Eastern Generative Grammar (EGG)
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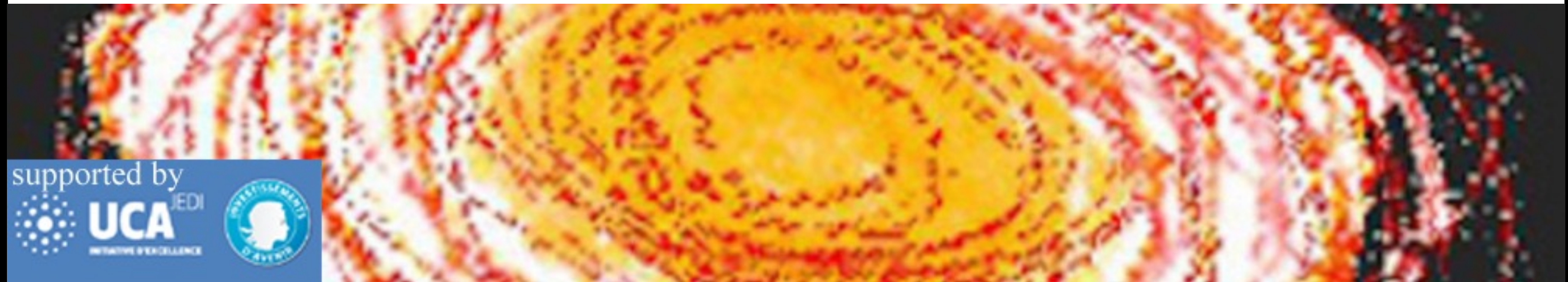
Foundations of Contrastive Hierarchy Theory

B. Elan Dresher

Class 3: Synchronic phonology with contrastive hierarchies

Course information

Readings and slides from each class are posted at the class page for this course:

http://www.eggschool.org/classes/intro-foundations-of-contrastive-hierarchy-theory/

Everyday I have an office hour at Gather at 17:30–18:15 CEST. I can stay longer if needed. If you can't make these hours, please contact me and we can arrange another time.
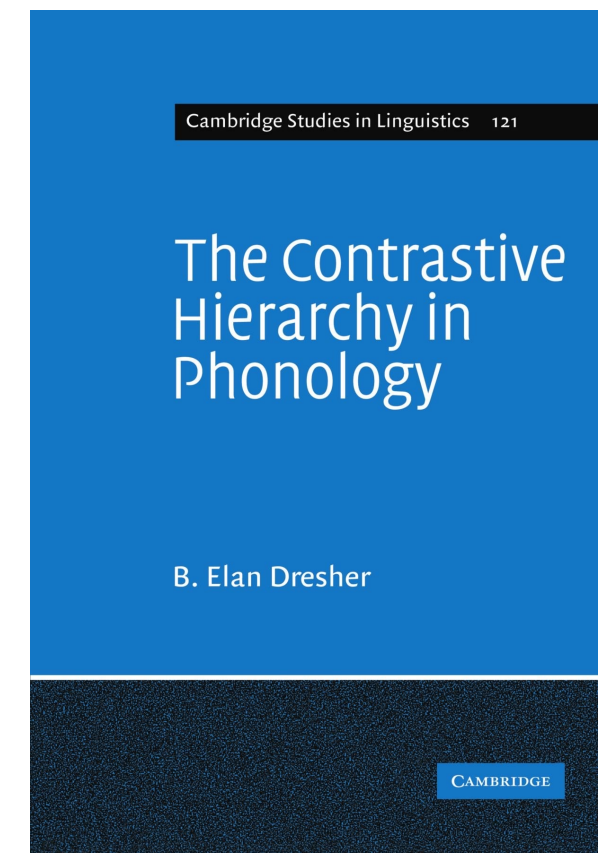
My email: elan.dresher@utoronto.ca

My website: https://dresher.artsci.utoronto.ca/

The main book relevant to this course (lots of publications since) is Dresher (2009): *The Contrastive Hierarchy in Phonology* (CUP).
https://www.cambridge.org/core/books/contrastive-hierarchy-in-phonology
I will post individual chapters on our page.

Cambridge Studies in Linguistics   121

The Contrastive Hierarchy in Phonology

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1. Synchronic Phonology:

Xunke Oroqen Vowel System

Xunke Oroqen vowel system (Zhang 1995, 1996)

The Xunke dialect of Oroqen has 9 vowel phonemes (length contrasts are omitted; they are not relevant here):

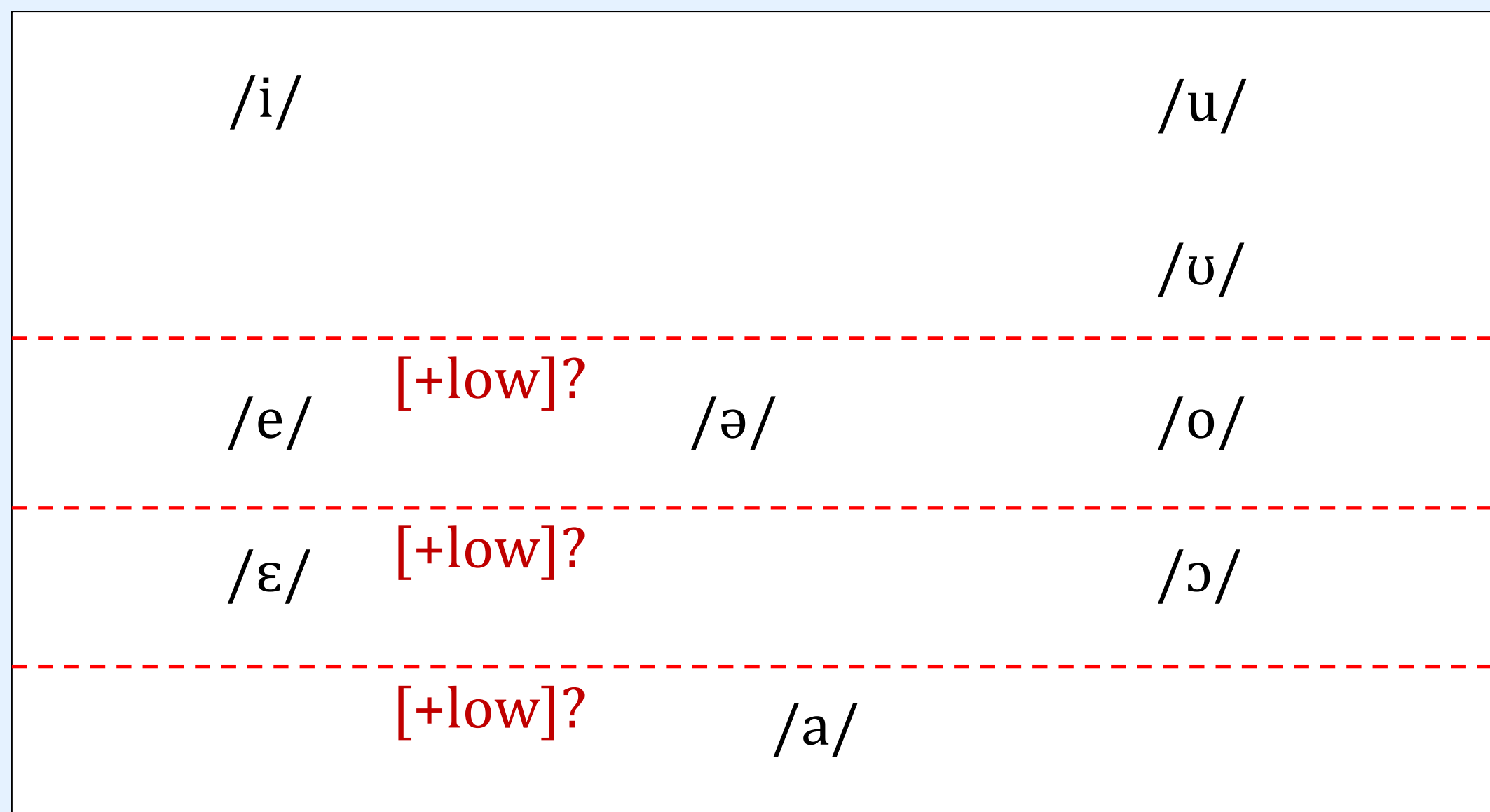|		
/i/		/u/
		/ʊ/
/e/	/ə/	/o/
/ɛ/		/ɔ/
	/a/	

