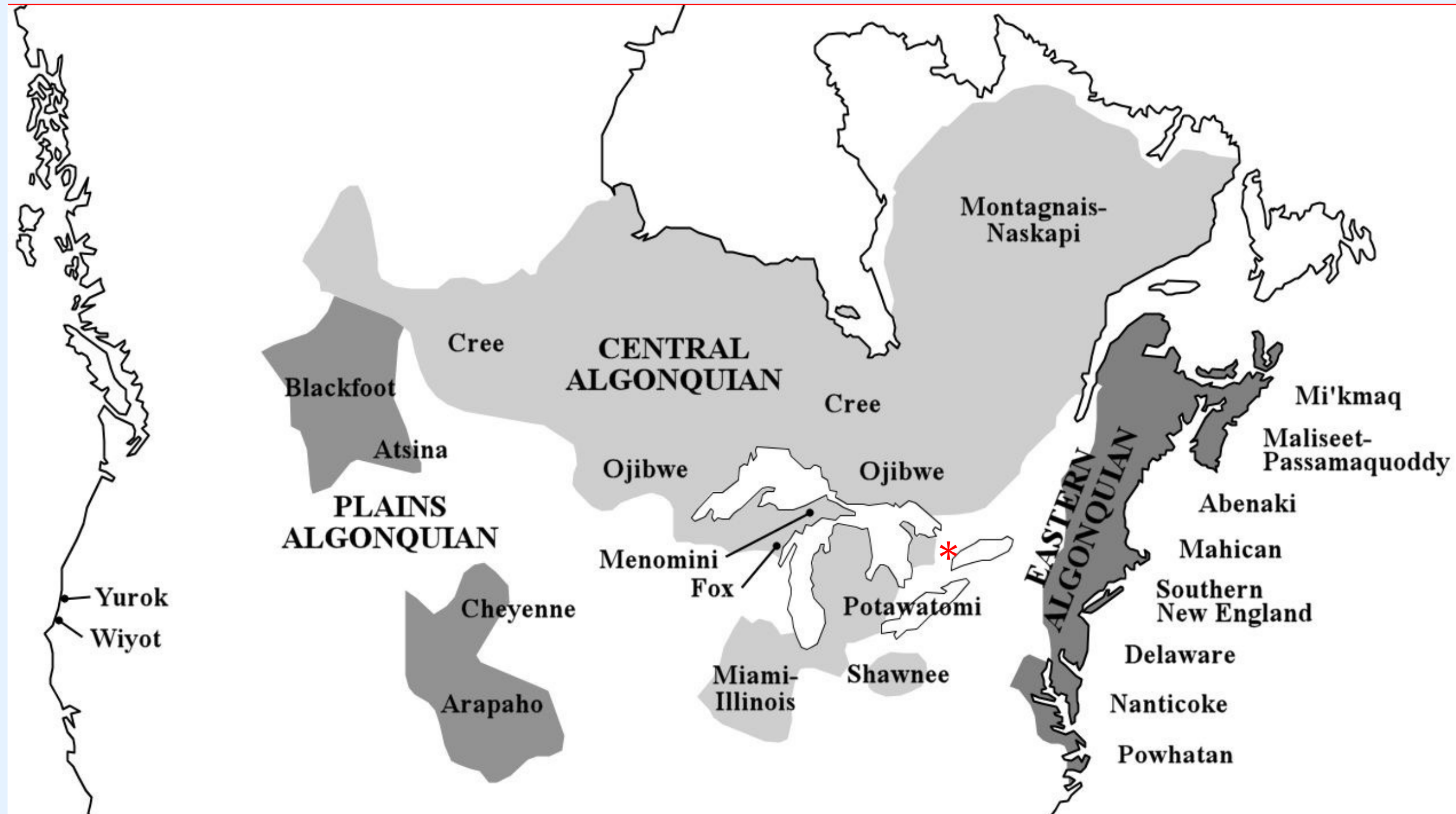
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1. From Proto-Algonquian to the
modern Algonquian languages

From Proto-Algonquian to the modern Algonquian languages

In a survey of the historical development of Algonquian vowel systems, Oxford (2015) observes that a large set of separate changes can be understood if we posit a single contrast shift.

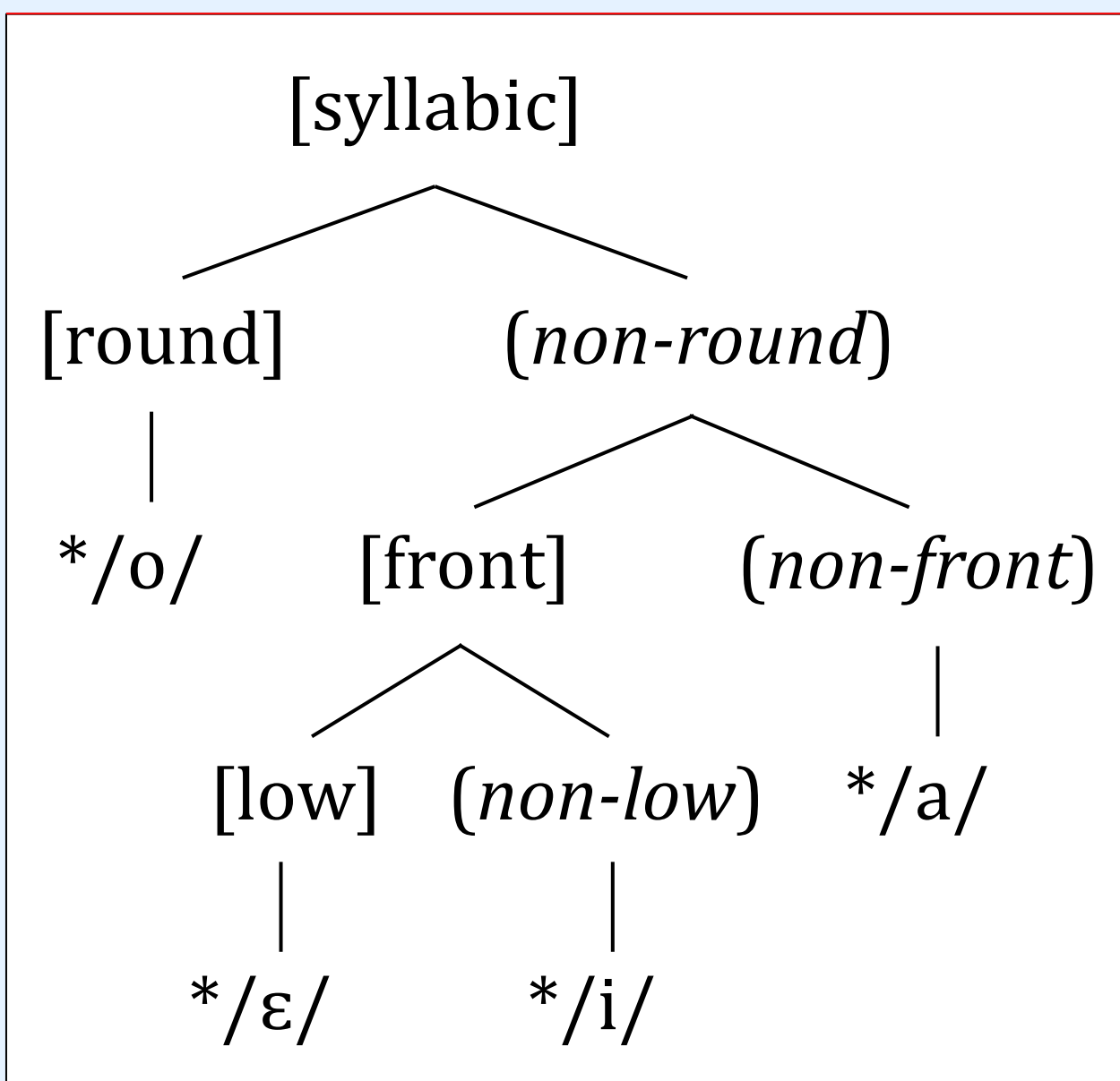
Map of Algonquian languages



←I am here *

Contrastive hierarchy for Proto-Algonquian vowels (Oxford 2015)

[round] > [front] > [low]



Oxford (2015) posits this feature hierarchy for **Proto-Algonquian** (length contrast omitted for ease of exposition).

***/o/ is [round]:** triggers rounding

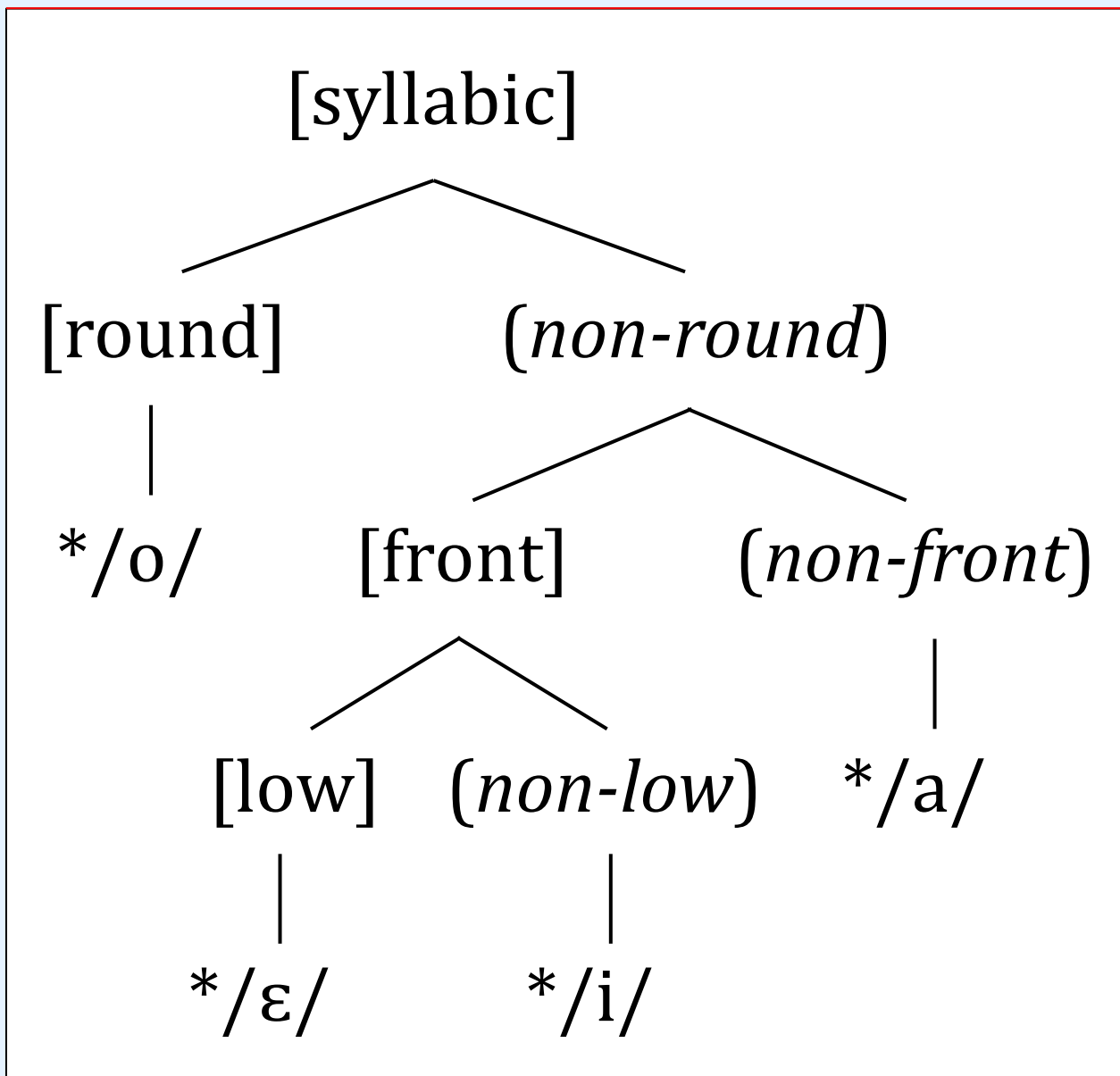
***/i/ is [front]:** triggers palatalization

***/i, ε/ sisters:** partial neutralization

***/a/ has no marked contrastive features:** is never a trigger

Contrastive hierarchy for Proto-Algonquian vowels

[round] > [front] > [low]

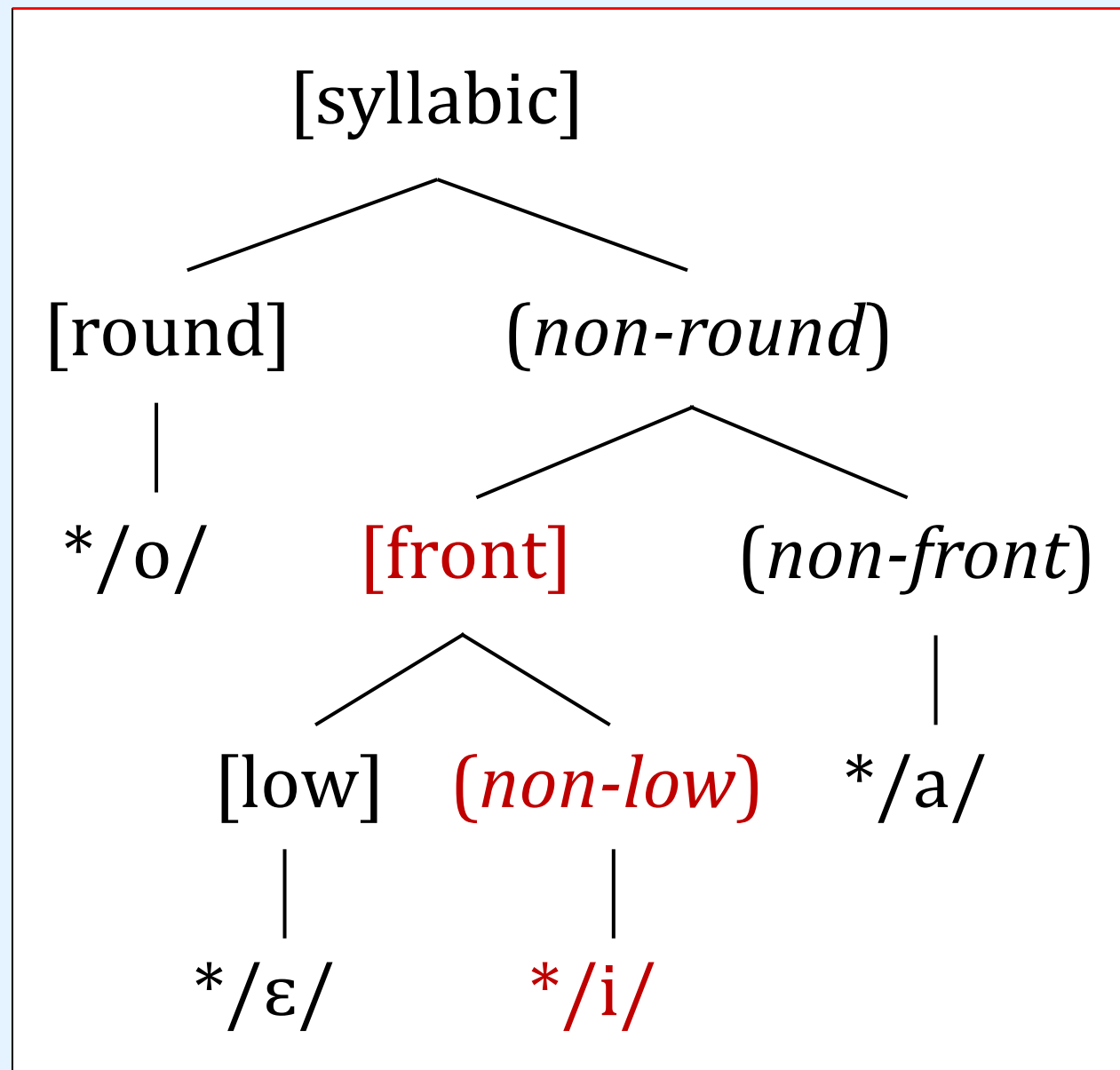


The PA hierarchy continues unchanged in the Central Algonquian languages and in Blackfoot.

It accounts for **two recurring patterns**:

Contrastive hierarchy for Proto-Algonquian vowels

[round] > [front] > [low]

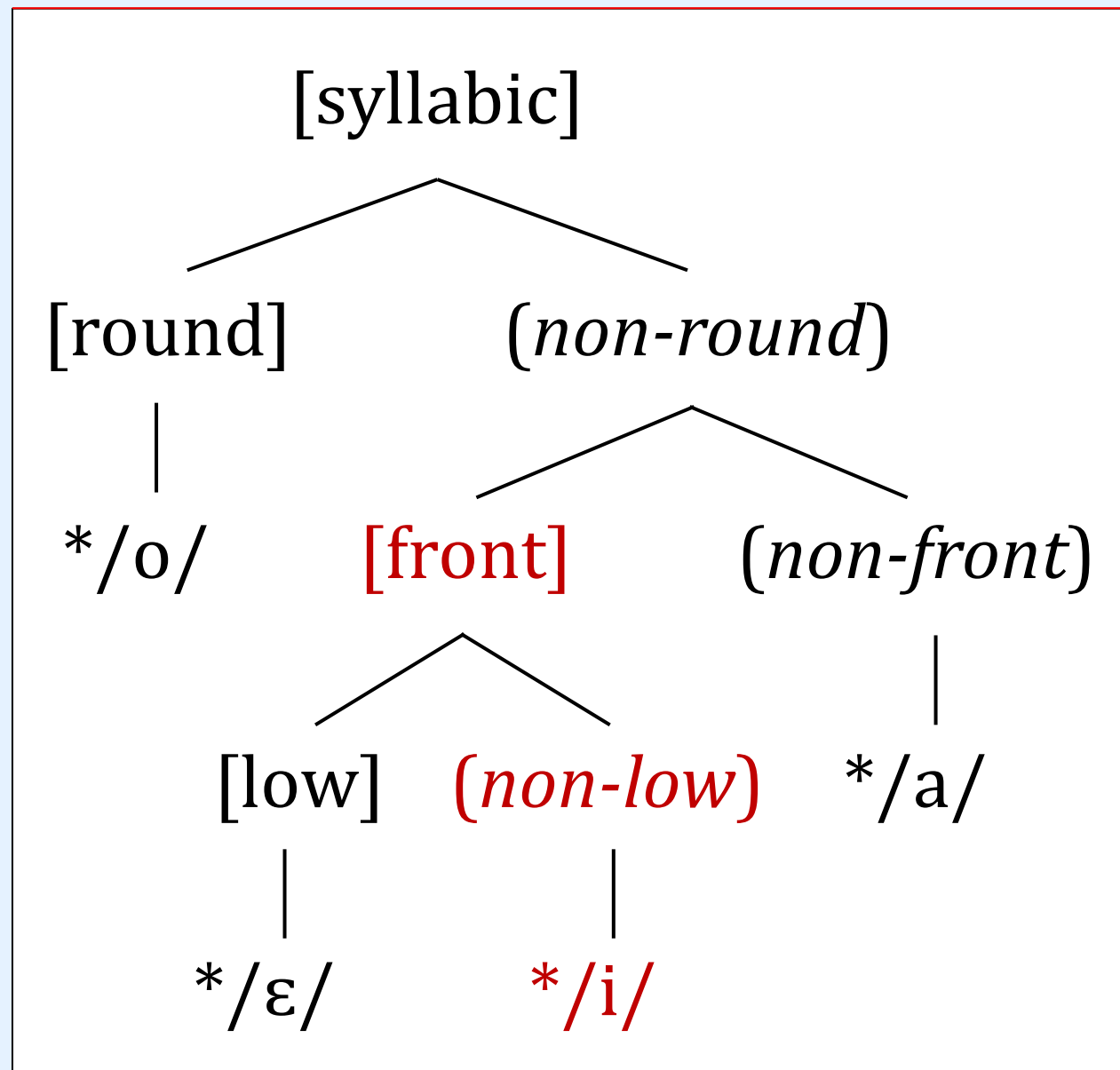


1. Palatalization always includes */i/ as a trigger

- PA */t, θ/-palatalization is triggered by */i, i:/'
- Innu */k/-palatalization is triggered by */i, i:, ε:/'
- Betsiamites Innu /t/-palatalization is triggered by /i:/'

Contrastive hierarchy for Proto-Algonquian vowels

[round] > [front] > [low]

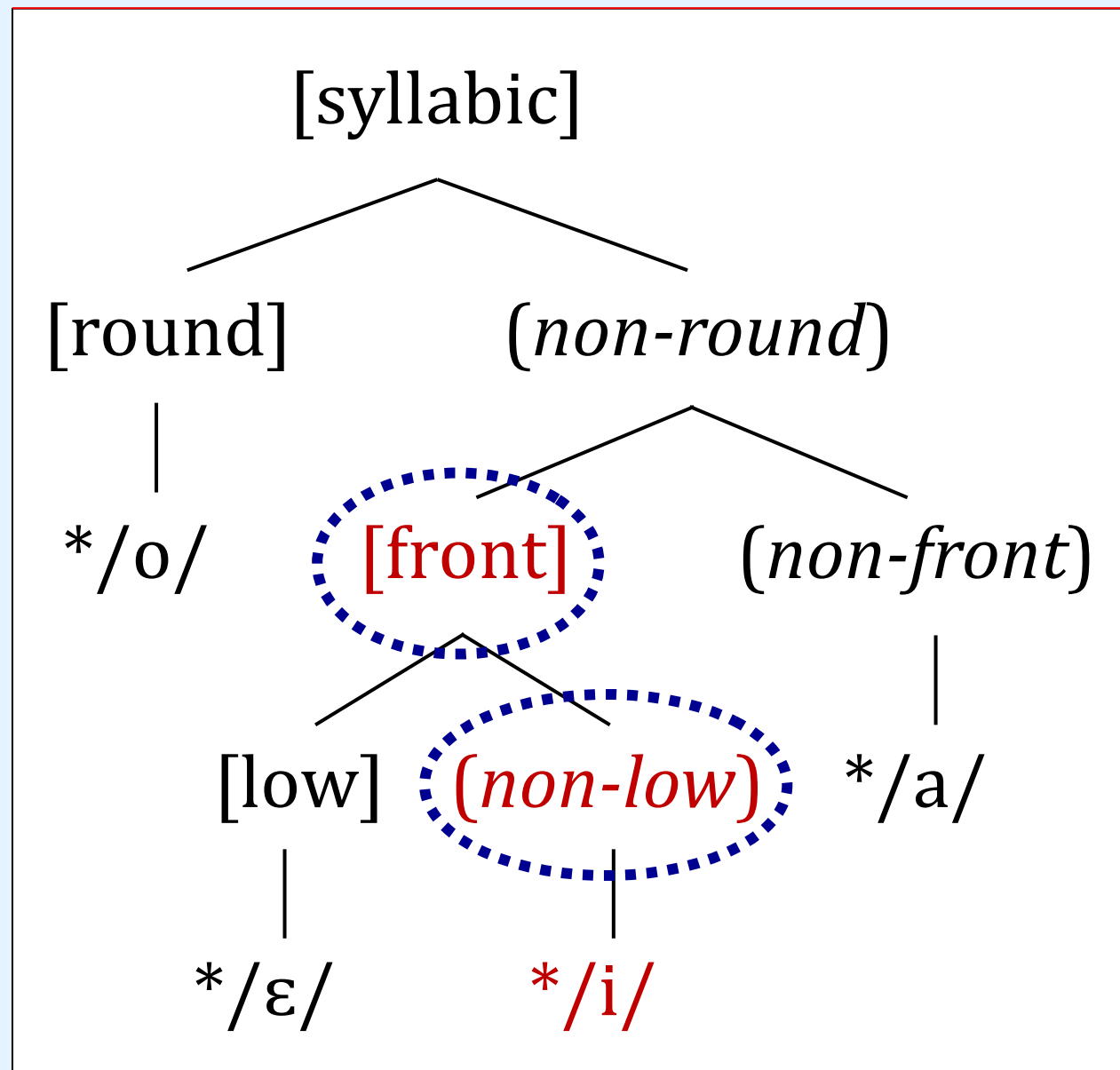


1. Palatalization always includes */i/ as a trigger

- Blackfoot */k/-assibilation is triggered by PA */i, i:/
- Blackfoot /t/-assibilation is triggered by Blackfoot /i, i:/

Contrastive hierarchy for Proto-Algonquian vowels

[round] > [front] > [low]

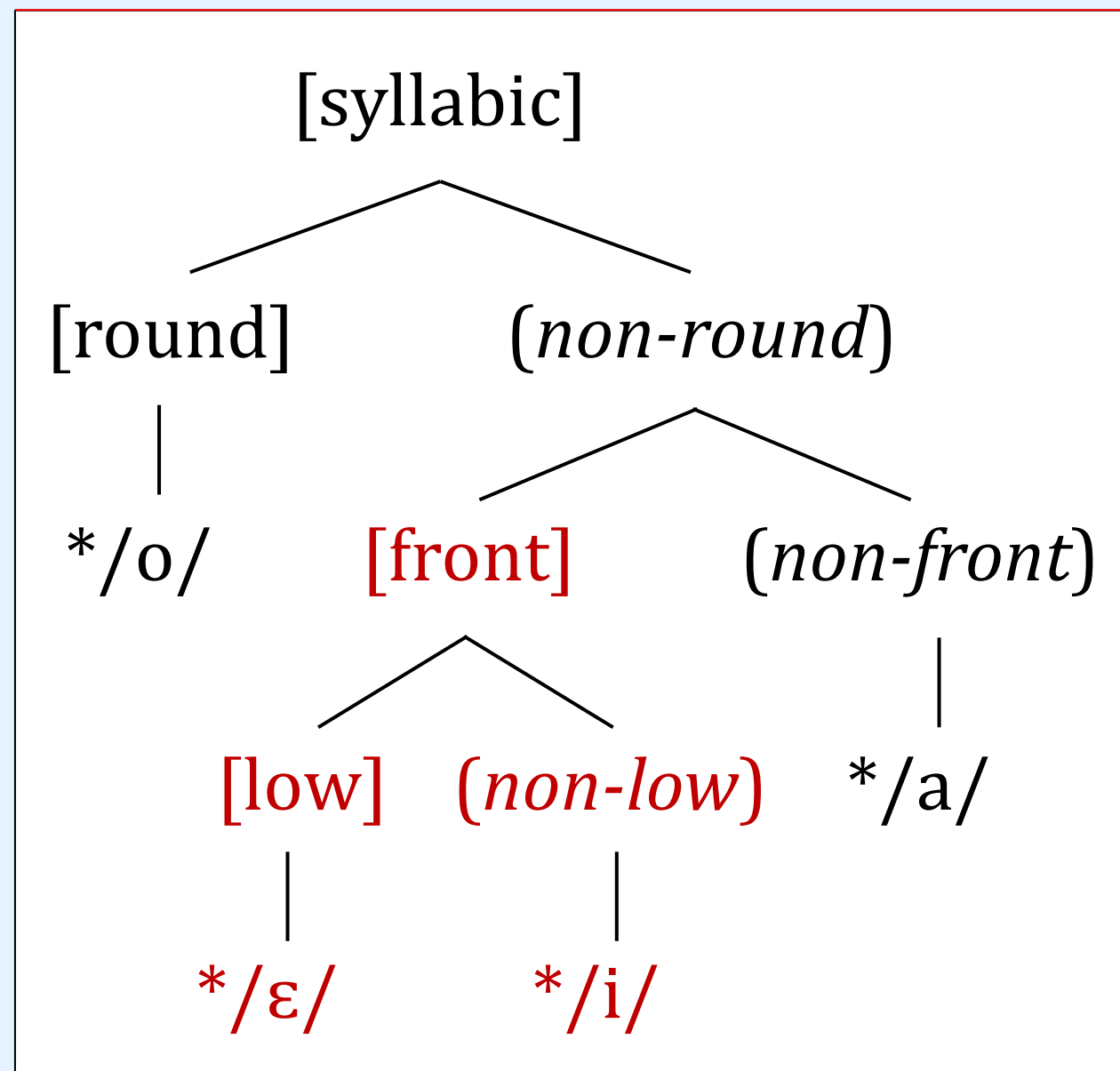


1. Palatalization always includes */i/ as a trigger

These patterns support the view that palatalization is triggered by a contrastive [front] feature, and favours vowels that are (non-low).

Contrastive hierarchy for Proto-Algonquian vowels

[round] > [front] > [low]

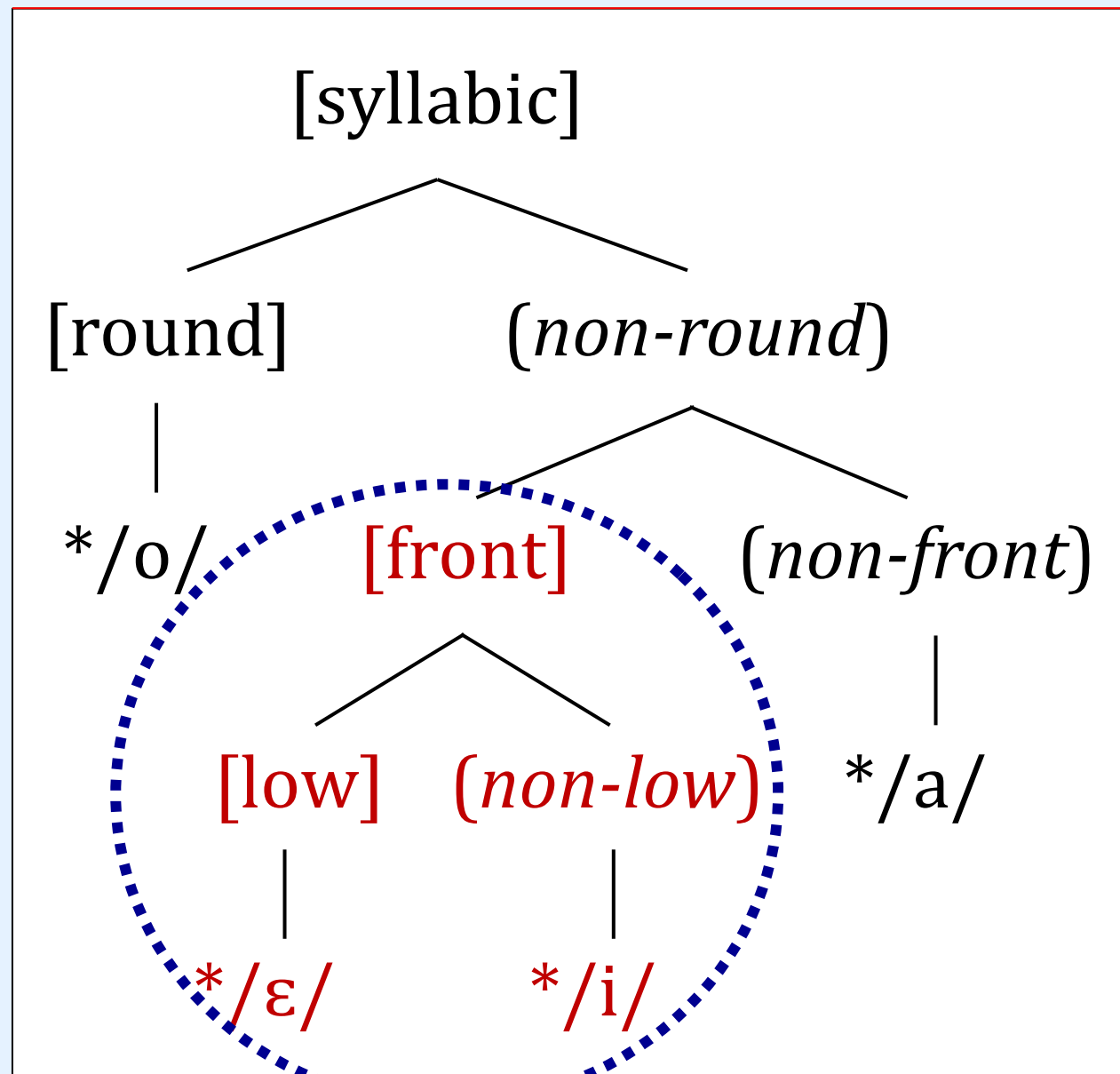


2. */ε/ regularly merges with */i/

- Partial or complete mergers of short */ε/ > /i/ occur in Fox, Shawnee, Miami-Illinois, Cree- Innu, Ojibwe, and Blackfoot
- Long */ε: / > /i: / in Woods Cree, Northern Plains Cree, and Blackfoot

Contrastive hierarchy for Proto-Algonquian vowels

[round] > [front] > [low]

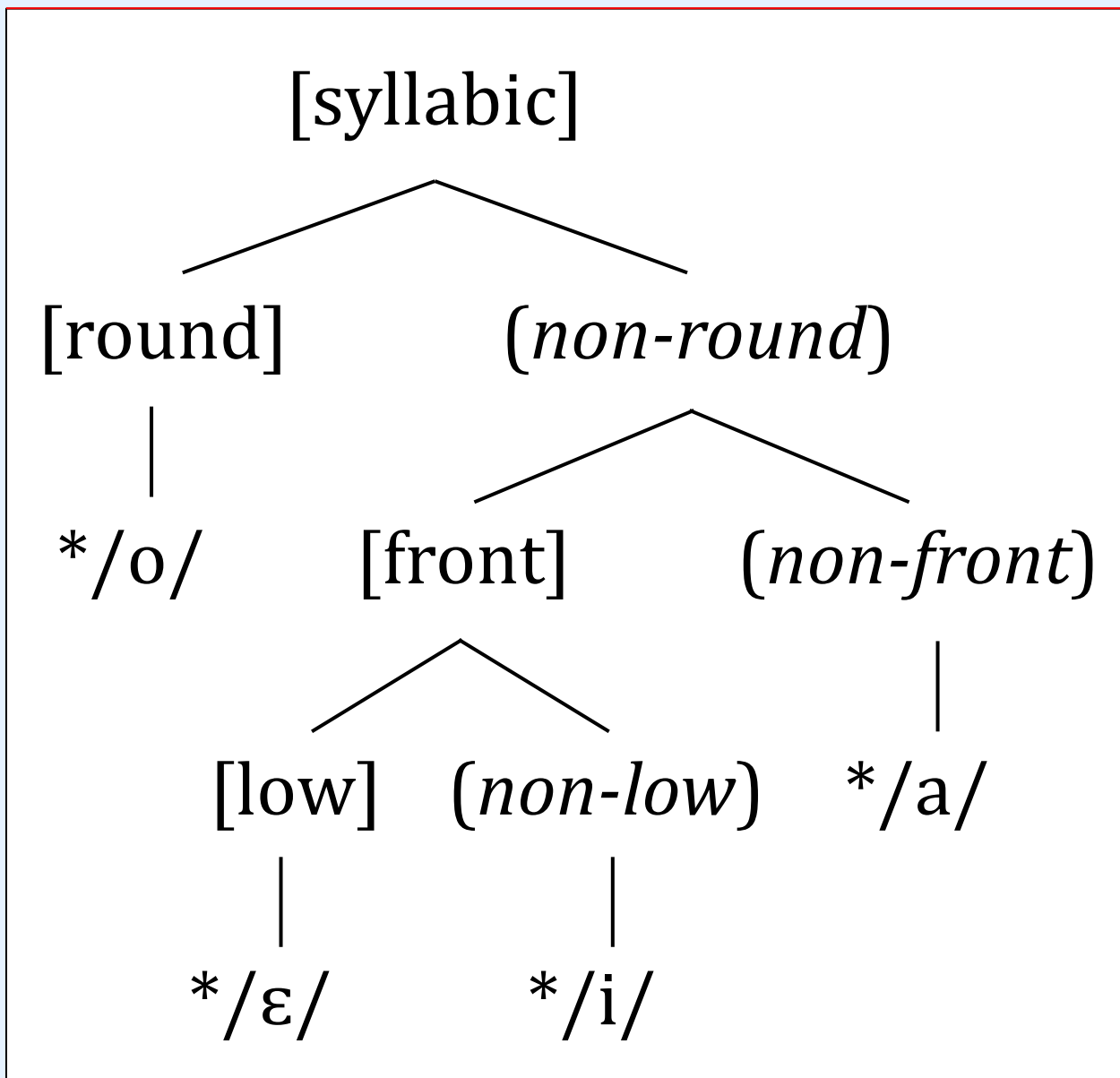


2. */ε/ regularly merges with */i/

These mergers are consistent with the idea that merger will tend to involve terminal nodes in the feature tree.

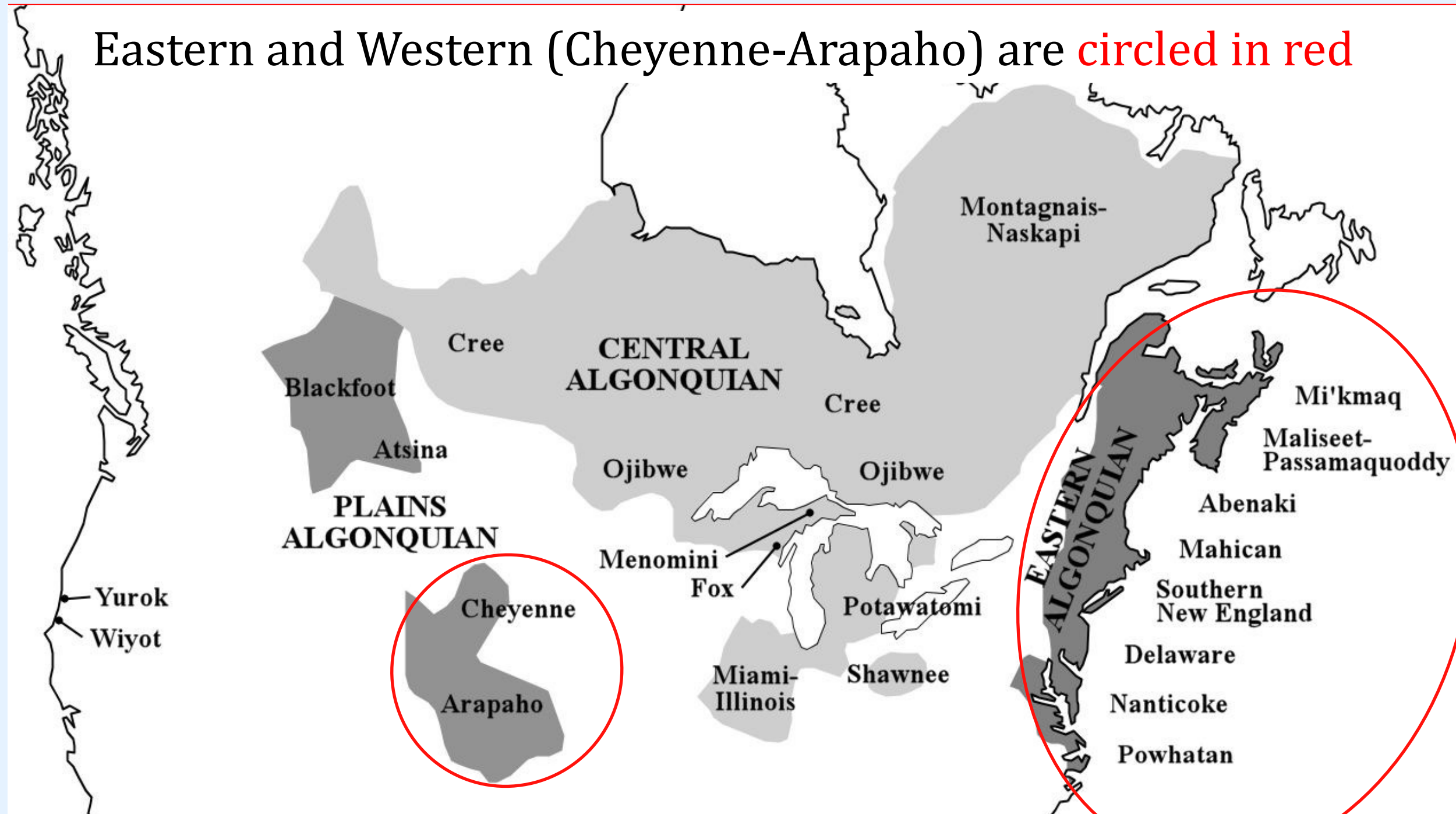
Eastern and Western Algonquian

[round] > [front] > [low]