Xunke Oroqen vowel system (Zhang 1995, 1996)

Even if there were innate universal features, there would be considerable ambiguity as to how they apply to this system.

/i/		/u/
		/ʊ/
/e/	/ə/	/o/
/ɛ/		/ɔ/
	/a/	

Xunke Oroqen vowel system (Zhang 1995, 1996)

Suppose we have innate features [±low] and [±high]: where is the boundary between the low vowel(s) and the high vowels?

/i/ /u/

/ʊ/

- -

[+low]?

/e/ /ə/ /o/

- -

/ɛ/ [+low]? /ɔ/

- -

[+low]? /a/

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Xunke Oroqen vowel system (Zhang 1995, 1996)

And how many heights should we distinguish: 2, 3, 5? Here are 5 possible heights with 3 height features: [high], [low], and [open]. This is not the correct analysis!

/i/	[+high, –open]	/u/
	[+high, +open]	/ʊ/
/e/ [–high, –open] /ə/		/o/
/ɛ/	[–high, +open]	/ɔ/
[+low]	/a/	

Xunke Oroqen vowel system (Zhang 1995, 1996)

For further insight, we need to look at how the vowels pattern, that is, at the types of phonological activity they exhibit.

/i/		/u/
		/ʊ/
/e/	/ə/	/o/
/ɛ/		/ɔ/
	/a/	

Activity in Xunke Oroqen

The three most notable kinds of phonological activity involving vowels are:

➢ RTR (retracted tongue root) harmony

➢ Labial (rounding) harmony

➢ Palatalization

RTR harmony

Vowels fall into two sets:
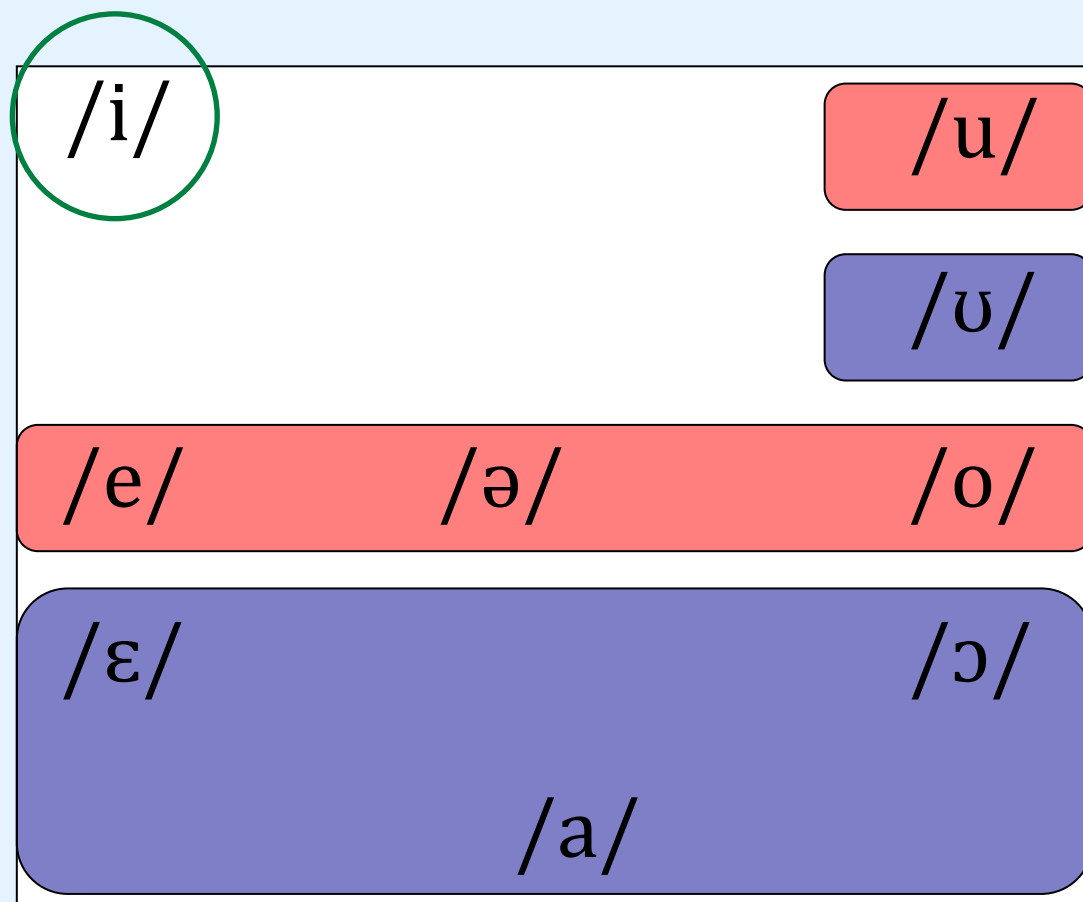
yin, or non-RTR, vowels in red include /u, e, ə, o/

yang, or RTR, vowels in blue include /ʊ, ɛ, a, ɔ/

Only vowels from the same set may co-occur in a word:

/i/		/u/
		/ʊ/
/e/	/ə/	/o/
/ɛ/		/ɔ/
	/a/	

non-RTR:	ulə	'meat'
RTR:	ʊla	'quill'
non-RTR:	ujəlee	'cousin'
RTR:	ɔjalɛɛ	'quill'
non-RTR:	kosuun	'pond'
RTR:	kɔɔsʊn	'empty'

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RTR harmony

The vowel /i/ is neutral and may co-occur with either set:

/i/ /u/ /ʊ/ /e/ /ə/ /o/ /ɛ/ /ɔ/ /a/

non-RTR:	nəkin-	'sweat'
RTR:	mʊrin	'horse'
non-RTR:	ulin-	'gifts'
RTR:	tari-	'that'
non-RTR:	bitə-	'letter'
RTR:	birakan-	'river'

RTR harmony

Except for /i/, every non-RTR vowel has an RTR counterpart with which it alternates.