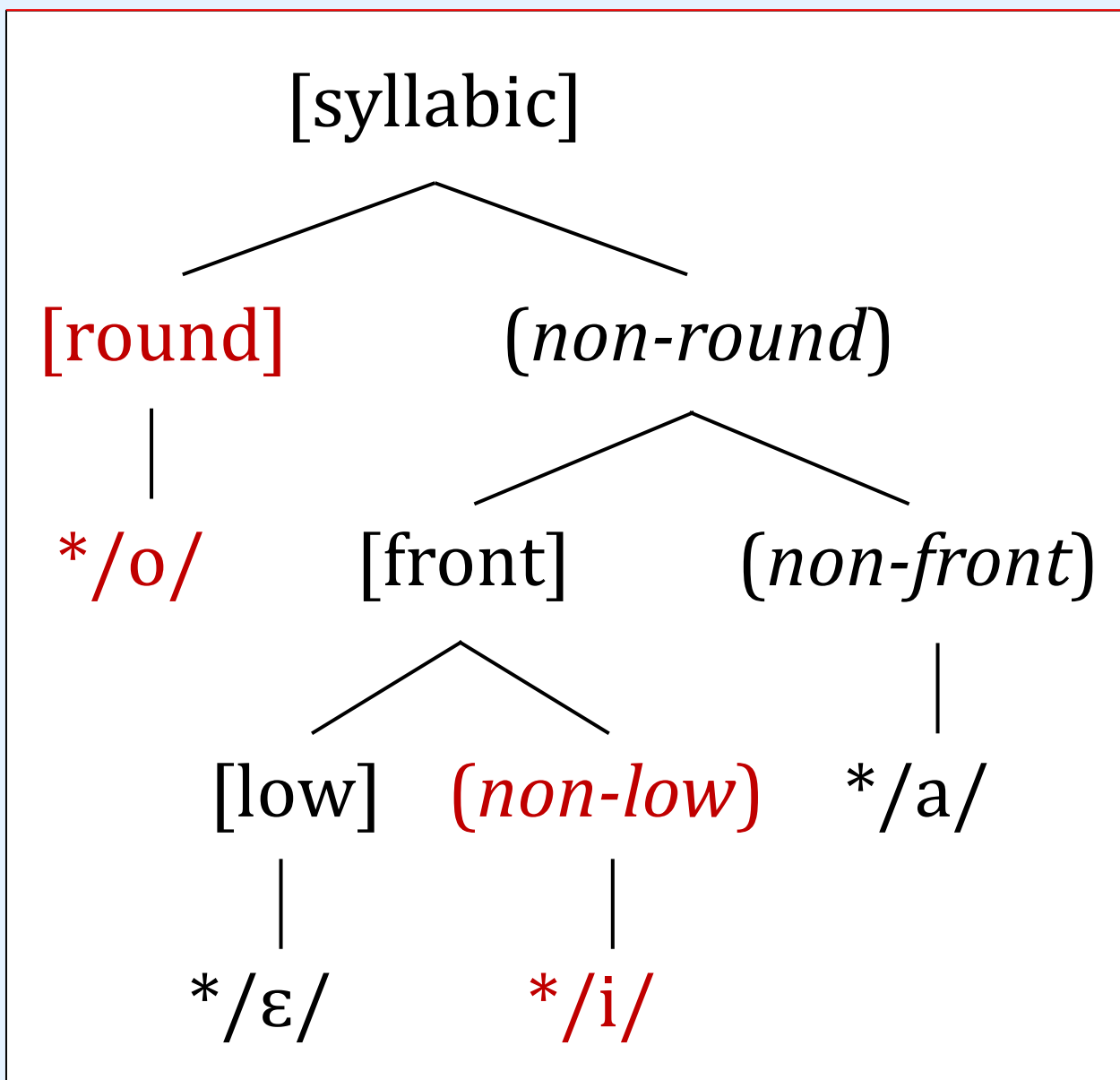
On the eastern and western edges of the Algonquian area, developments diverge from the predictions of the PA hierarchy.

Map of Algonquian languages



Eastern and Western proto-languages

[round] > [front] > [low]



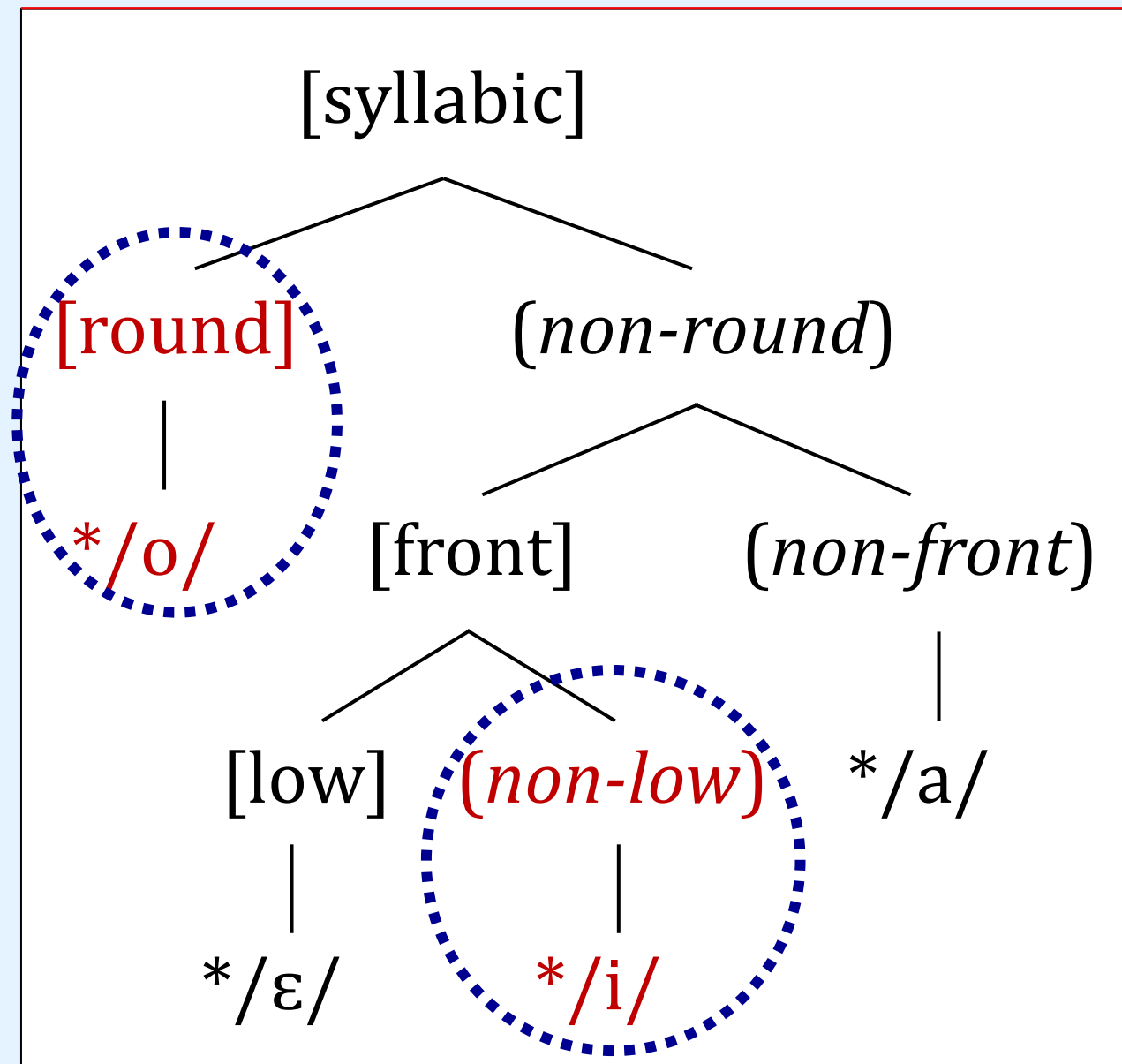
The high vowels begin to pattern together

In the east: Proto-Eastern Algonquian lost the length contrast only in the high vowels (reflexes of */o/, */i/)

In the west: Proto-Arapaho-Atsina and Pre-Cheyenne merge */o, o:/ with */i, i:/

Eastern and Western proto-languages

[round] > [front] > [low]

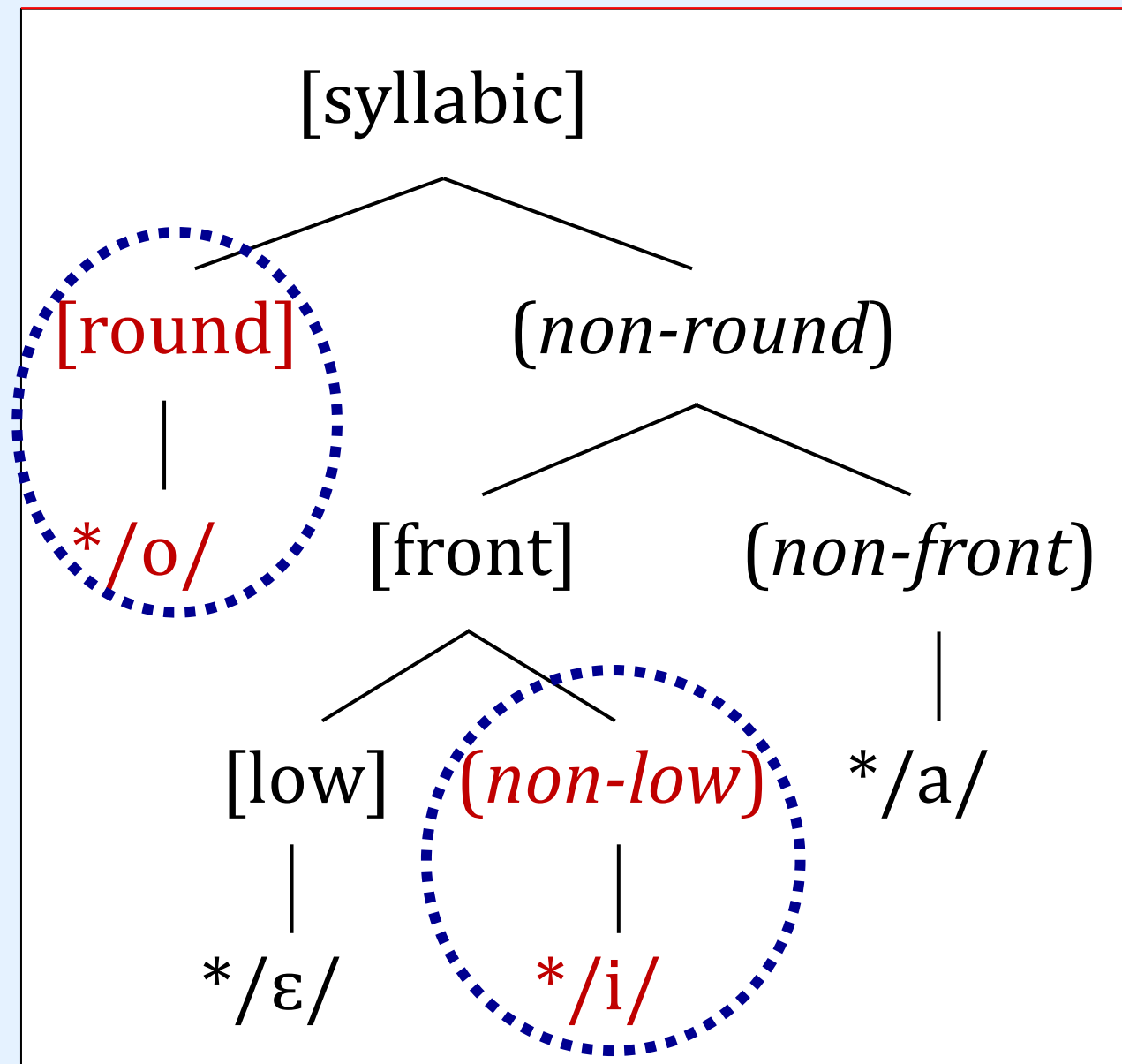


The high vowels begin to pattern together

But under the hierarchy inherited from PA, the high vowels are **not a natural class!**

Eastern and Western proto-languages

←
[round] > [front] > [high]

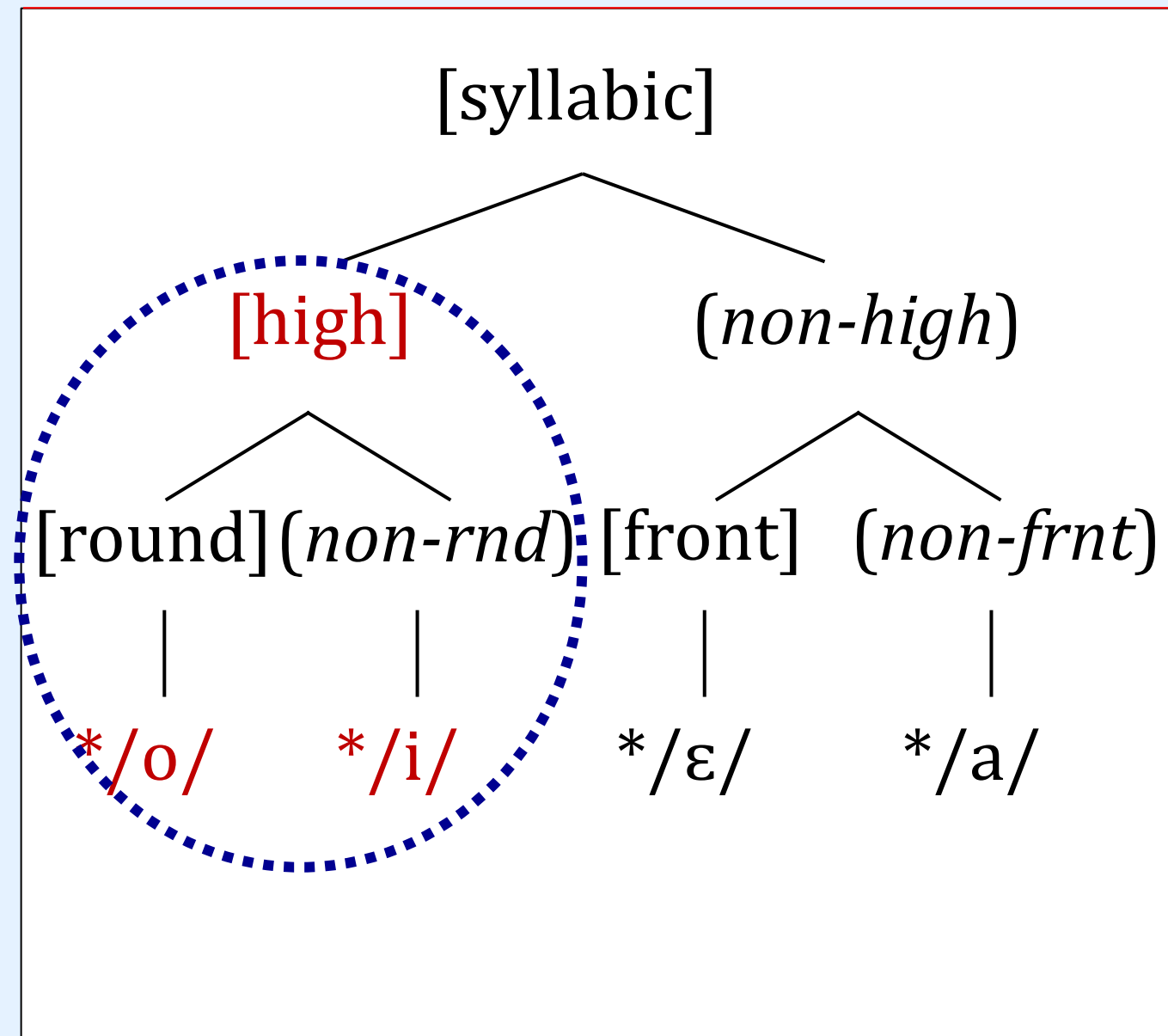


If the hierarchy constrains patterning, then the height contrast (reinterpreted as [high]) must have come to outrank place contrasts

That is, the feature [high] moves to the top of the hierarchy.

Eastern and Western proto-languages

[high] > [round] > [front]



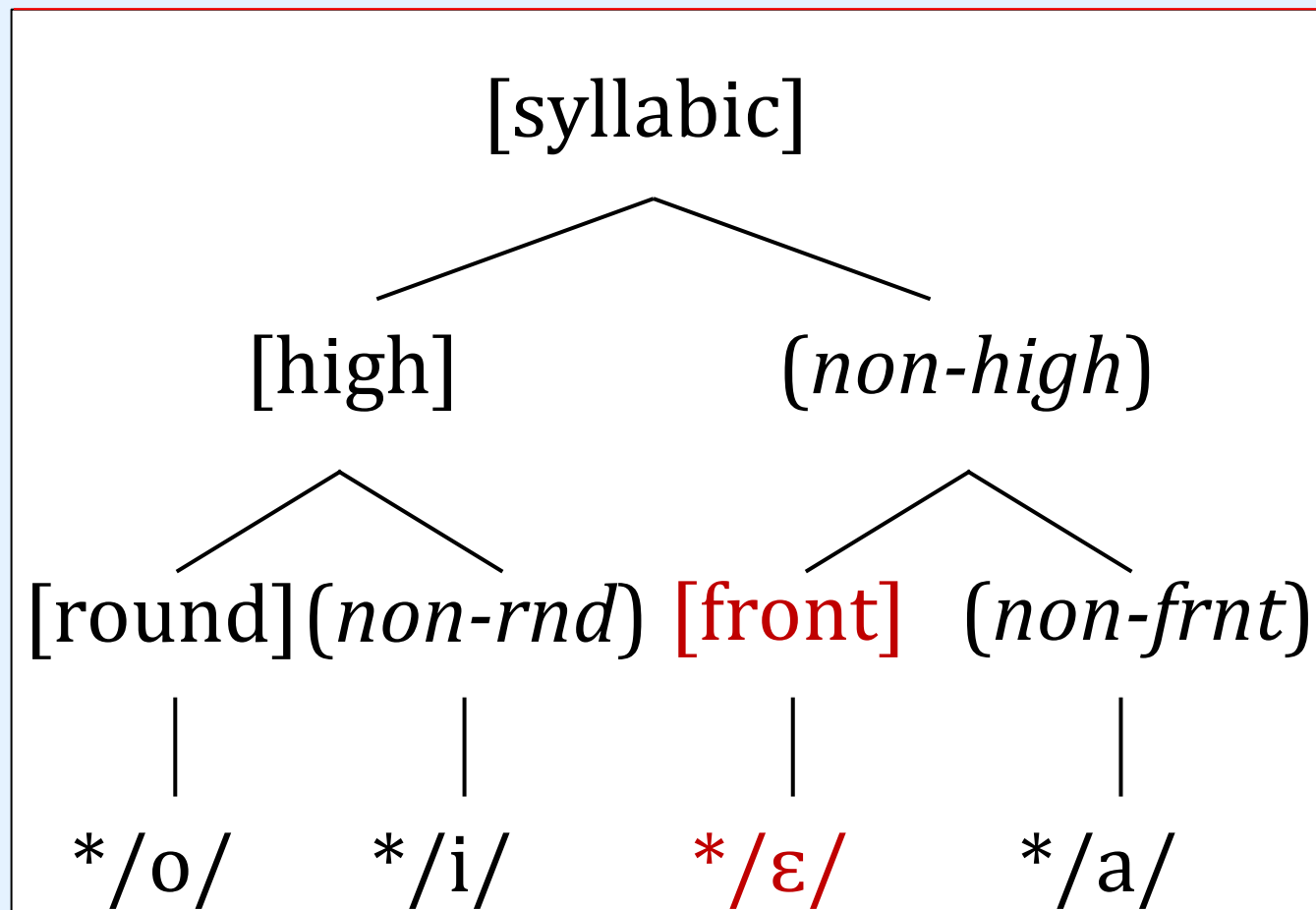
The result is a new Proto-Eastern Algonquian (PEA) hierarchy

Subsequent developments in the eastern and western daughter languages **follow the predictions of the new hierarchy.**

The patterns consistently differ from those of Central Algonquian:

Eastern and Western daughter languages

[high] > [round] > [front]

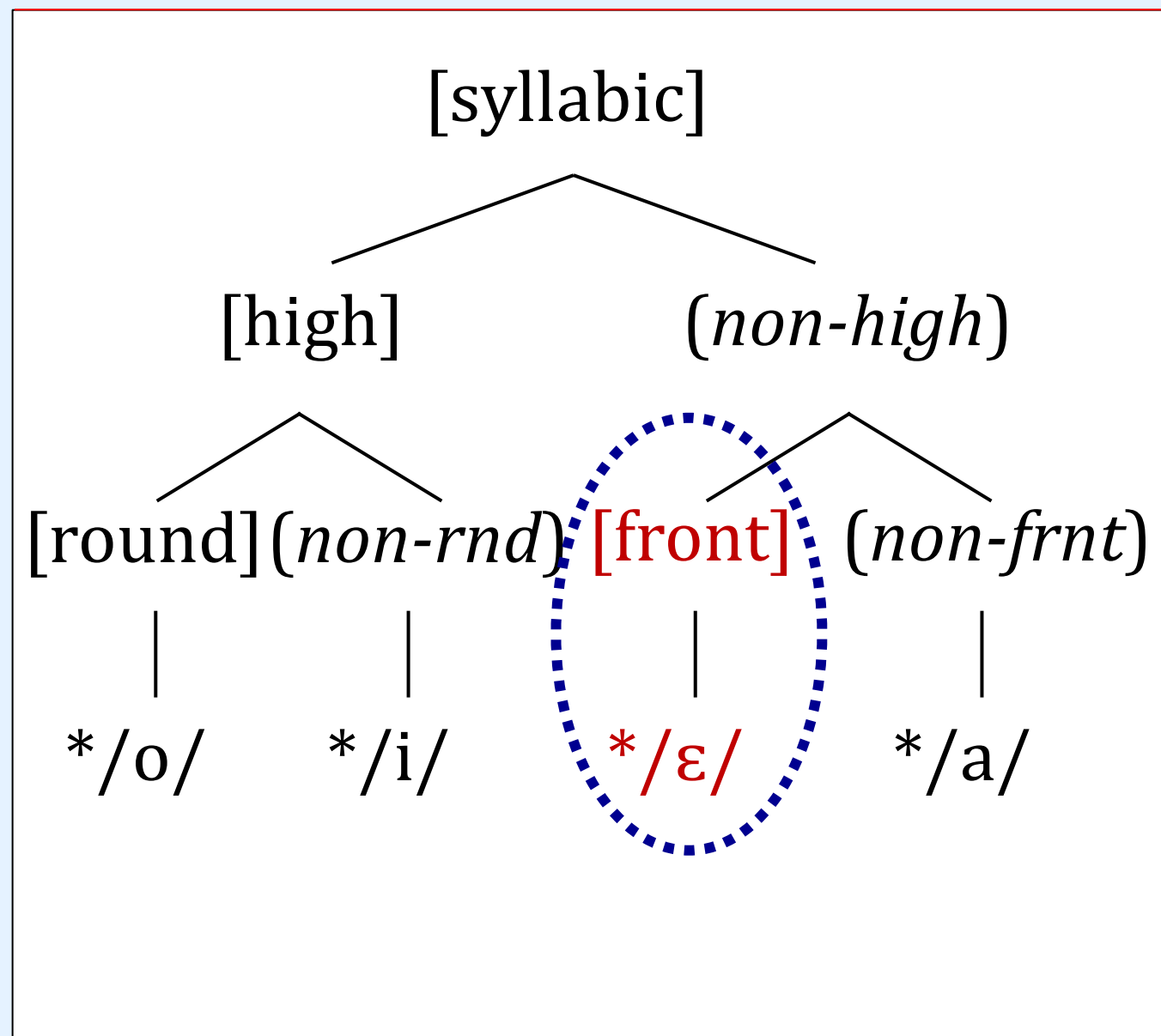


1. Palatalization is triggered by **/ε/* but excludes **/i/*

- **Massachusetts** **/k/*-palatalization is triggered by PEA **/ε:/* but not */i:/*
- **Cheyenne** “yodation”, where **/k/* > */kj/*, is triggered by **/ε(:)/* only

Eastern and Western daughter languages

[high] > [round] > [front]



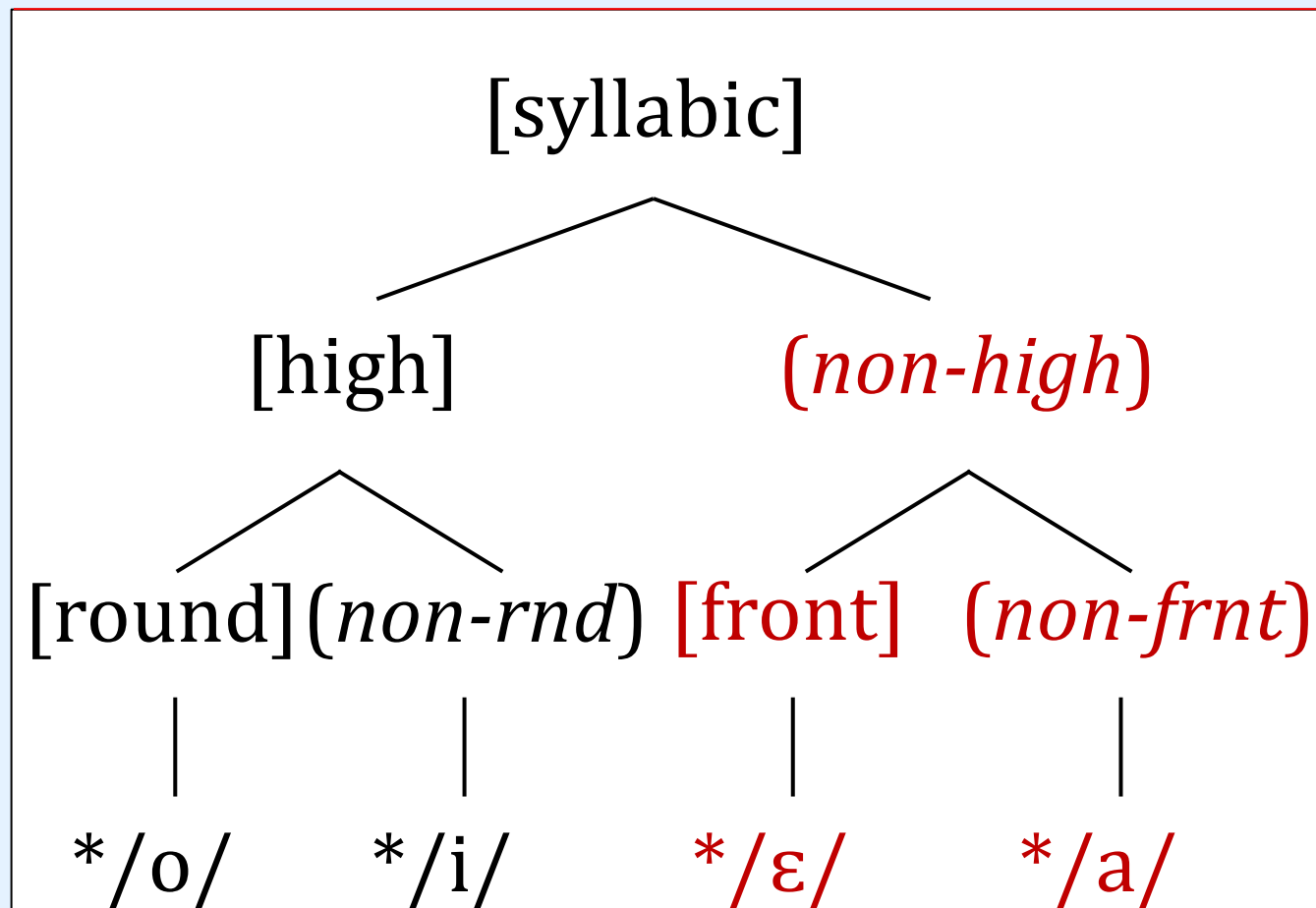
1. Palatalization is triggered by */ε/ but excludes */i/

Again, these patterns support the view that palatalization is triggered by a contrastive [front] feature.

Only /ε/ is contrastively [front] in these languages.

Eastern and Western daughter languages

[high] > [round] > [front]

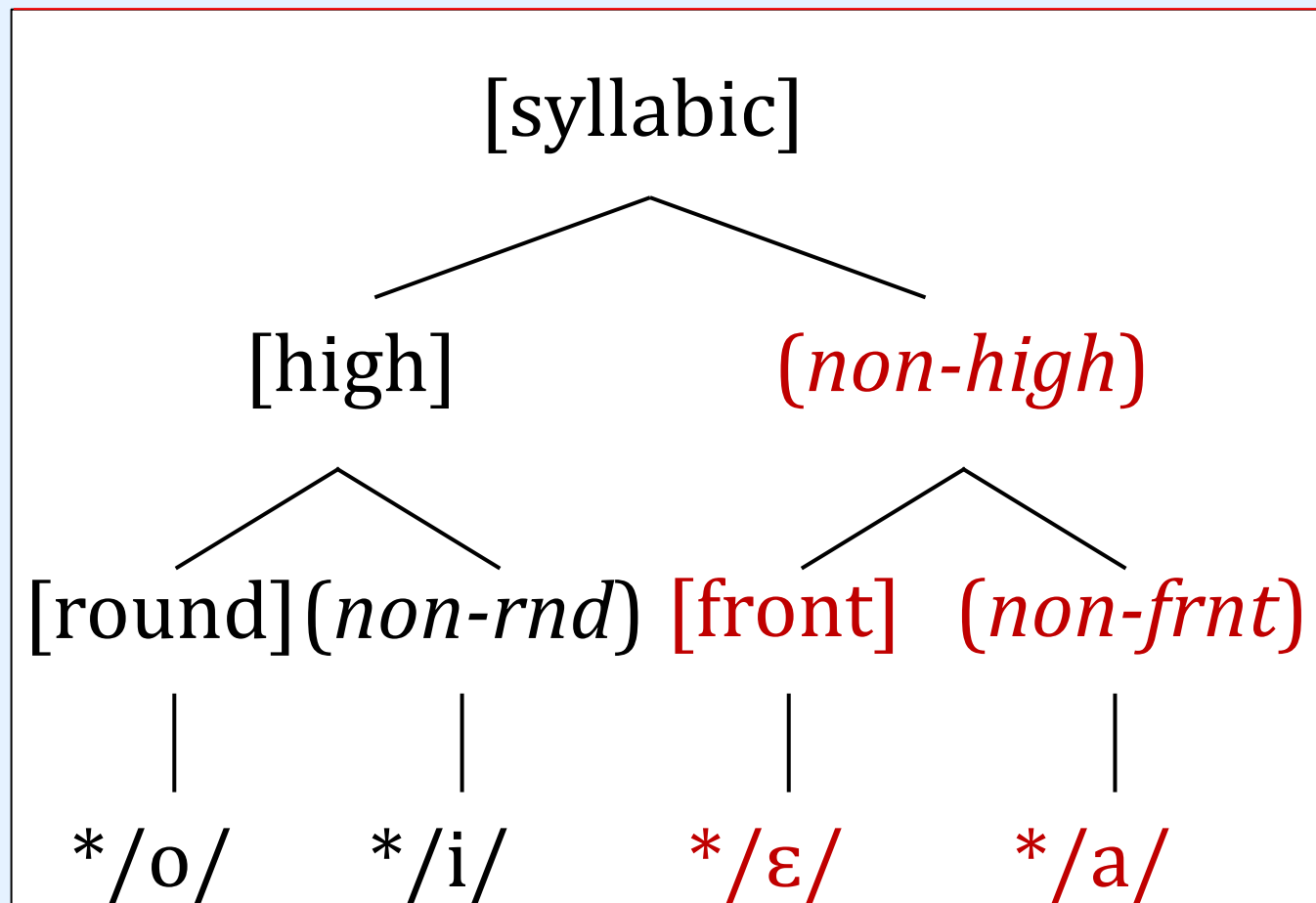


2. */ε/ merges with or shifts to */a/

- Partial or complete mergers of PA short */ε/ with */a/ occur in **Abenaki**, **Mahican**, **Mi'kmaq**, and **Maliseet-Passamaquoddy**
- PEA long */ε:/ shifts to /a:/ in **Massachusetts** and merges with */a/ in **Western Abenaki**

Eastern and Western daughter languages

[high] > [round] > [front]

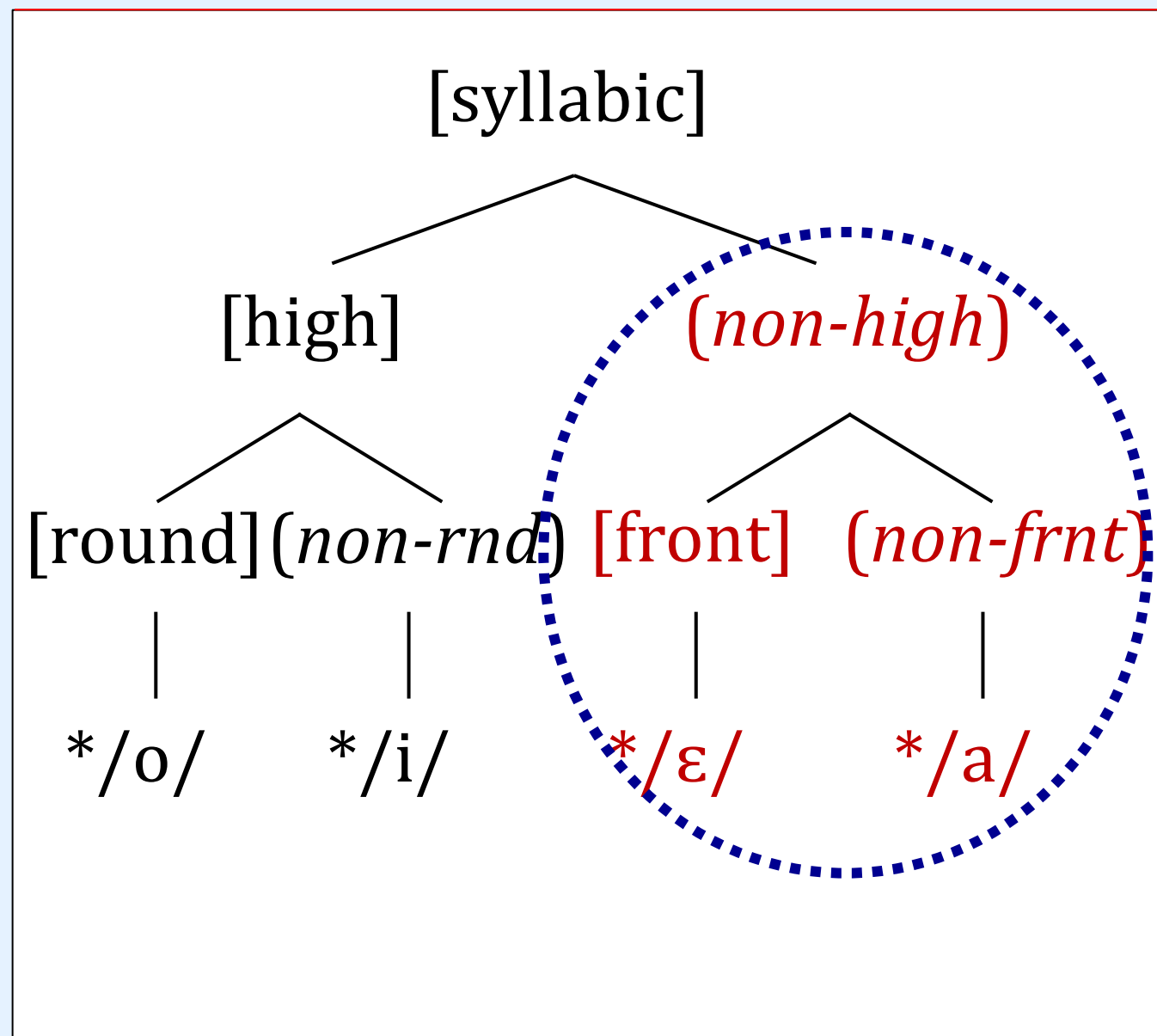


2. */ε/ merges with or shifts to */a/

- Long and short */ε(:)/ shift to /a(:)/ in Cheyenne
- Vowel harmony involves */ε(:)/ and */a(:)/ in Arapaho

Eastern and Western daughter languages

[high] > [round] > [front]



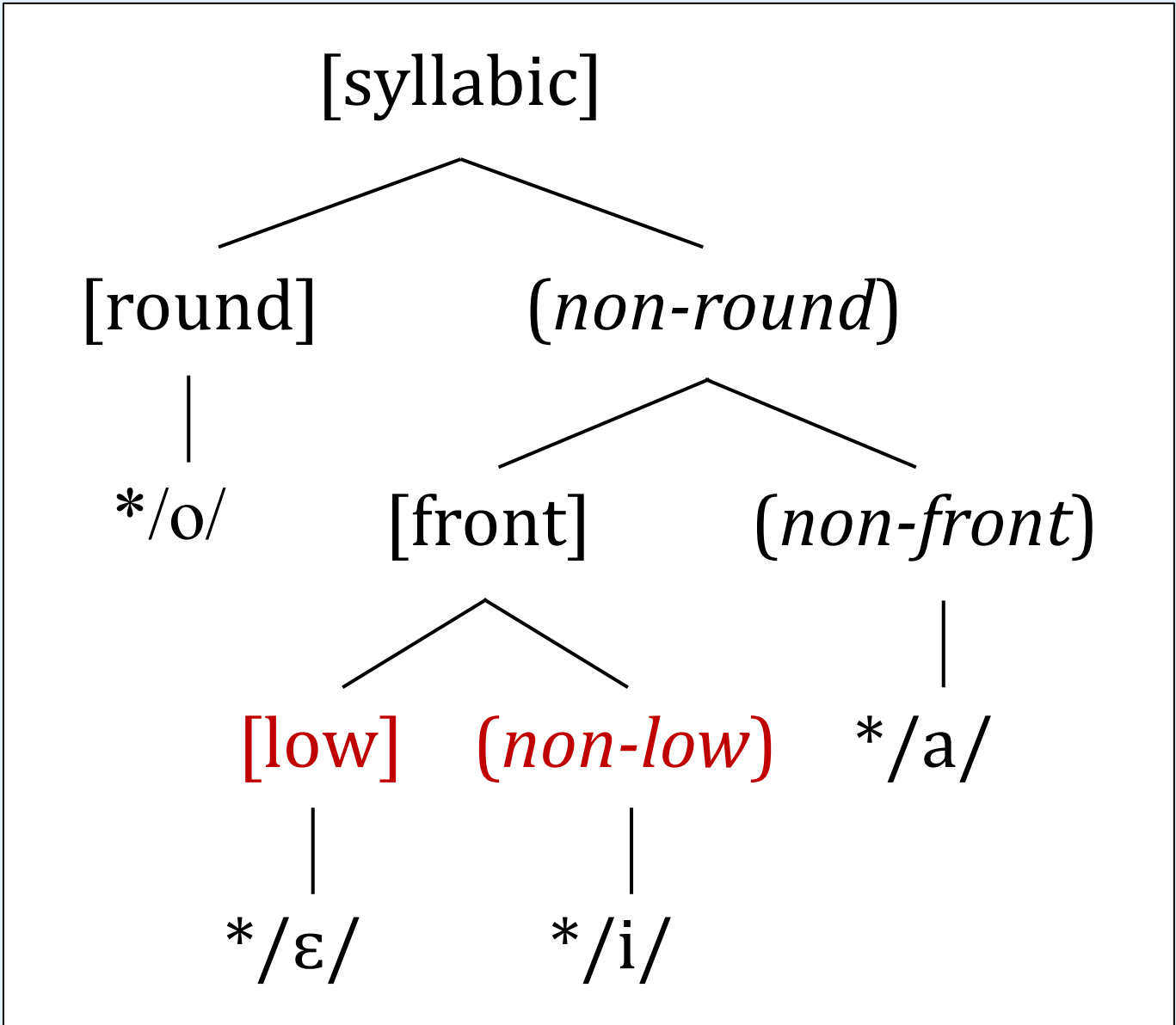
2. */ε/ merges with or shifts to */a/

This follows from the **sisterhood** of */ε/ and */a/ under the new hierarchy.