/i/

/u/
/ʊ/

/e/
/ɛ/

/ə/

/o/
/ɔ/

/a/
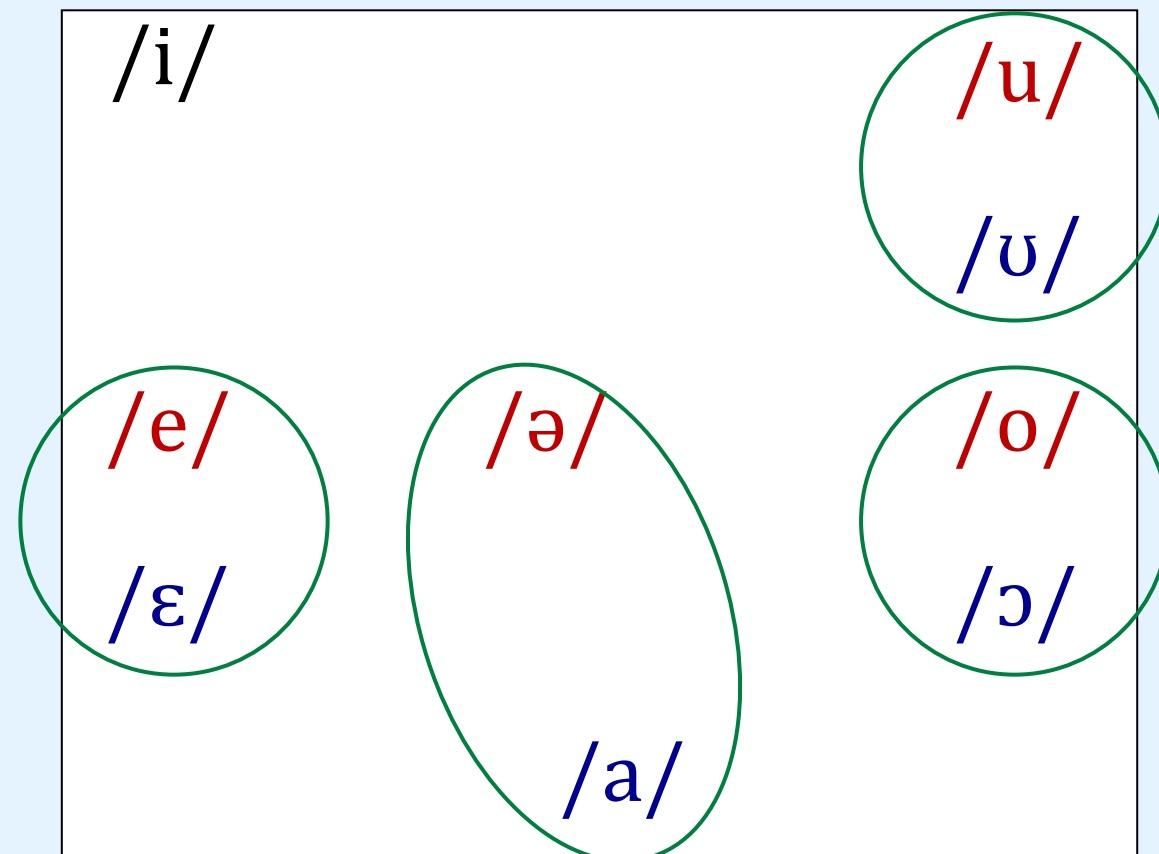
RTR harmony

The vowels /ʊ/, /ɛ/, /a/ and /ɔ/ trigger RTR stem-to-suffix harmony within a word, creating alternations in suffix vowels.

Definite object: *-ma* alternates with *–mə*		
[RTR]	kɔɔkan-ma	'child-DEF.OBJ'
(non-RTR)	bəjun-mə	'moose-DEF.OBJ'
Dative: *-dʊ* alternates with *–du*		
[RTR]	bʊwa-dʊ	'place-DAT'
(non-RTR)	utə-du	'son-DAT'

RTR harmony

The vowel /i/ is neutral and transparent to harmony: it does not disrupt the redness or blueness of a word.

Plural: *-sal* alternates with *–səl*		
[RTR]	mʊrin-sal	'horse-PL'
(non-RTR)	dəji-səl	'bird-PL'
Diminutive: *-tʃara* alternates with *–tʃərə*		
[RTR]	wargi-tʃara	'salty-DIM'
(non-RTR)	toŋgorin-tʃərə	'round-DIM'

RTR harmony

In a suffix /i/ can occur with both types of words.

/i/ in instrumental suffix *–dʒi*		
[RTR]	tʊkala-dʒi	'clay-INST'
(non-RTR)	sukə-dʒi	'axe-INST'
[RTR]	bɔlɔ-dʒi	'stick-INST'
(non-RTR)	kədərə-dʒi	'knife-INST'

RTR harmony

When /i/ is the only vowel in a stem it occurs with (non-RTR) vowels.

This is not because of harmony, but shows that (non-RTR) is the default.

| /i/ is the only stem vowel		
(non-RTR)	il-lə	'to stand-PAST'
(non-RTR)	lipki-rə	'to block up-PAST'
(non-RTR)	irgi-wə	'tail-DEF.OBJ'
(non-RTR)	iŋŋi-wə	'tongue-DEF.OBJ'

RTR harmony

The evidence from activity, therefore, is that every vowel except /i/ has a + or – value of an active feature; by hypothesis, this feature must be contrastive.
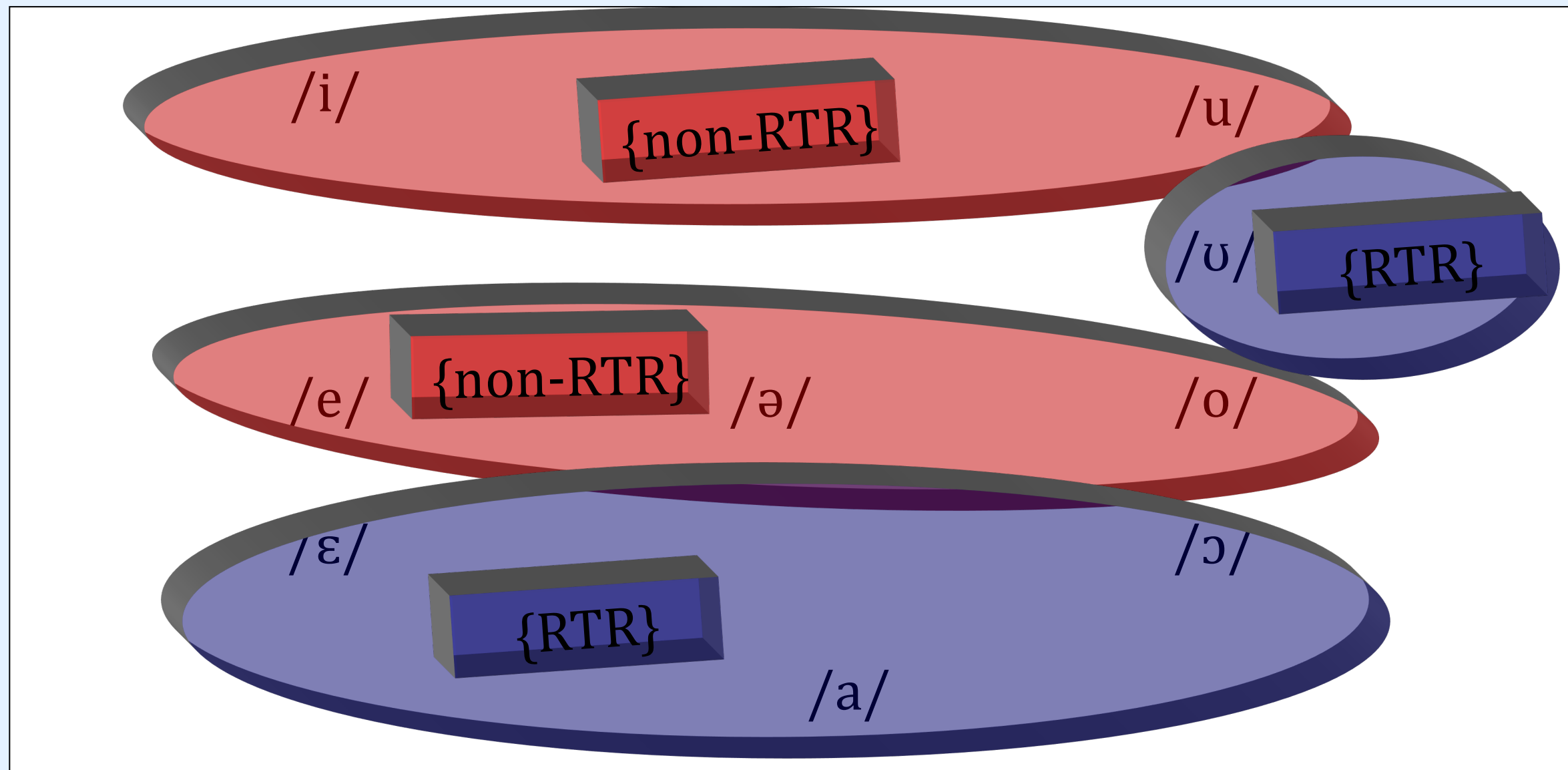
RTR harmony