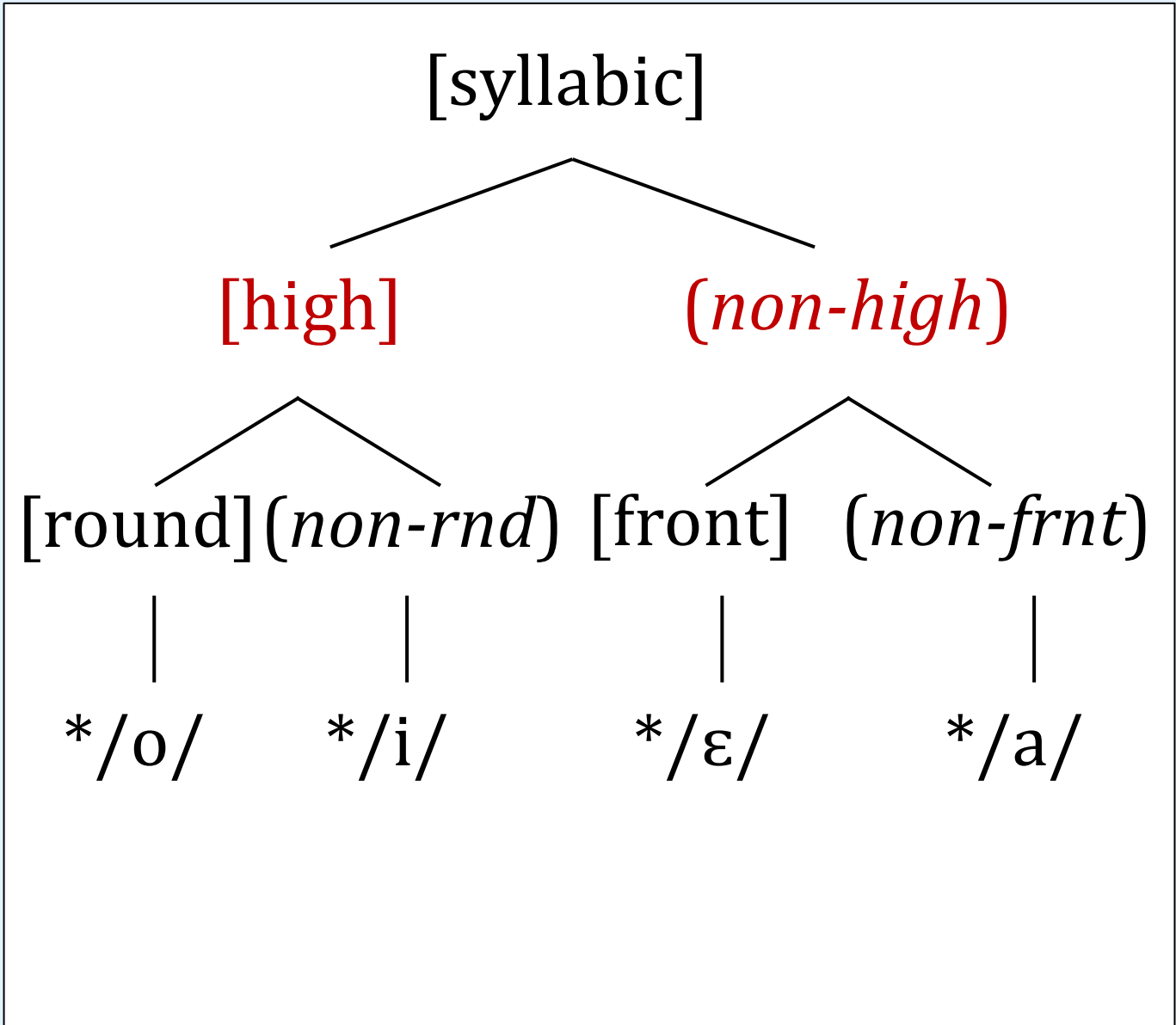
- Vowel harmony involves */ε(ː)/ and */a(ː)/ in **Arapaho**

A single contrast shift thus accounts for the patterning of a large number of phonological changes across the Algonquian family.

PA and Central languages



Eastern and Western languages



References and further reading

For further reading see Oxford (2015); Dresher, Harvey, & Oxford (2018) :

- Dresher, B. Elan, Christopher Harvey, & Will Oxford. 2018.
Contrastive feature hierarchies as a new lens on typology. In Larry Hyman & Frans Plank (eds.), *Phonological typology*, 273–311.
Berlin: de Gruyter Mouton.
- Oxford, Will. 2015. Patterns of contrast in phonological change:
Evidence from Algonquian vowel systems. *Language* 91: 309–57.

Eastern Generative Grammar (EGG)

Thursday 29 July 2021



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2. From the Middle Chinese Tone System to Modern Chinese

Deriving features from activity

Krekoski (2017) constructs contrastive trees for the tone systems of a number of languages that descend from Middle Chinese.

He bases the trees not on the phonetics of the tones, but on the patterns of activity they display in the form of tone sandhi.

Thus, Beijing Mandarin has the 4 tones shown, which participate in 2 robust sandhi rules:

Beijing Mandarin tones

/55/	high level
/35/	rising
/214/	low concave
/51/	high falling

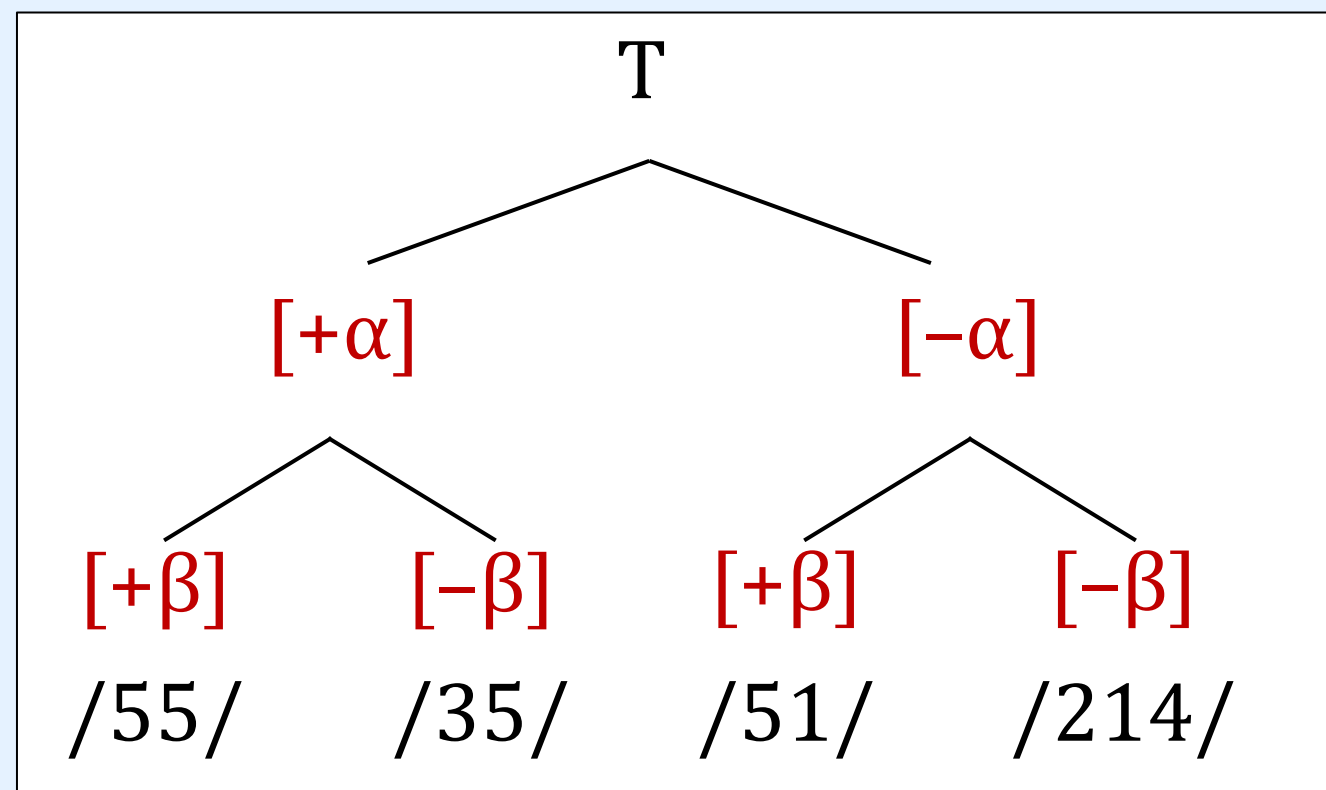
Beijing Mandarin tone sandhi

/214/	→	35/	_____	/214/
/35/	→	55/	{/35/, /55/}	_____T
(T = any tone)				

Beijing Mandarin contrastive hierarchy

Krekoski (2017) assumes that, where possible, tones related by a sandhi rule differ minimally, that is by only one feature.

Thus, tone /35/ differs by 1 feature from /214/ and from /55/. Below is a tree satisfying these constraints:



[α], [β] are placeholders for features which will be given a phonetic interpretation.

Beijing Mandarin tone sandhi

/214/ → 35/_____/214/

/35/ → 55/{/35/, /55/}____T

(T = any tone)

Pingyao (Jin) tone system

Pingyao is a Jin language with 4 underlying tones. Though two of them have merged at the surface, they can be distinguished by the way they participate in tonal alternations (Chen 2000).

Krekoski identifies 9 tone sandhi rules in Pingyao. Their inputs and outputs are summarized below. I omit alternations that are purely allotonic.

Pingyao tones

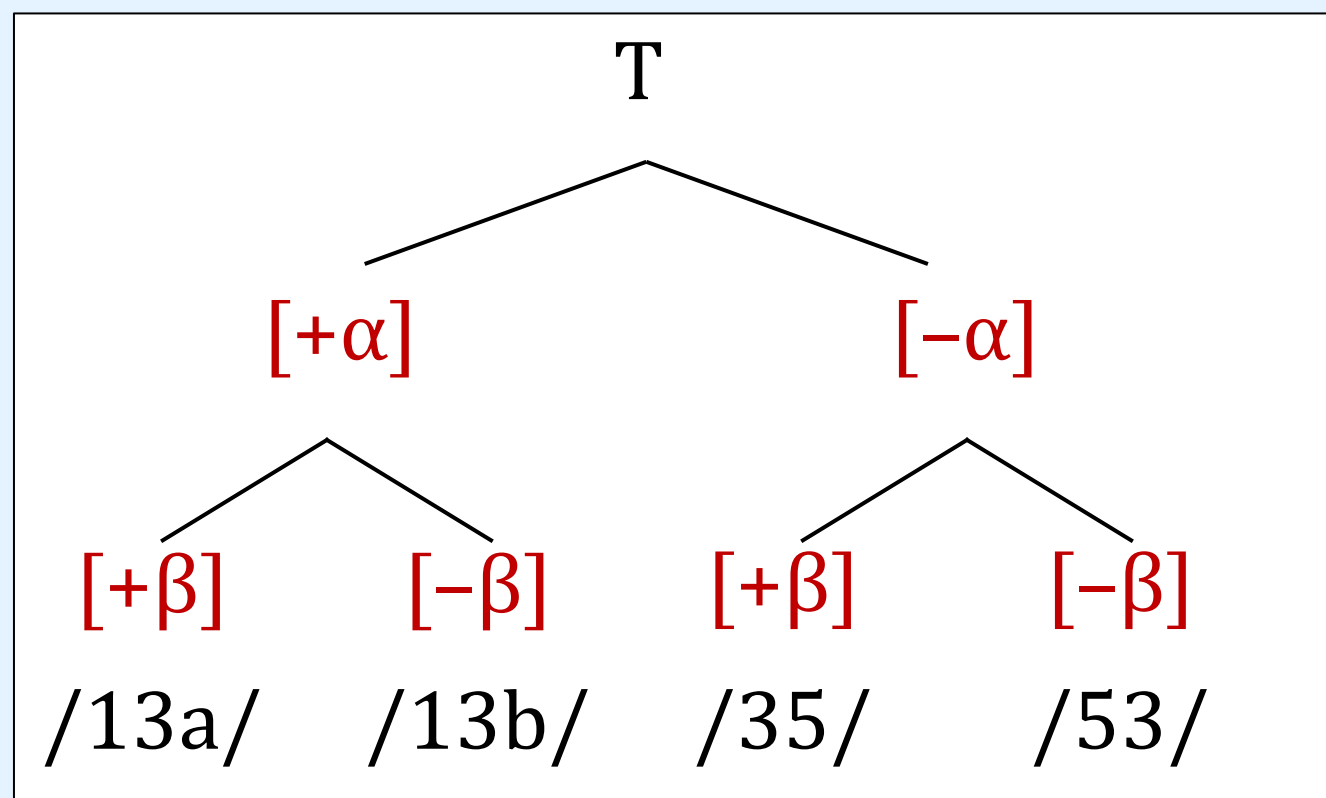
/13a/	low rising
/13b/	low rising
/53/	high falling
/35/	high rising

Pingyao tone sandhi

Input	Outputs
/13a/	35
/35/	13 [= 13a], 53
/53/	35, 13 [= 13b]

Pingyao (Jin) contrastive hierarchy

Following the same procedure as for Beijing, Krekoski arrives at a tree for Pingyao whereby each of the tonal alternations involves a change of only 1 feature.



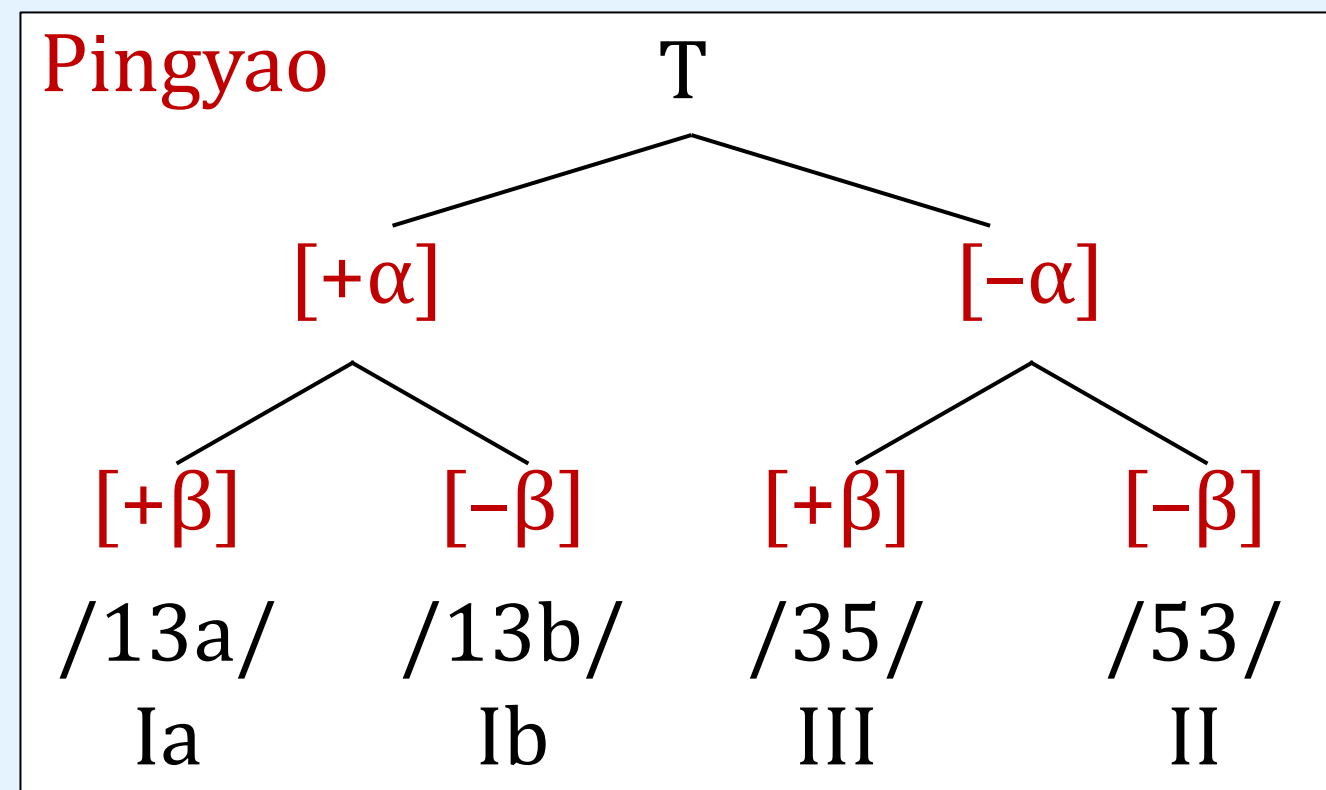
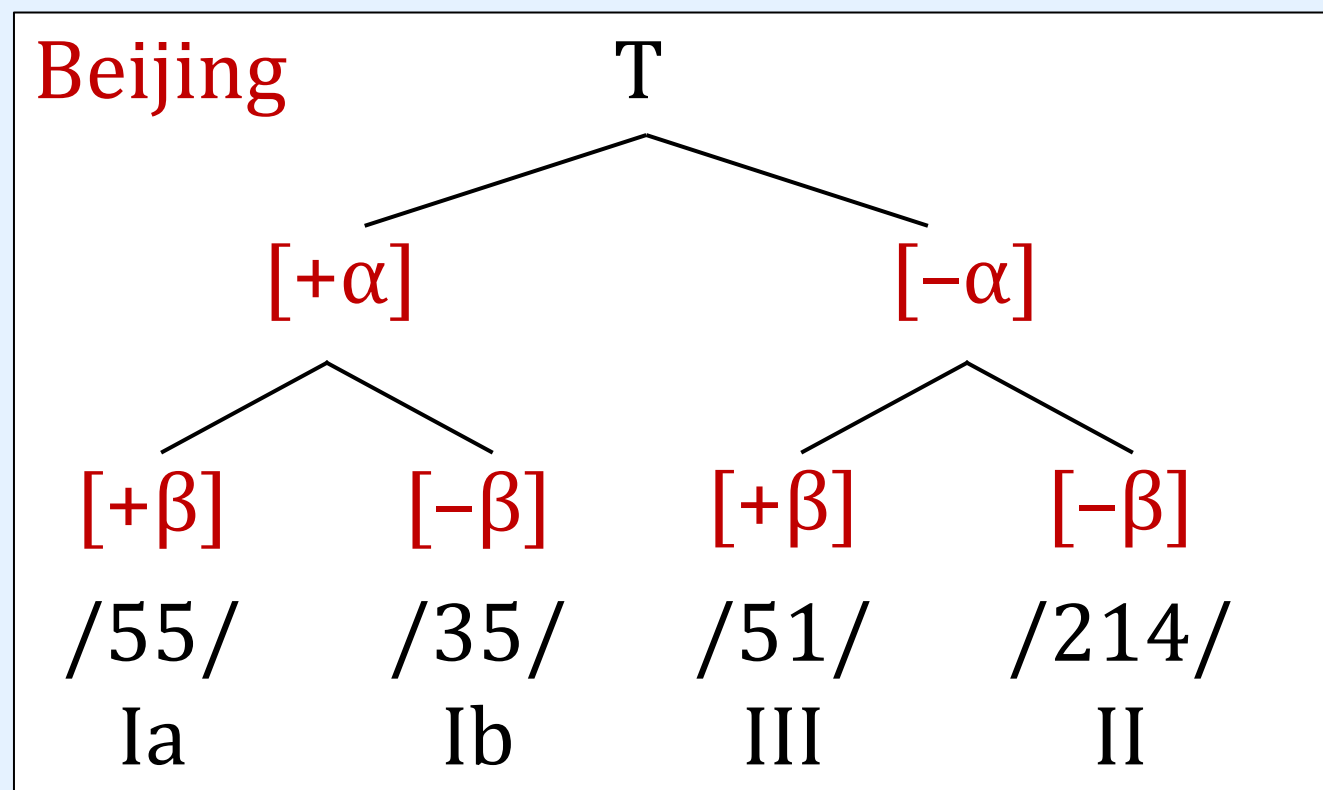
Pingyao tone sandhi

Input	Outputs
/13a/	35
/35/	13 [= 13a], 53
/53/	35, 13 [= 13b]

Beijing and Pingyao cognate tones

Krekoski observes that Beijing and Pingyao tones in corresponding positions are cognates and descend from the same Middle Chinese tone (labelled Ia, Ib, II, III).

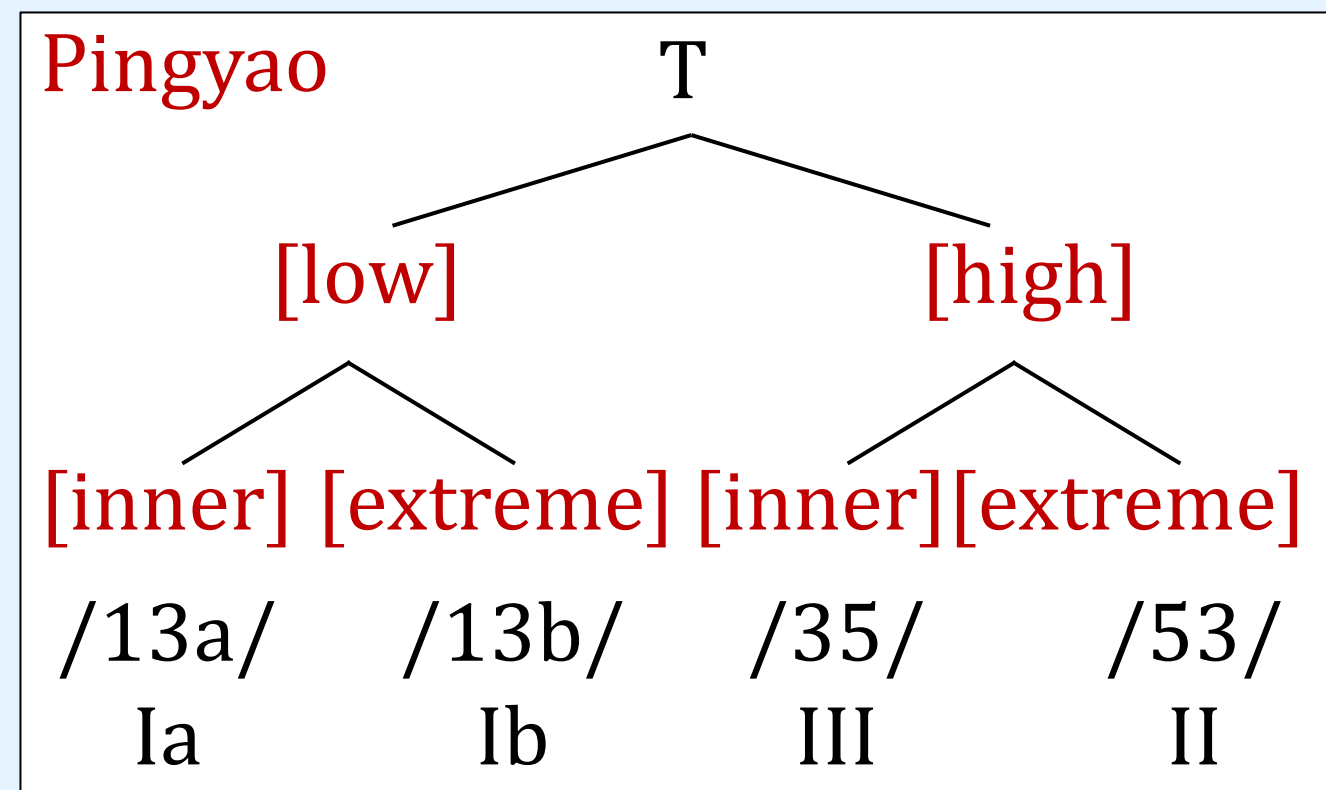
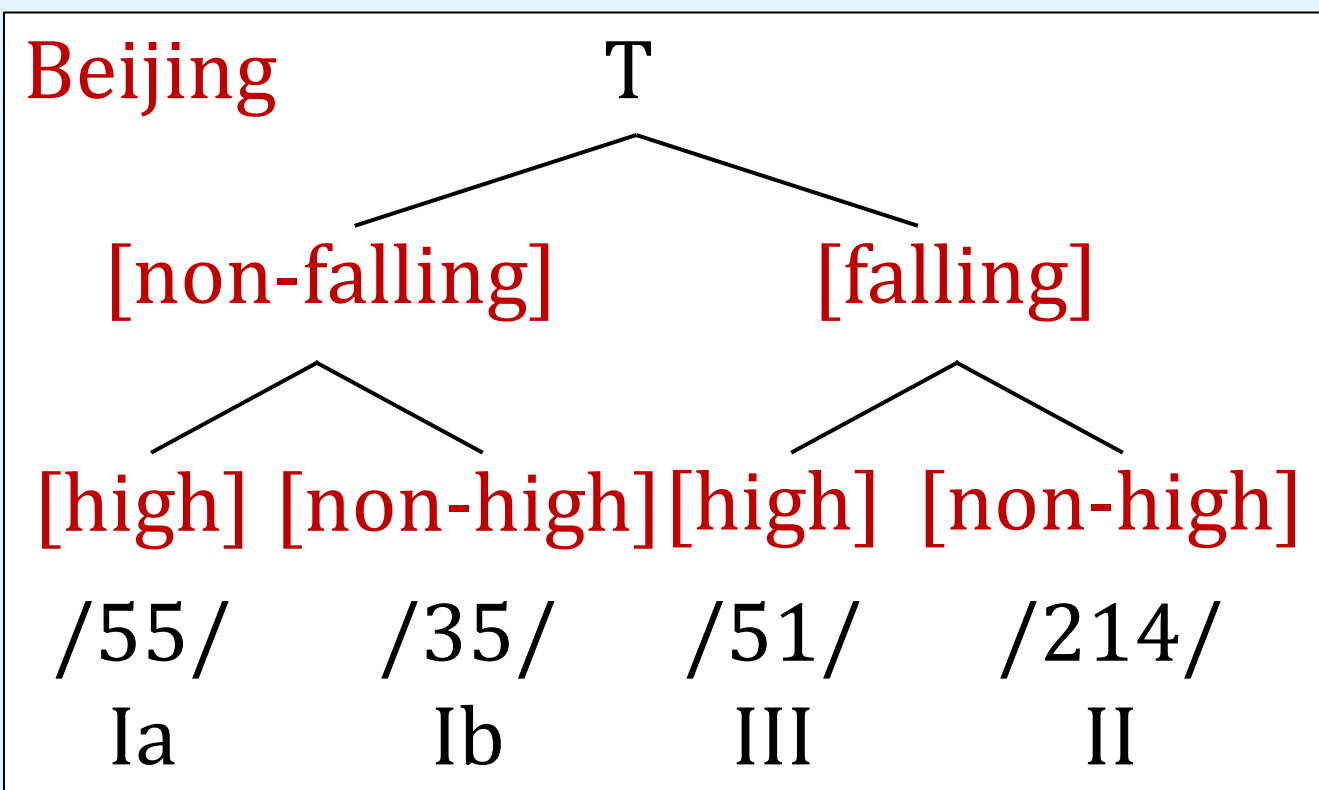
That is, despite extensive changes in their phonetics, the tones retain the same positions in the contrastive hierarchy.



Beijing and Pingyao tone features

Up to here we have not tried to give the features phonetic interpretations; however, features are not purely abstract entities.

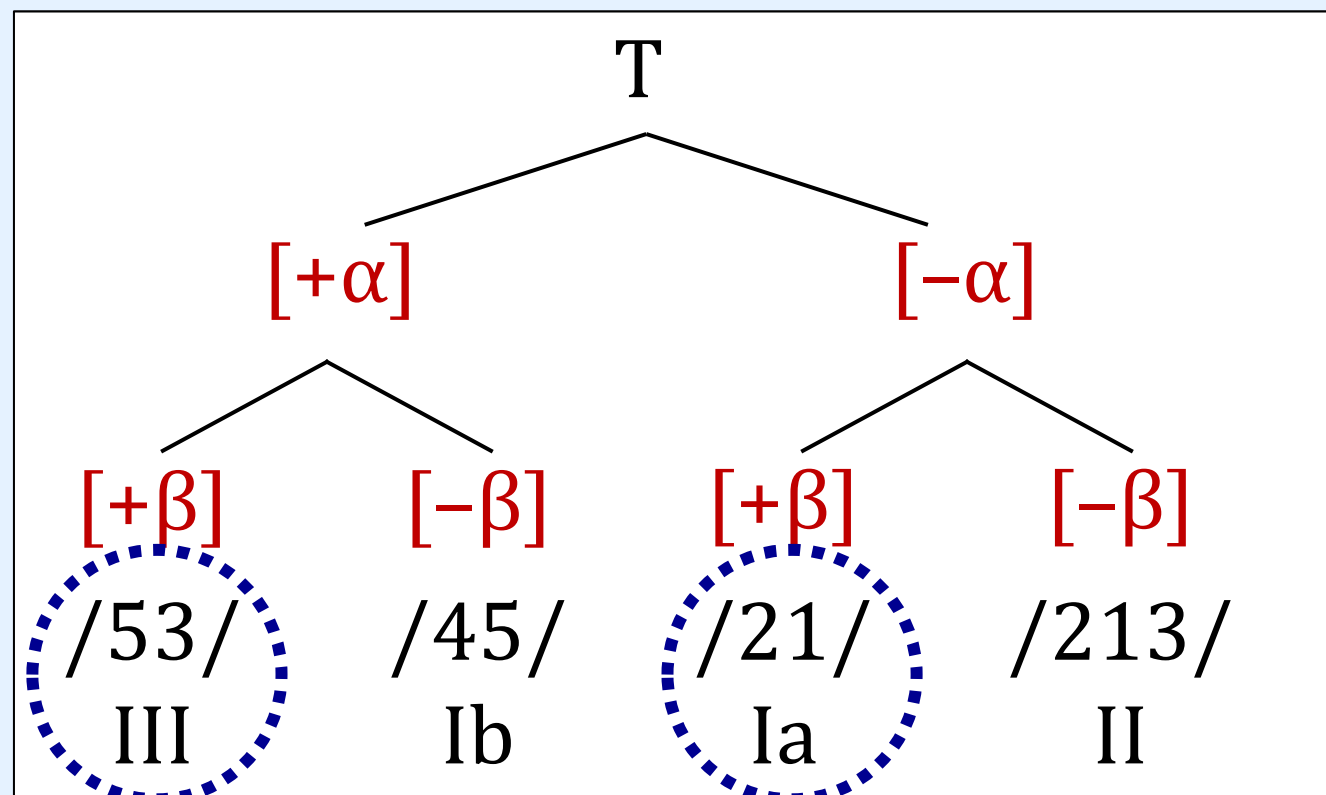
Krekoski (2017) suggests correlates for the features; I do not attempt to assign markedness. [extreme] refers to the periphery of a tonal space, [inner] to a more central region of the space.



Substance strikes back: Tianjin Mandarin

Following the same methodology, Krekoski posits the tree below for Tianjin Mandarin.

Surprisingly, these tones do **not** correspond as expected with their cognates in Beijing and Pingyao.

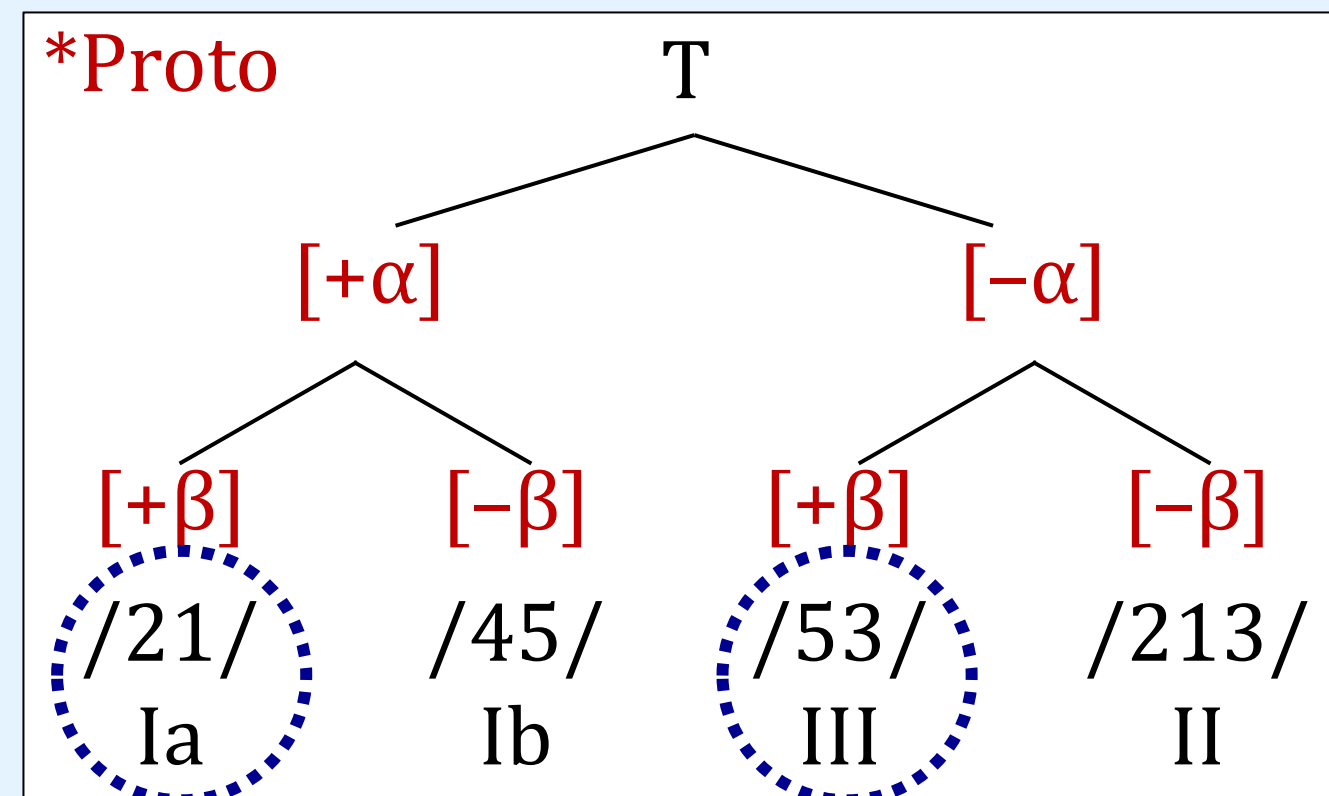
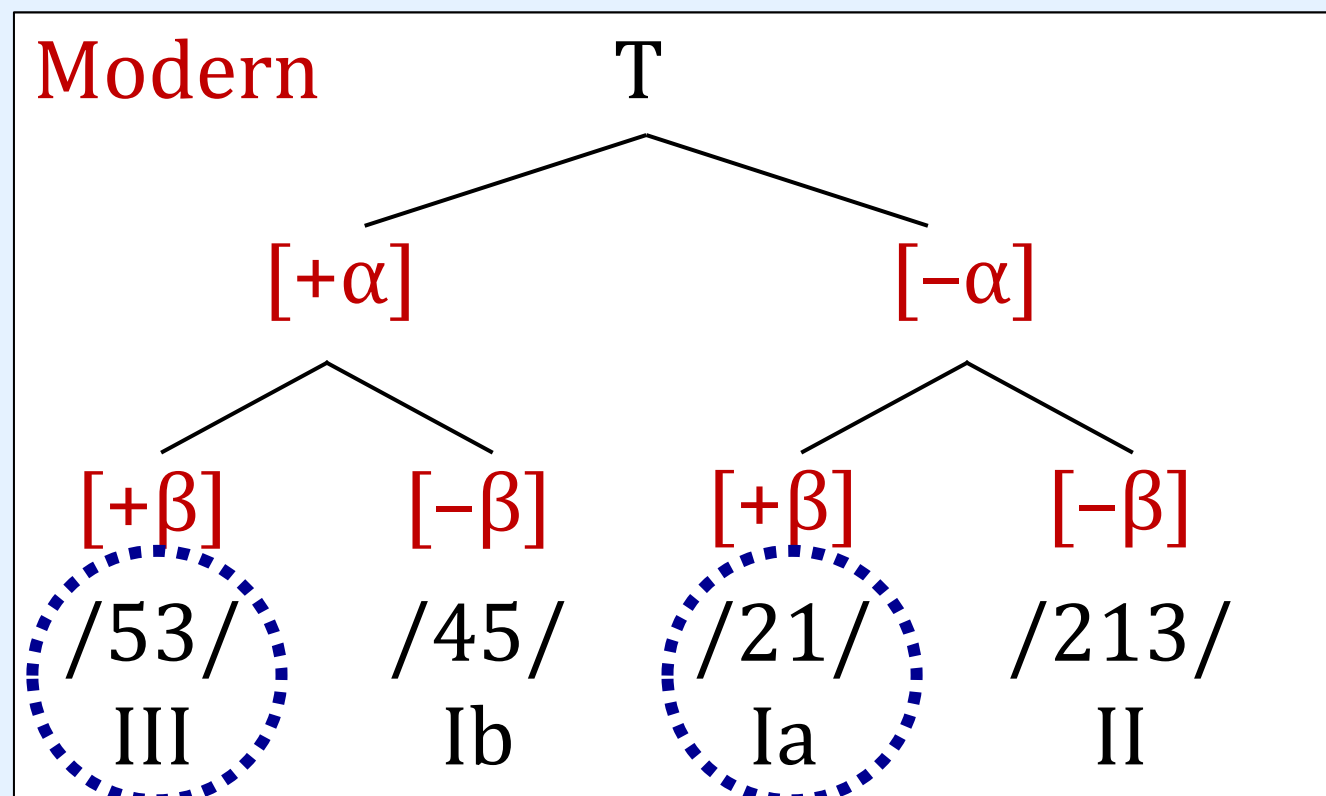


Tones /21/ and /53/ are in the ‘wrong place’ relative to the other dialects that descend from Middle Chinese.

Substance strikes back: Tianjin Mandarin

Tracing the tones from Middle Chinese, Krekoski proposes that an earlier stage of Tianjin (*Proto-Tianjin) must have had the hierarchy on the right.