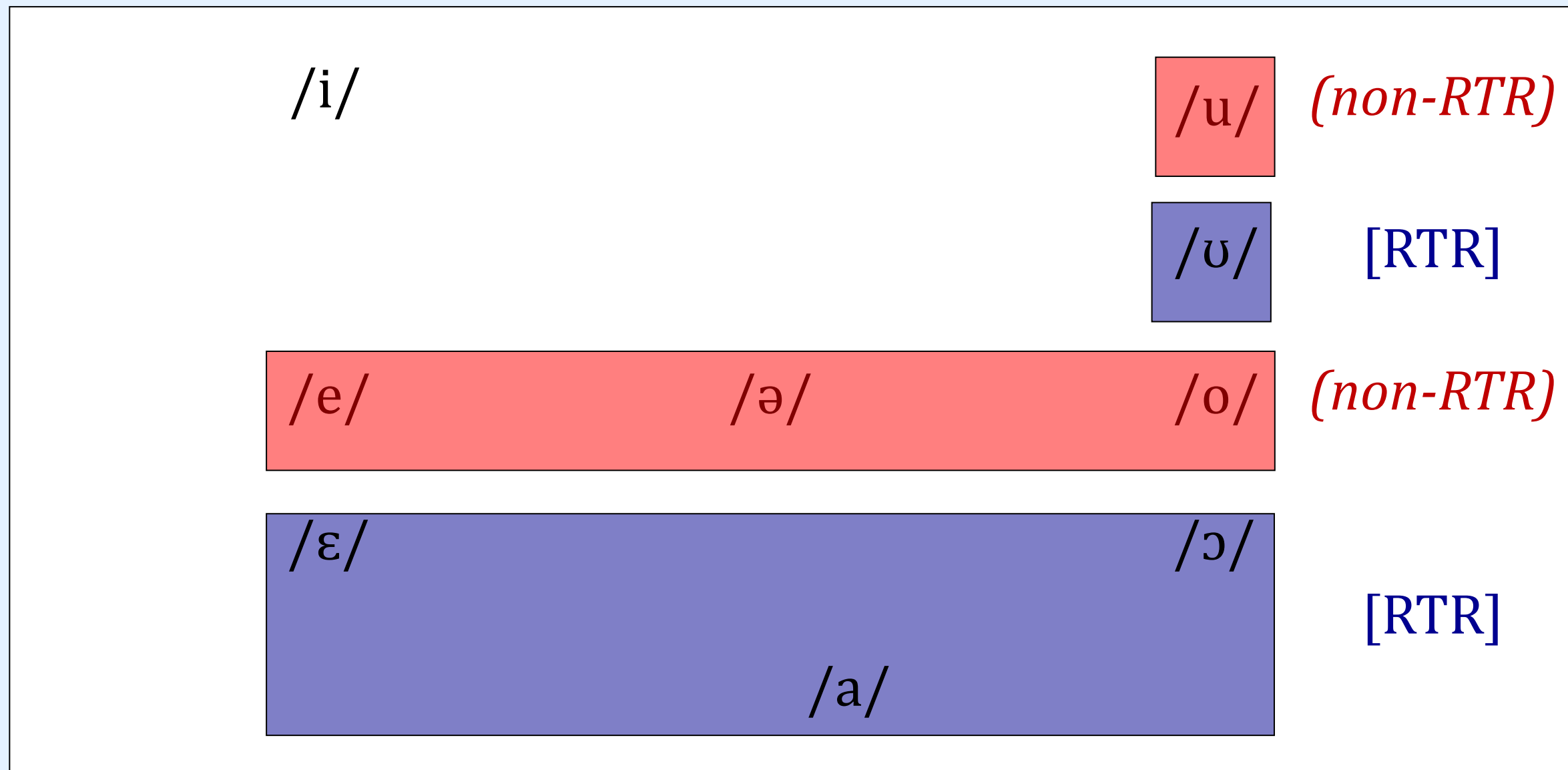What feature could this be? I have already given away that it is [RTR].

/i/

/u/ *(non-RTR)*

/ʊ/ [RTR]

/e/ /ə/ /o/ *(non-RTR)*

/ɛ/ /ɔ/

[RTR]

/a/
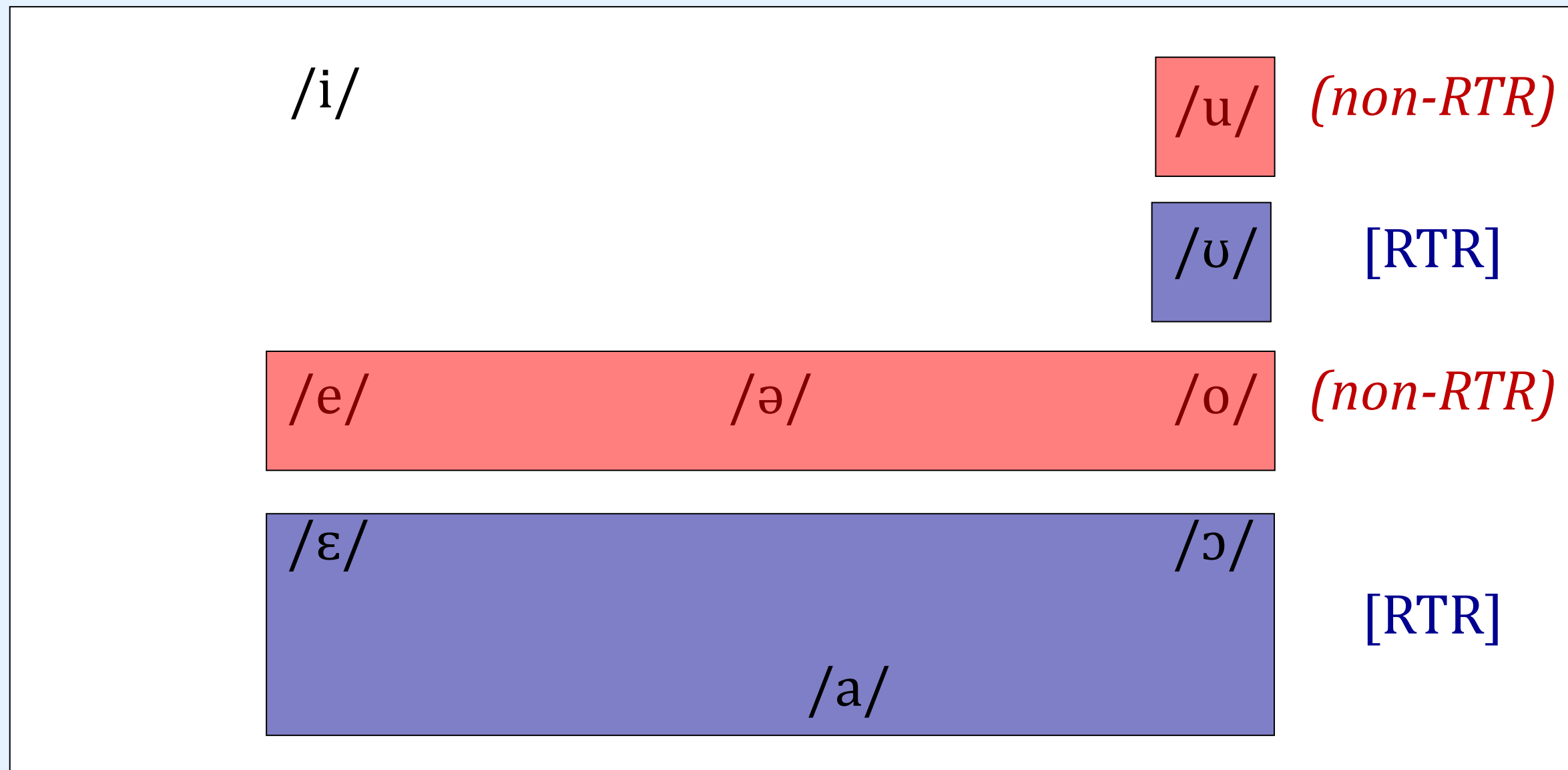
RTR harmony

But this is not obvious, because/i/ is phonetically {non-RTR}.
(Ovals and { } represent phonetic percepts.)

RTR harmony
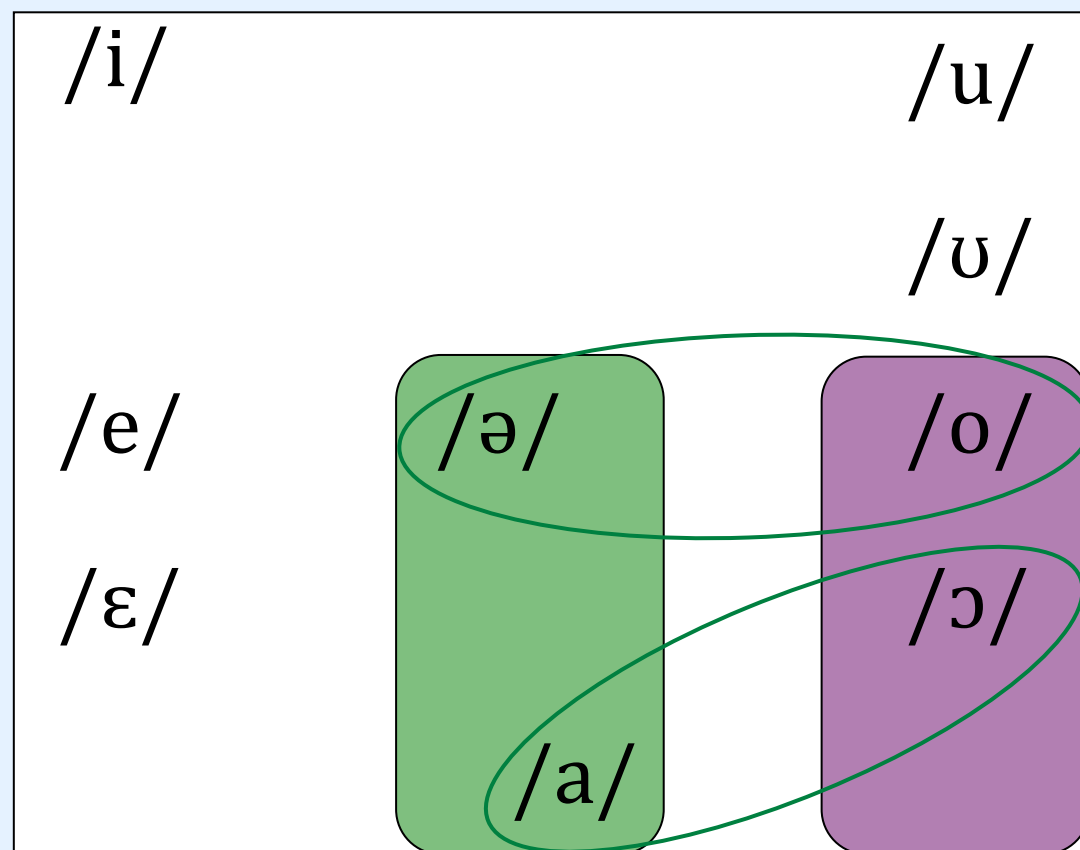
Nevertheless, the Oroqen learner will have to find a feature ordering in which the feature [±RTR] does not apply to /i/.

Labial (rounding) harmony

Only the low vowels /o/ and /ɔ/ trigger labial harmony.

Only /ə/ and /a/ undergo rounding:

/i/		/u/
		/ʊ/
/e/	/ə/	/o/
/ɛ/		/ɔ/
	/a/	

/ə/ alternates with /o/, and /a/ alternates with /ɔ/.