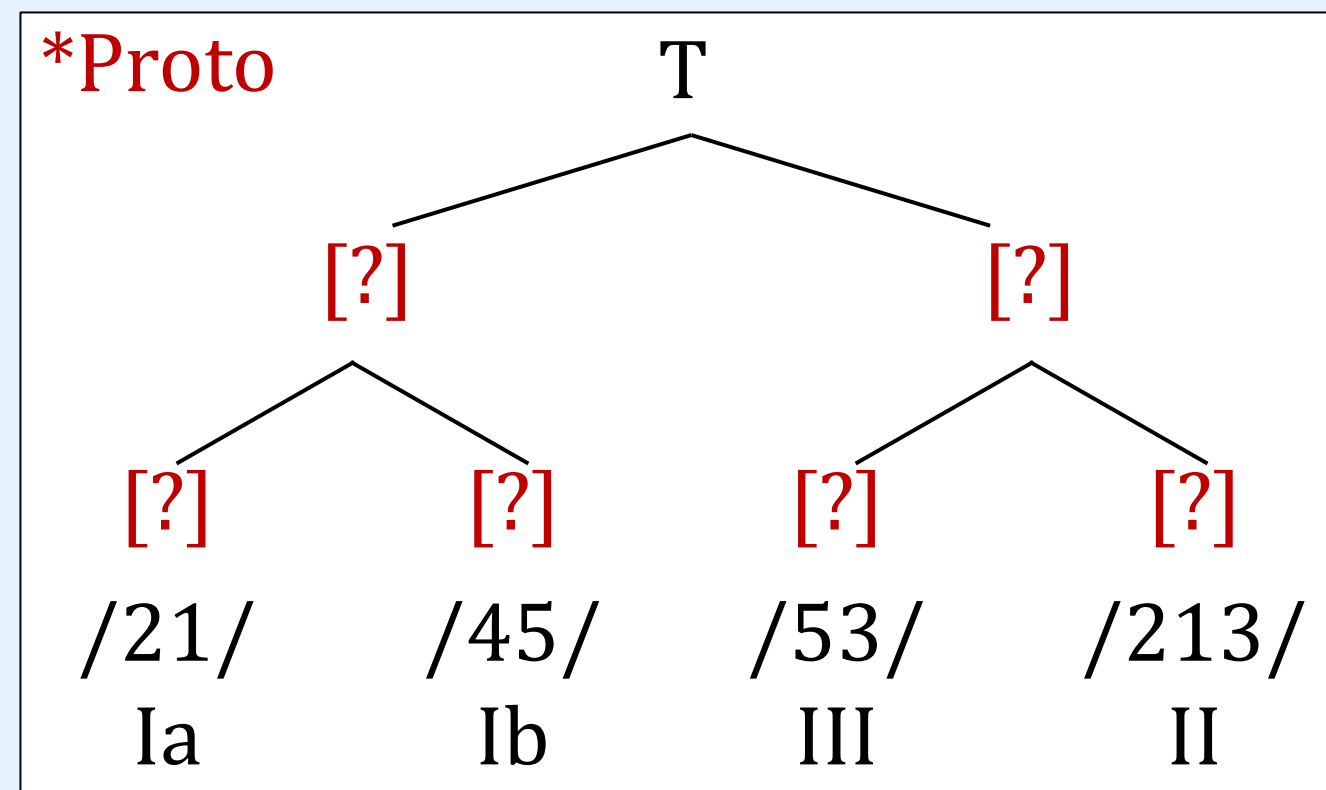
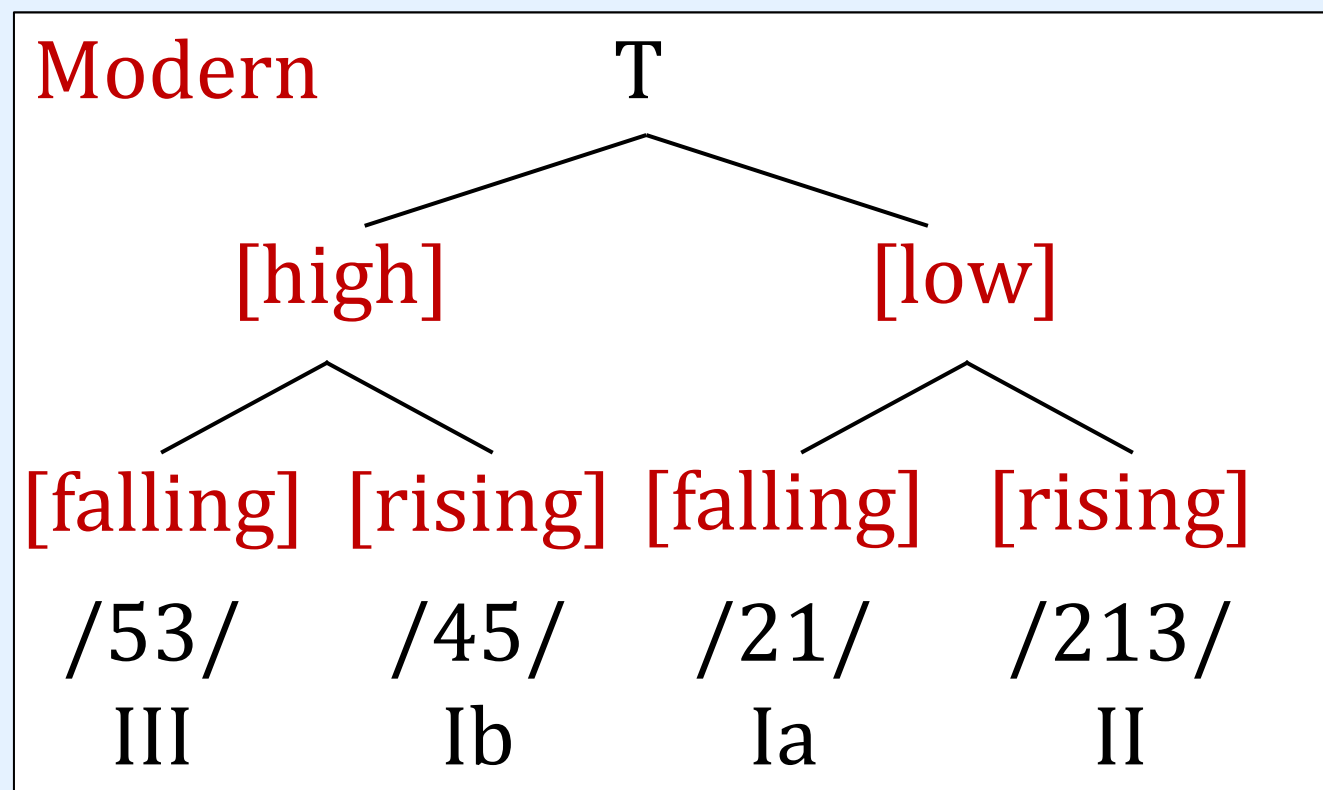
Why did a contrastive shift occur in the history of Tianjin? An answer can be found in the phonetics of the tones.



Substance strikes back: Tianjin Mandarin

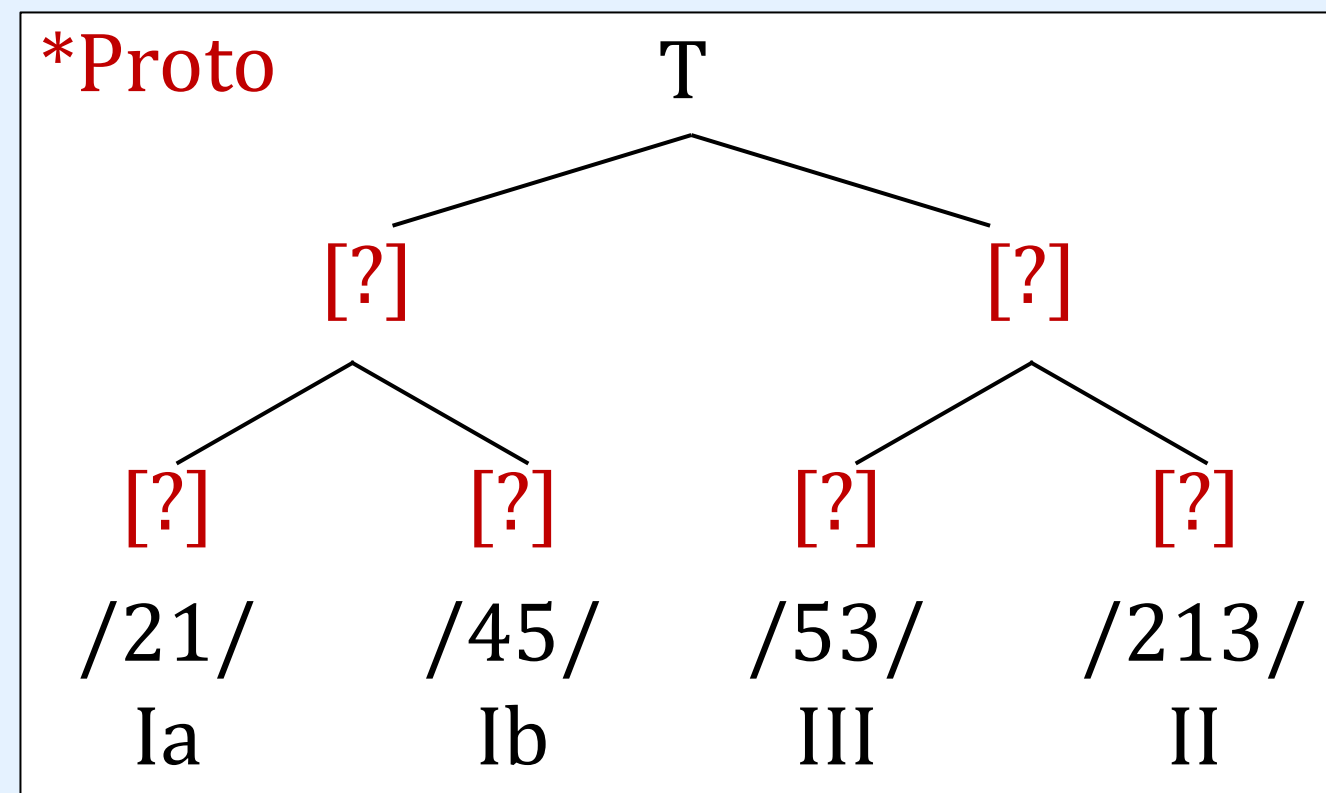
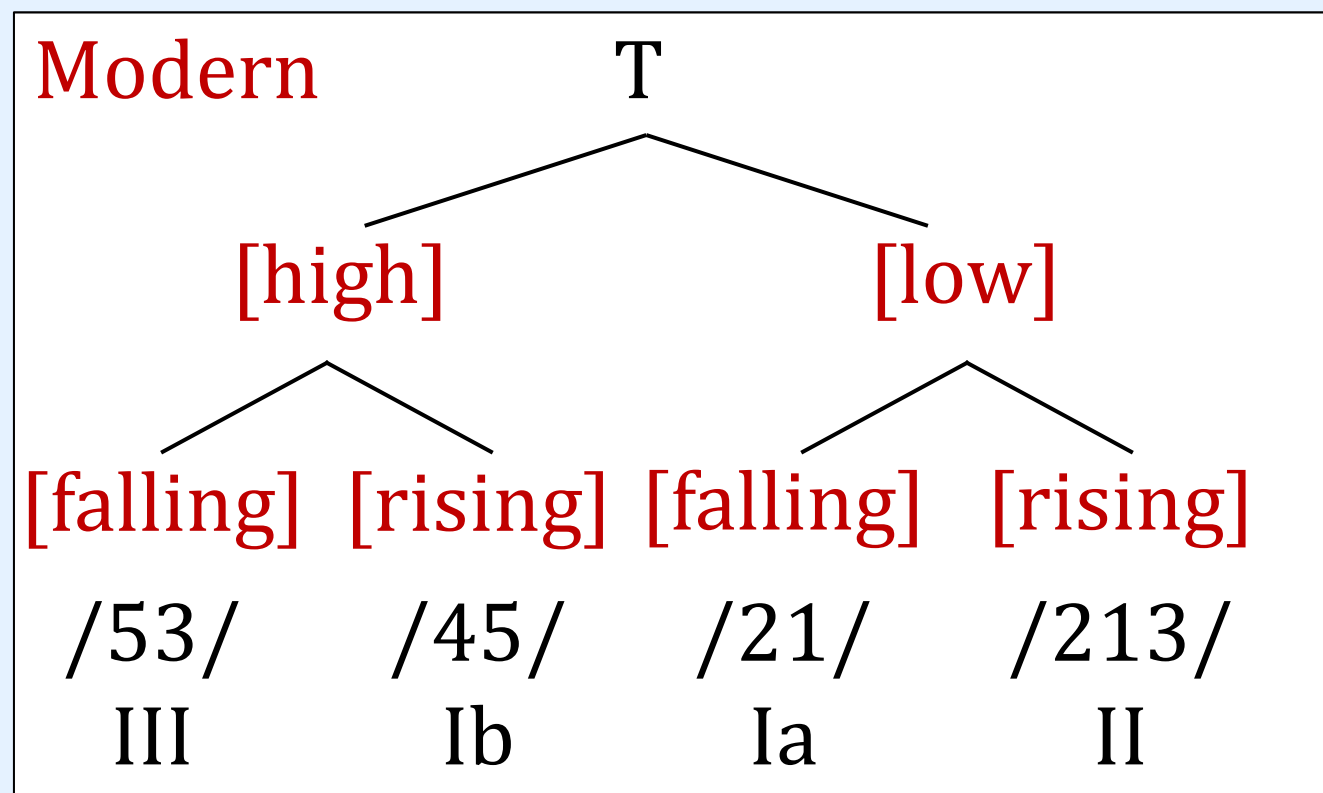
Krekoski observes that it is difficult to find plausible phonetic correlates for the features in *Proto-Tianjin; whereas the Modern system clearly groups the tones by height.

He proposes that:



Substance strikes back: Tianjin Mandarin

“Tonal drift likely accreted changes in height values until the system of contrasts reached some critical inflection point which precipitated the reanalysis of specifications.”



Substance strikes back: Tianjin Mandarin

What this example illustrates is that features may be suggested by patterns of phonological activity, but that phonetic substance has a say also.

Contrastive trees for tonal features can remain stable even as the phonetic realizations of the tones change; but the feature tree is restructured when it gets too out of sync with the phonetics.

Without such a mechanism, we would expect a much greater proliferation of ‘crazy rules’ than we actually find.

The hierarchy influences substance

While phonetic substance influences the contrastive feature hierarchy, the influence is not all in this direction.

I proposed the other day that the contrastive hierarchy serves as an organizing principle for synchronic phonology, and influences the direction of diachronic changes, such as mergers.

The conclusion is that influence runs in **both** directions.

References and further reading

For further reading see Krekoski (2017); Dresher (2014) :

Dresher, B. Elan. 2014. The arch not the stones: Universal feature theory without universal features. *Nordlyd* 41.2: 165–181.
University of Tromsø — The Arctic University of Norway.

Krekoski, Ross. 2017. Contrast and complexity in Chinese tonal systems. Doctoral dissertation, University of Toronto.

Eastern Generative Grammar (EGG)

Thursday 29 July 2021



Department of Linguistics
UNIVERSITY of TORONTO

3. From Proto-Eskimo to Inuit and Yupik: 'Strong' and 'Weak' *i*

Proto-Eskimo vowel system

The next example shows how features and markedness are related to the inventory it is part of: a larger inventory supports more features than a smaller one.

Compton & Dresher (2011) argue that Inuit dialects, which vary between four- and three-vowel systems, support the hypothesis that activity is tied to contrast.

Proto-Eskimo (Inuit and Yupik)

/i/

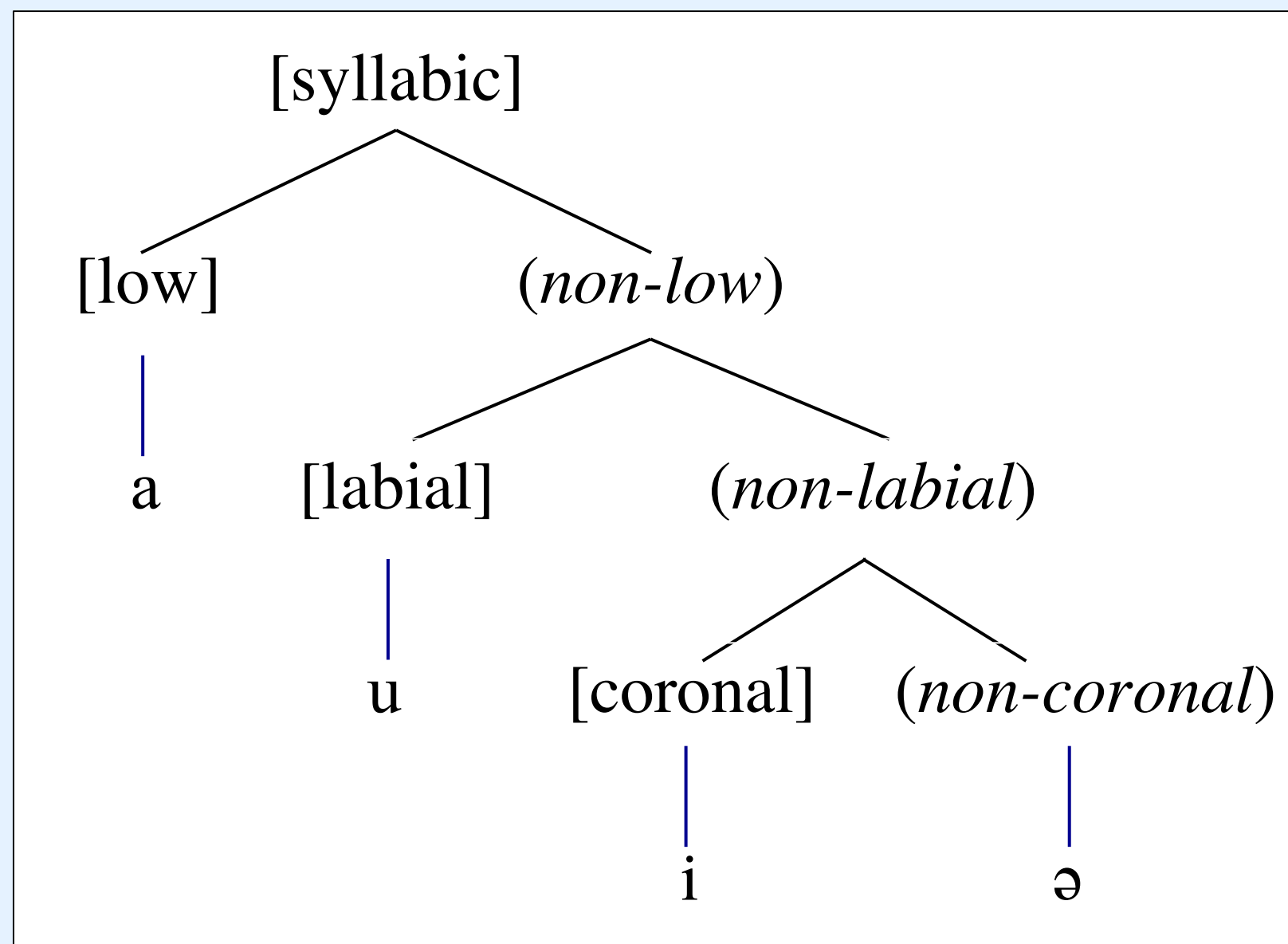
/u/

/ə/

/a/

Proto-Eskimo is commonly reconstructed to have the vowels */i, u, a/ and a fourth vowel assumed to be some sort of central vowel which we write schwa */ə/, following Fortescue, Jacobson, & Kaplan's *Comparative Eskimo dictionary* (1994).

Inuit-Yupik contrastive hierarchy (Compton and Dresher 2011)



[low] > [labial] > [coronal]

Compton & Dresher (2011) propose the contrastive hierarchy:

[low] > [labial] > [coronal].

Four-vowel Inuit dialects

Evidence for this type of representation for /ə/ comes from Yupik, which retains the four-vowel system.

Though present in the inventory, schwa does not have the same status as the other vowels.

According to Kaplan (1990:147), it ‘cannot occur long or in a cluster with another vowel’; instead, it undergoes dissimilation or assimilation when adjacent to full vowels.

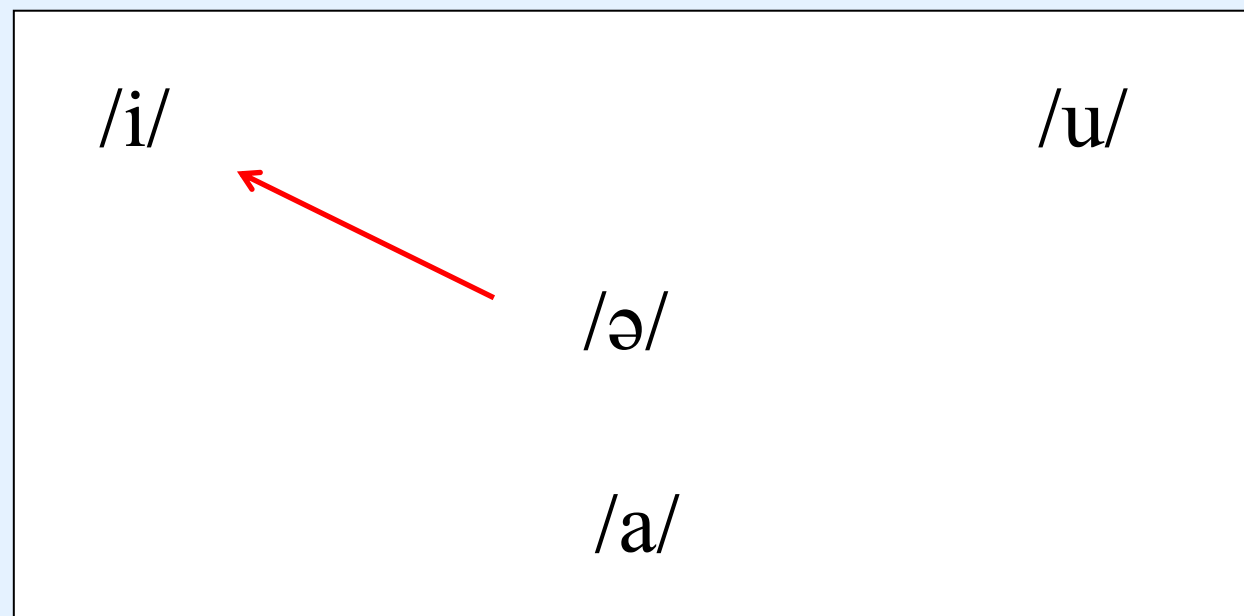
/i/	/u/	/a/	/ə/	
[coronal]	[labial]	[low]	[]	

Four-vowel Inuit dialects

In other dialects underlying /ə/ has merged with /i/ at the surface, but it can be distinguished from underlying /i/ by its distinct patterning.

In the literature this vowel is known as ‘weak *i*’, as opposed to the ‘strong *i*’ that descends from Proto-Eskimo *i.

In Barrow Inupiaq (Kaplan 1981: 119), weak *i* changes to [a] before another vowel, but strong *i* does not.



Four-vowel Inuit dialects

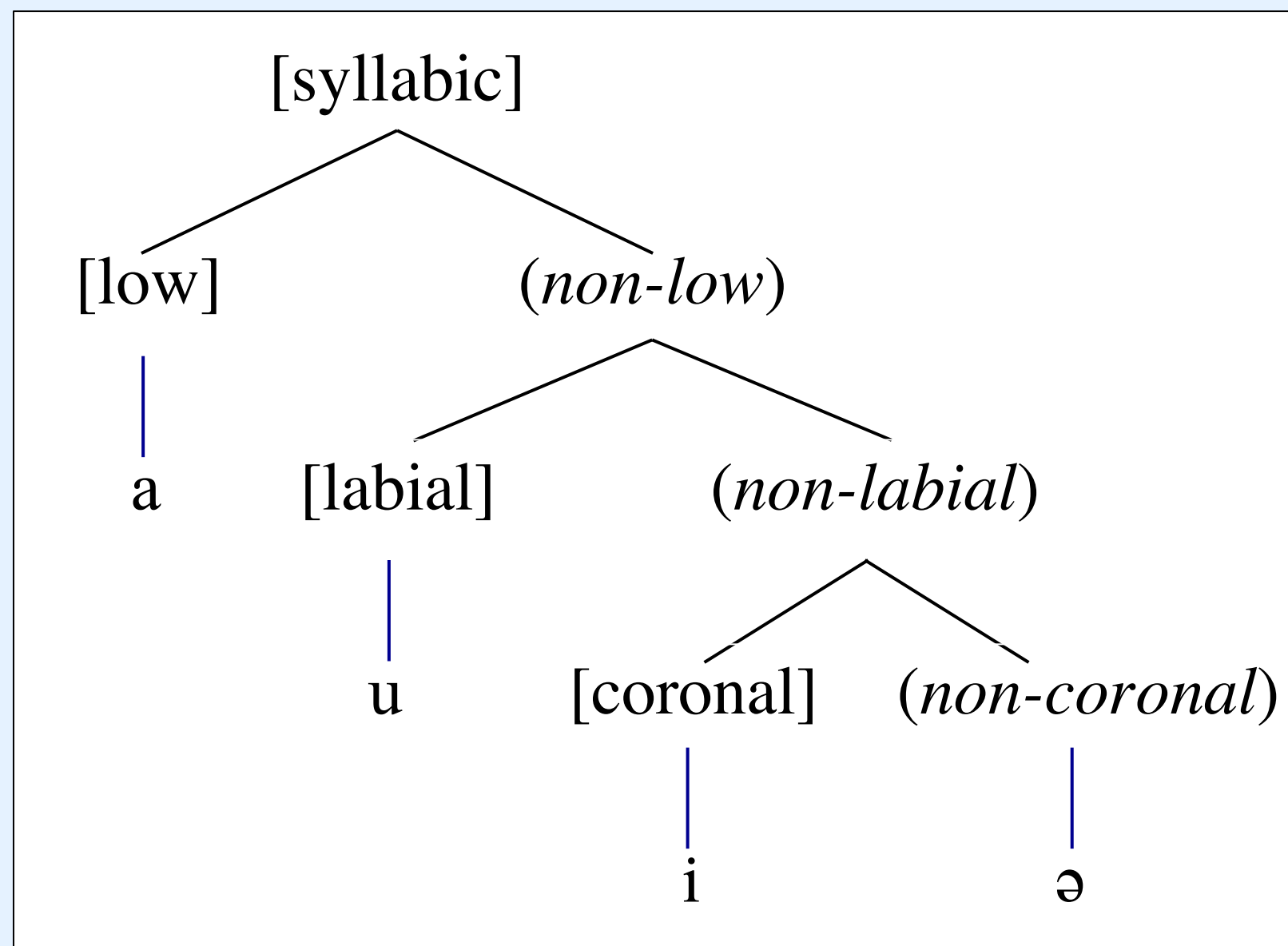
Original */i/ could cause palatalization of consonants, and some Inuit dialects show palatalization (or traces of former palatalization) (Dorais 2003: 33).

In the word ‘foot’ in the North Baffin dialect, *i* (from P-E **i*) causes a following *t* to change to *s*. This assibilation is the most common manifestation of palatalization in Inuit dialects.

Compare the retention of [t] after weak *i* (from P-E **ə*) in ‘palm of hand’.

	Proto-Eskimo		North Baffin	
Strong <i>i</i>	* <i>itə</i> γaᵛ	>	<i>isi</i> yak	‘foot’
Weak <i>i</i>	* <i>ətə</i> may	>	<i>iti</i> mak	‘palm of hand’

Inuit-Yupik contrastive hierarchy (Compton and Dresher 2011)



[low] > [labial] > [coronal]

These examples support attributing a feature to /i/ that can cause palatalization; Compton & Dresher (2011) call it [coronal].

They argue that [low] and [labial] are also phonologically active (participate in phonological processes).

But now let us turn to three-vowel Inuit dialects!

Three-vowel Inuit dialects

In many Inuit dialects the distinction between */i/ and */ə/ has been completely lost: these dialects have only three distinct vowels: /i/, /a/, and /u/.

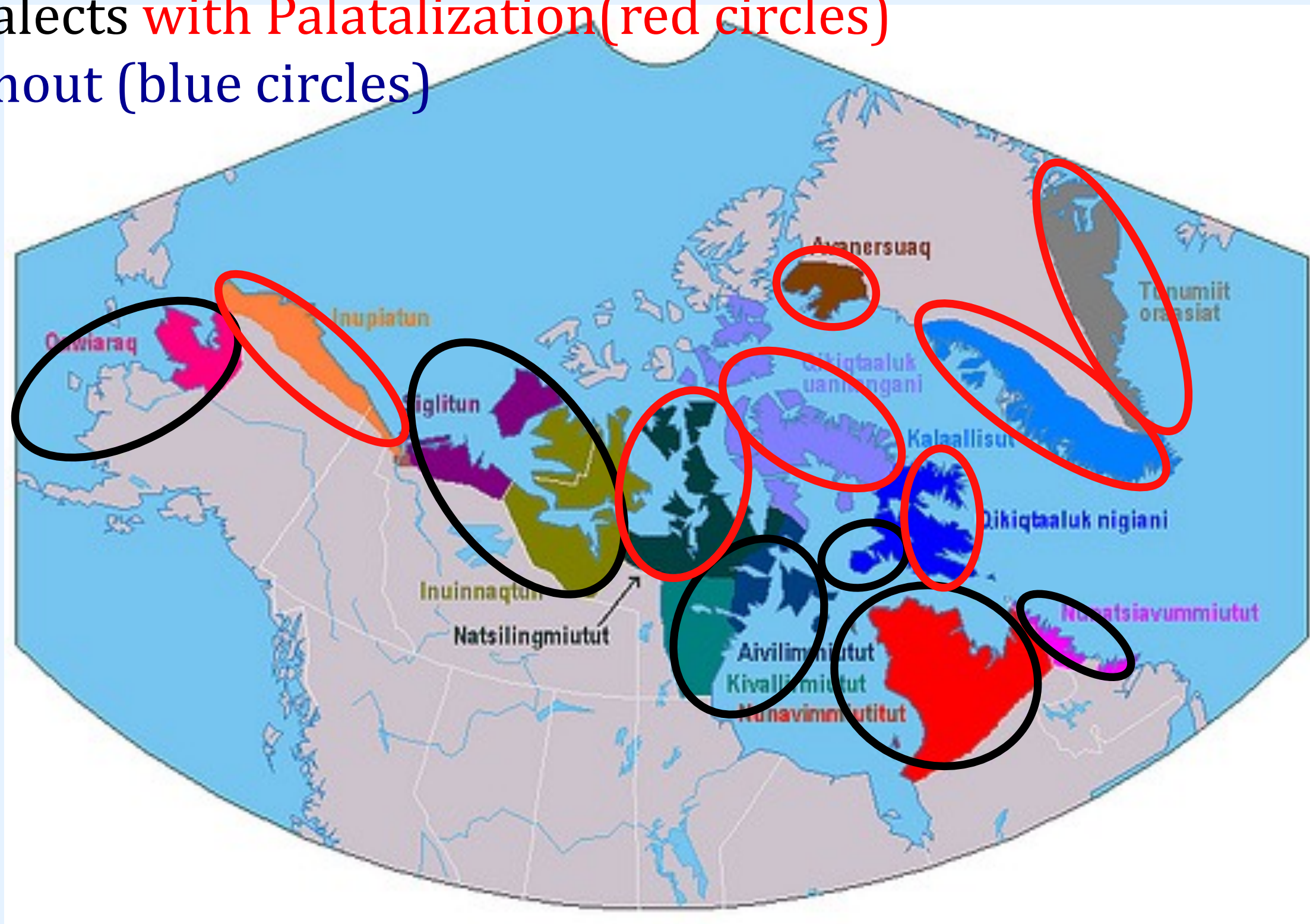
Dialects with palatalization or with signs of former palatalization occur across the Inuit region, as do dialects without palatalization:

Four-vowel dialects

Three-vowel dialects

/i/	/u/	/a/	/ə/	/i/	/u/	/a/
[coronal]	[labial]	[low]	[]	?	[labial]	[low]

Inuit Dialects **with Palatalization**(red circles)
and **without** (blue circles)



Inuit dialects

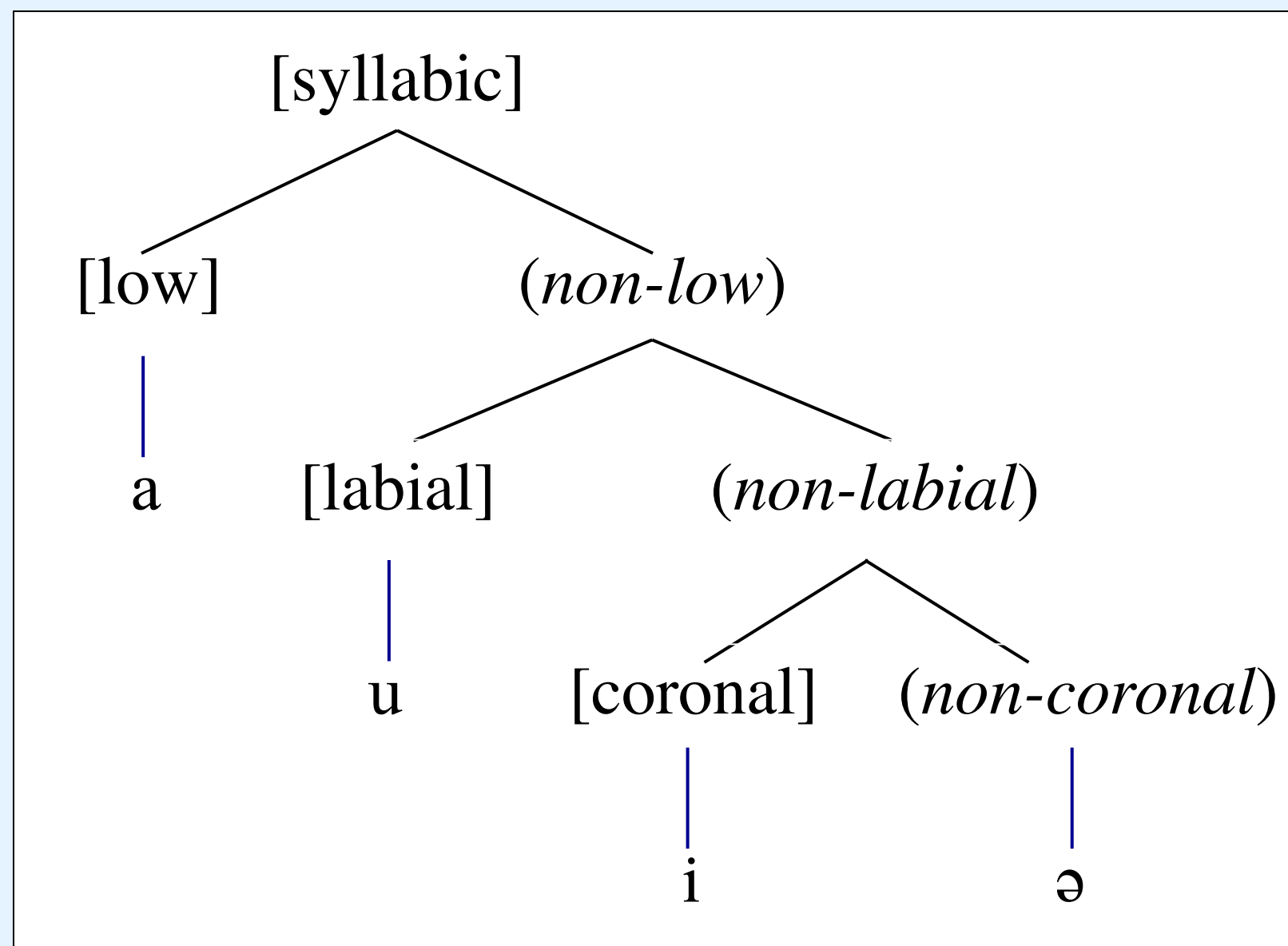
One might suppose that some dialects that once had palatalization would generalize it to occur after all /i/s, including original /i/ from *i and the new /i/ from *ə.

But this is not the case. Compton and Dresher (2011) observe a generalization about palatalization in Inuit dialects:

Inuit /i/ can cause palatalization (assibilation) of a consonant **only** in dialects where there is evidence for a (former) contrast with a fourth vowel; where there is no contrast between strong and weak *i*, /i/ does not trigger palatalization.

This generalization follows if we assume that the feature hierarchy for Inuit and Yupik is [low] > [labial] > [coronal]:

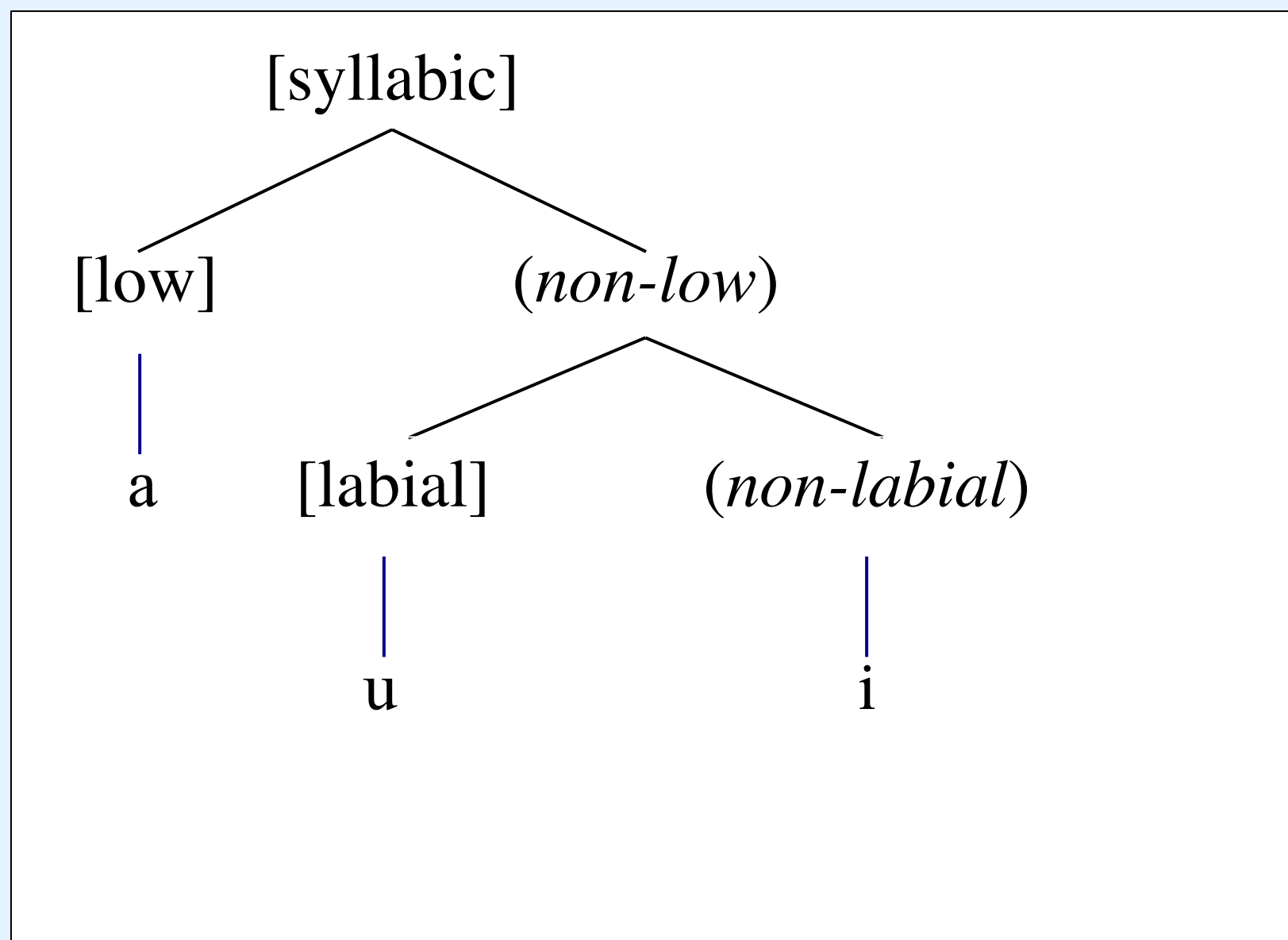
Inuit-Yupik contrastive hierarchy (Compton and Dresher 2011)



[low] > [labial] > [coronal]

When the fourth vowel is in the underlying inventory, /i/ has a contrastive [coronal] feature that enables it to cause palatalization.

Inuit-Yupik contrastive hierarchy (Compton and Dresher 2011)



[low] > [labial]

But in the absence of a fourth vowel, [coronal] is not a contrastive feature.

By the Contrastivist Hypothesis, if a feature is not contrastive, it may not be active.

Three-vowel Inuit dialects

Therefore, the restriction of a three-vowel inventory to two features, required by the Contrastivist Hypothesis and the Successive Division Algorithm, is supported by evidence from phonological patterning.

The result of our analysis is that the representation of an /i/ in a three-vowel dialect is closer to that of /ə/ in a four-vowel dialect than it is to the representation of /i/ in a four-vowel dialect (below only marked features are shown).

Four-vowel dialects

Three-vowel dialects

/i/	/u/	/a/	/ə/	/i/	/u/	/a/
[coronal]	[labial]	[low]	[]	[]	[labial]	[low]

Three-vowel Inuit dialects

That is, in three-vowel dialects /i/ has only the features (*non-low, non-labial*); these features characterize many vowels besides [i], including [ə, ʌ, ε, e, ð], etc.

It is **enhancement** that causes this vowel to surface as [i].

On this view, there is no such thing as a universal /i/ or [i] in phonology, so it is not worth trying to give a universal characterization of how ‘/i/’ should behave.

Four-vowel dialects

Three-vowel dialects

/i/	/u/	/a/	/ə/	/i/	/u/	/a/
[coronal]	[labial]	[low]	[]	[]	[labial]	[low]

References and further reading

For further reading see Compton & Dresher (2011) :

Compton, Richard & B. Elan Dresher. 2011. Palatalization and 'strong i' across Inuit dialects. *Canadian Journal of Linguistics/ Revue canadienne de linguistique* 56: 203–28.

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