Labial (rounding) harmony

Two successive /ɔ/ or /o/ vowels cause a suffix /a/ or /ə/ to become round (Zhang 1995, 1996; Dresher & Nevins 2017):

Present tense	
[RTR] stems	(non-RTR) stems
-ra alternates with *–rɔ*	*-rə* alternates with *-ro*
baka-ra 'get-PRES'	nəkə-rə 'weave-PRES'
ɔlgɔɔ-rɔ 'dry-PRES'	mooro-ro 'moan-PRES'

Labial (rounding) harmony

Note that /ʊ/ and /u/ do not trigger labial harmony:

Definite object: *-wV/-mV*	
[RTR] stems	(non-RTR) stems
-ma alternates with *–mɔ*	*-wə* alternates with *-wo*
ʊrʊʊn-ma 'hoof-DEF.OBJ'	ulgulu-wə 'language-DEF.OBJ'
*ʊrʊʊn-mɔ	*ulgulu-wo

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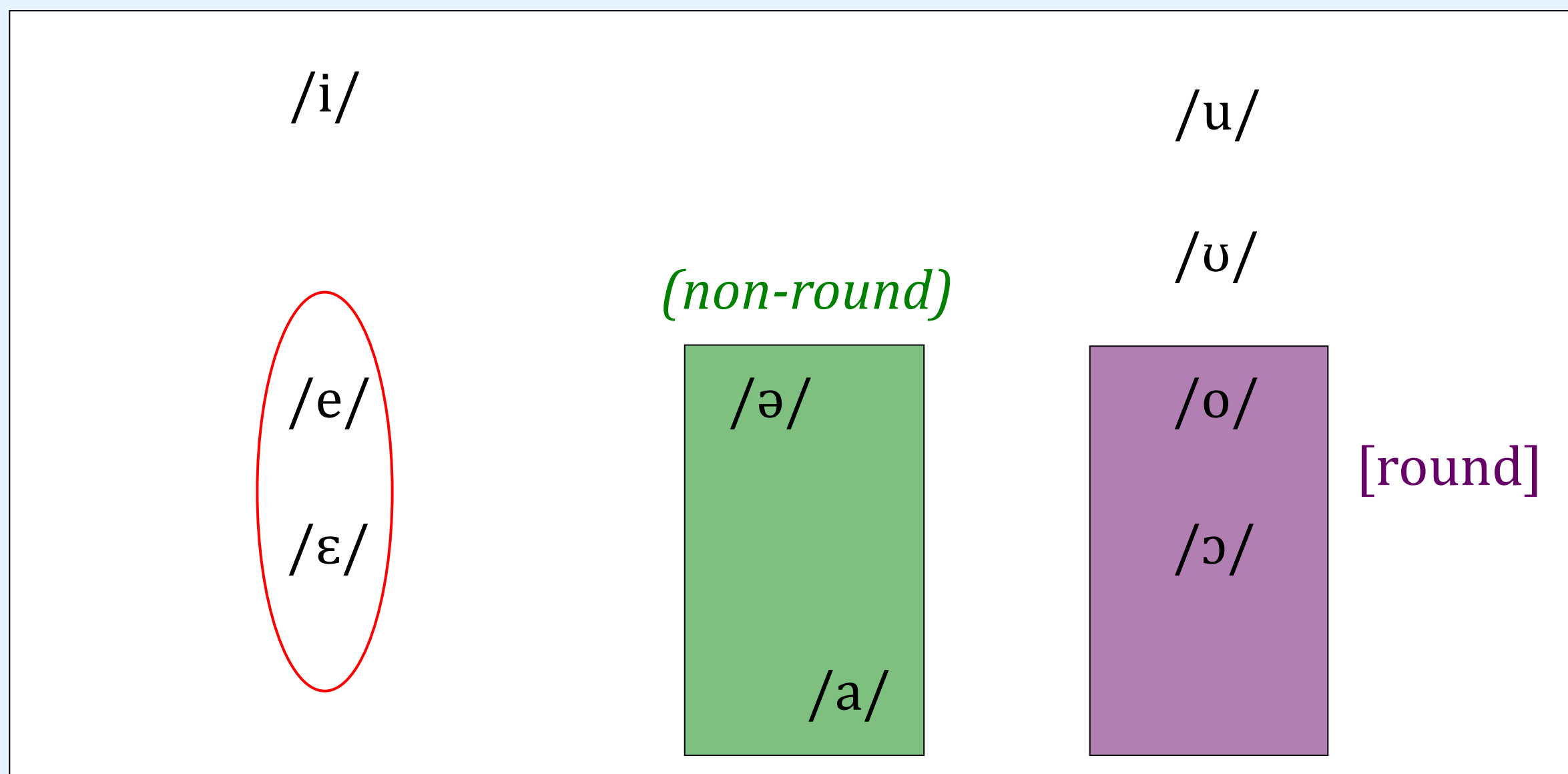# Labial (rounding) harmony

The evidence from activity, then, is that /o, ɔ/ must have an active, hence contrastive, feature that causes rounding. [round] (or [labial]) is an obvious candidate.

/i/   /u/

                                       /ʊ/

/e/   /ə/   /o/   [round]

/ɛ/   /ɔ/

                    /a/

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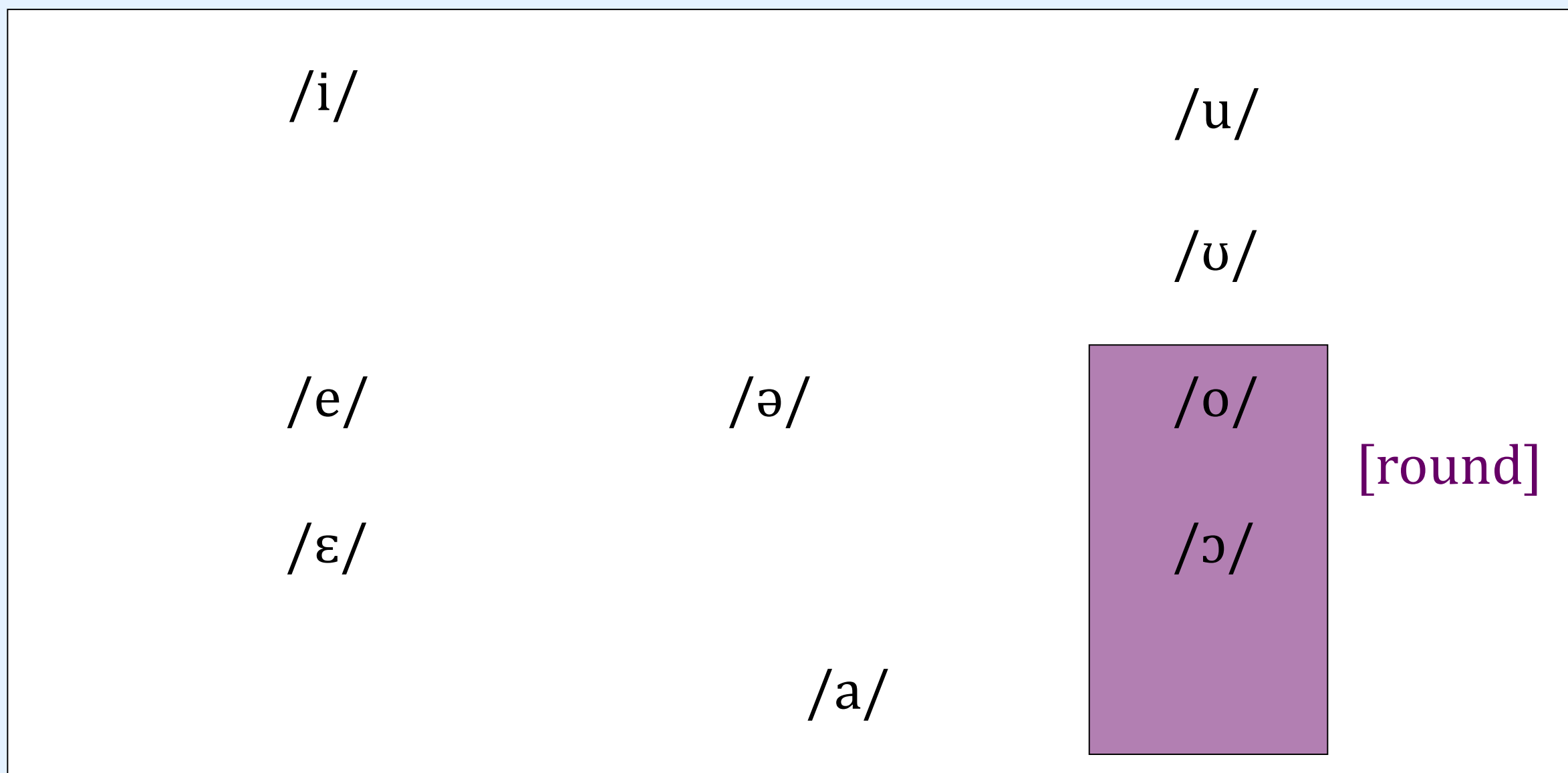
Labial (rounding) harmony

These vowels alternate with /ə/ and /a/, the only vowels that undergo rounding, suggesting they are contrastively *(non-round)*. /e/ and /ɛ/ are not involved.

/i/   /u/

                                                       /ʊ/

                    (non-round)

/e/   /ə/   /o/   [round]

/ɛ/   /ɔ/

                         /a/

Labial (rounding) harmony

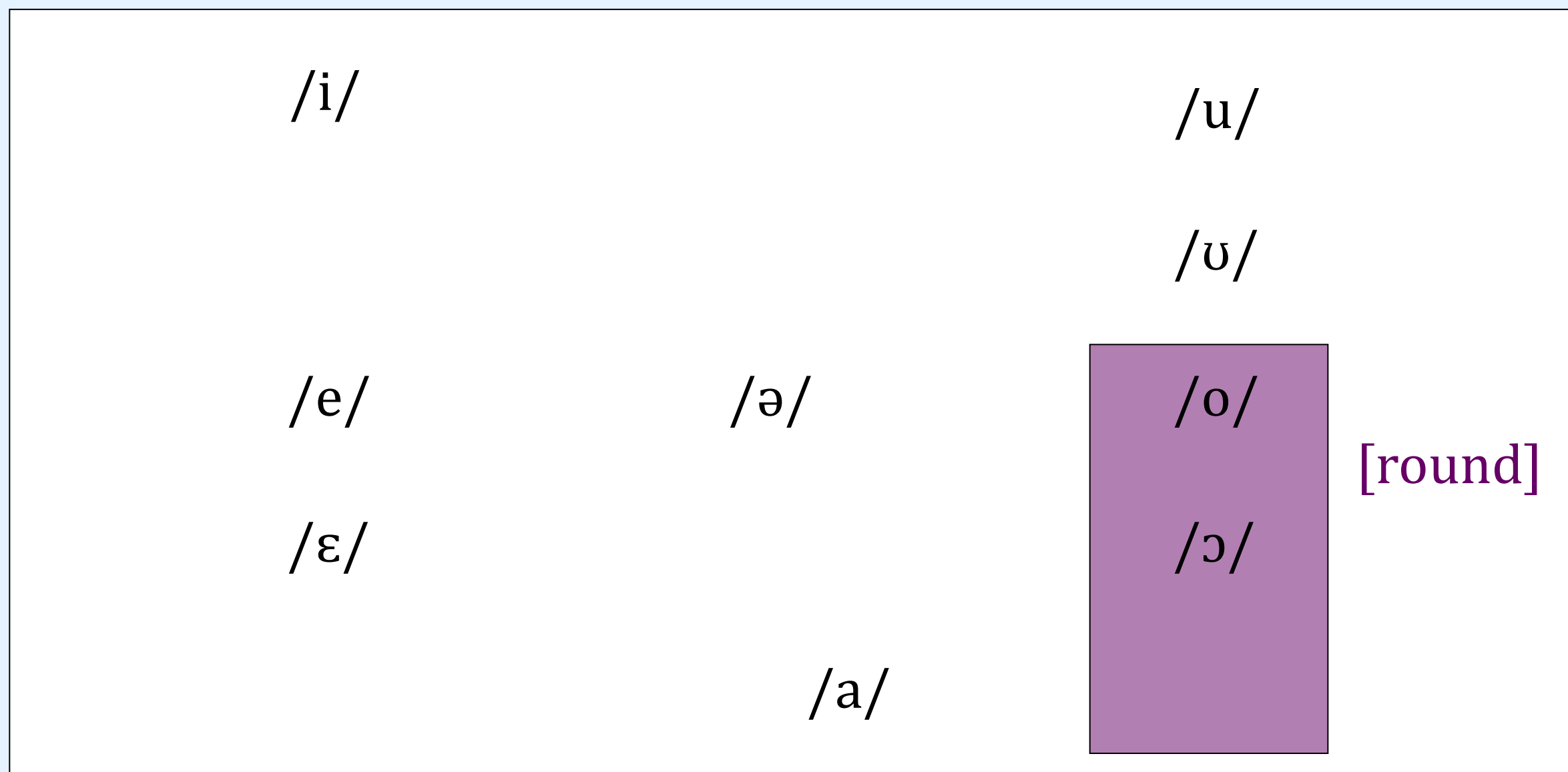But /u/ and /ʊ/ are also phonetically {round}, though there is no evidence that that they have an active [round] feature.

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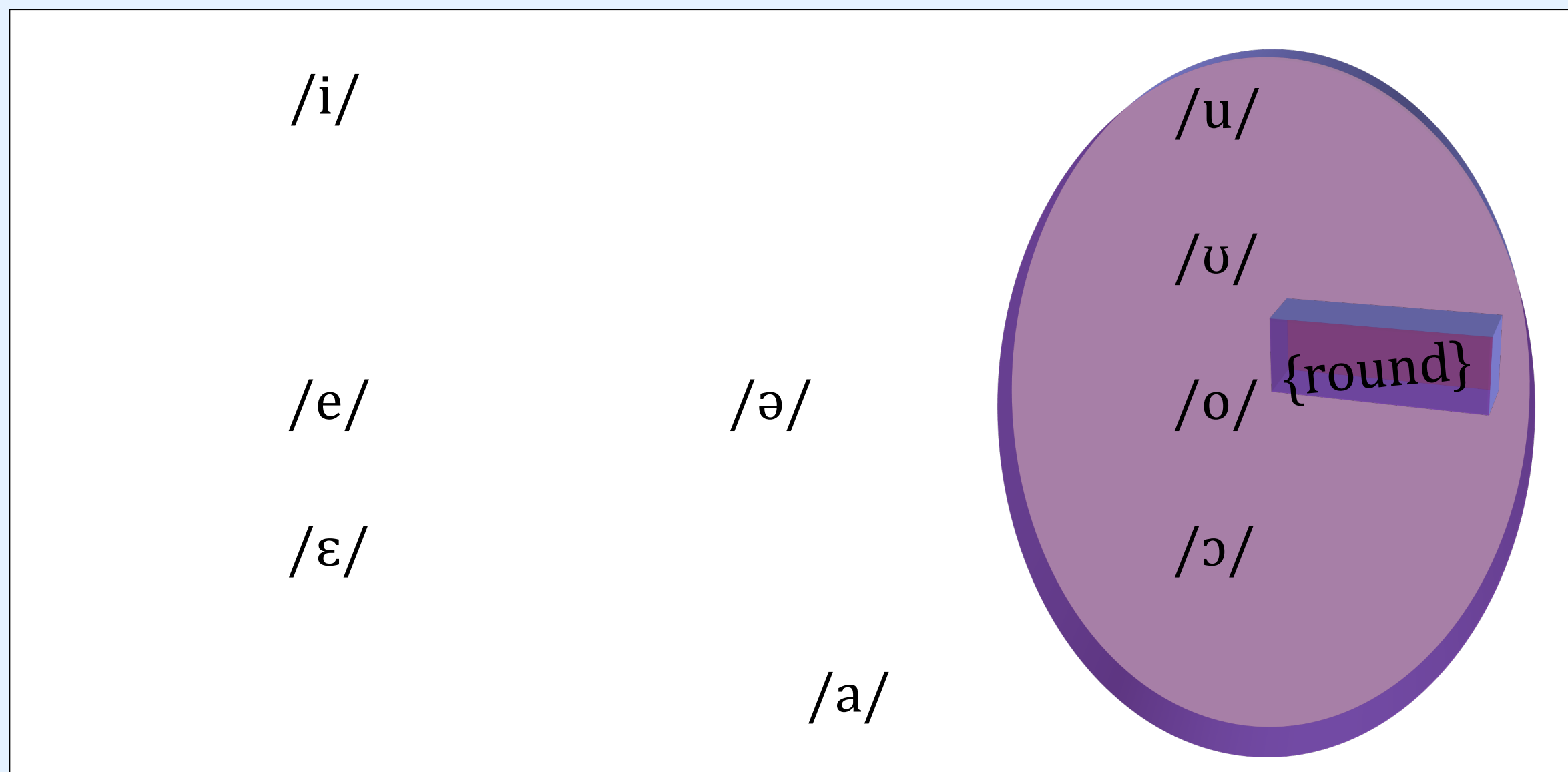
Labial (rounding) harmony

Here, the preferred analysis is one where the contrastive [round] feature is restricted to /o/ and /ɔ/, and excludes /u/ and /ʊ/.

Palatalization

The front vowels /i, e, ɛ/ cause palatalization of a preceding /s/, which suggests that they have a contrastive triggering feature we will call [front] (or [coronal]).

/i/		/u/
[front]		/ʊ/
/e/	/ə/	/o/
/ɛ/		/ɔ/
	/a/	

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Palatalization

/s/ palatalizes to [ʃ] before /i, e, ε/:

Before non-front vowels:

sukə	[suxə]	'axe'
sʊnta	[sʊnta]	'deep'
sɔkɔ-	[sɔxɔ]	'fill'
sələ	[sələ]	'iron'
sarbʊ	[sarbʊ]	'chopsticks'

Before front vowels:

asi	[aʃi]	'now'
sεεn	[ʃεεn]	'ear'

Palatalization

In this case /i, e, ɛ/ are the only vowels that fall in the space of the phonetic percept {front}.

/i/   /u/

{front}   /ʊ/

/e/   /ə/   /o/

/ɛ/   /ɔ/

/a/

One more contrast

Up to here, we have tentatively distinguished these vowels: /ɛ/ is [front, RTR]; /o/ is [round, non-RTR]; /ɔ/ is [round, RTR].

/i/   /u/

                                             /ʊ/

/e/   /ə/   /o/

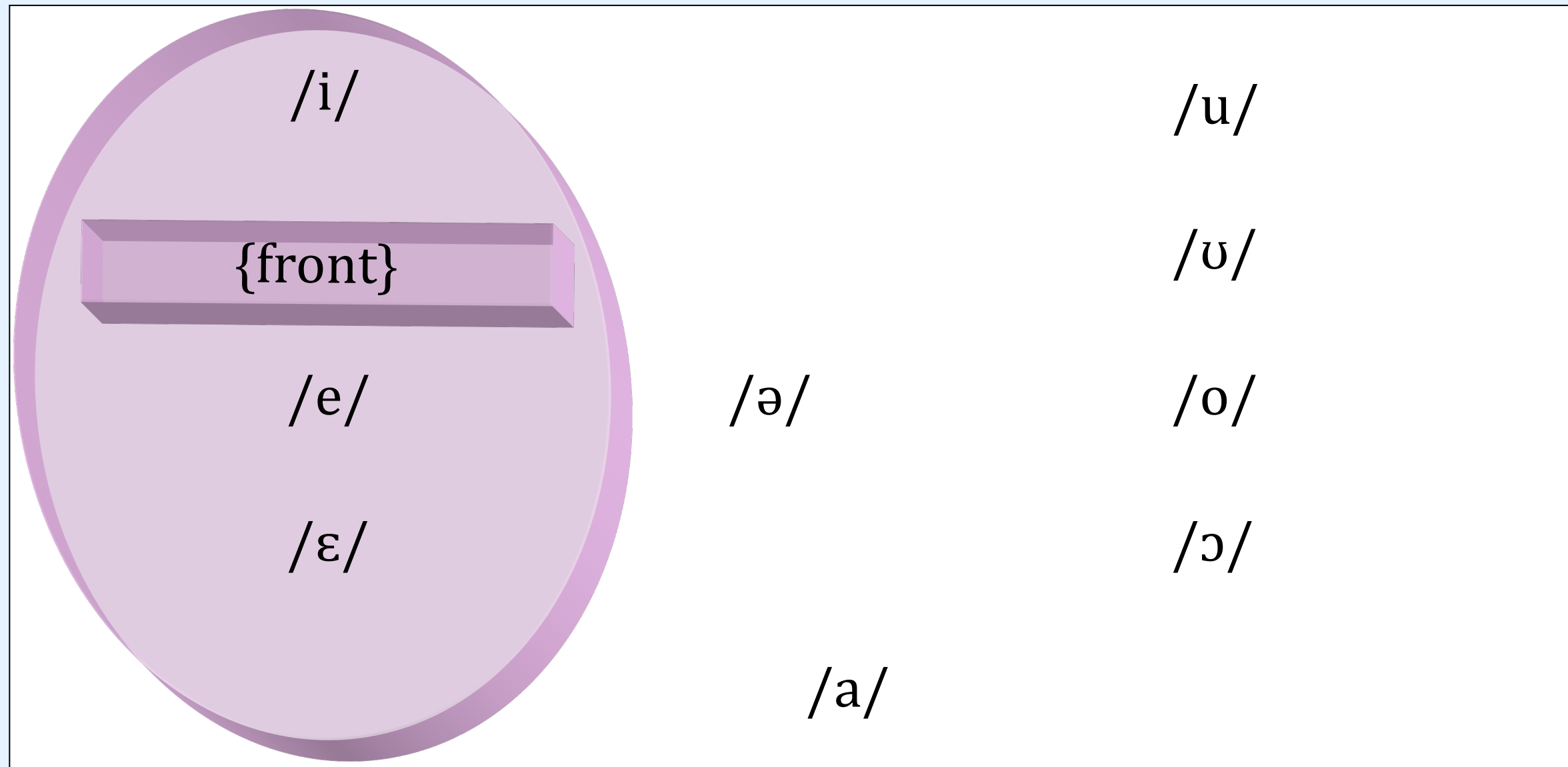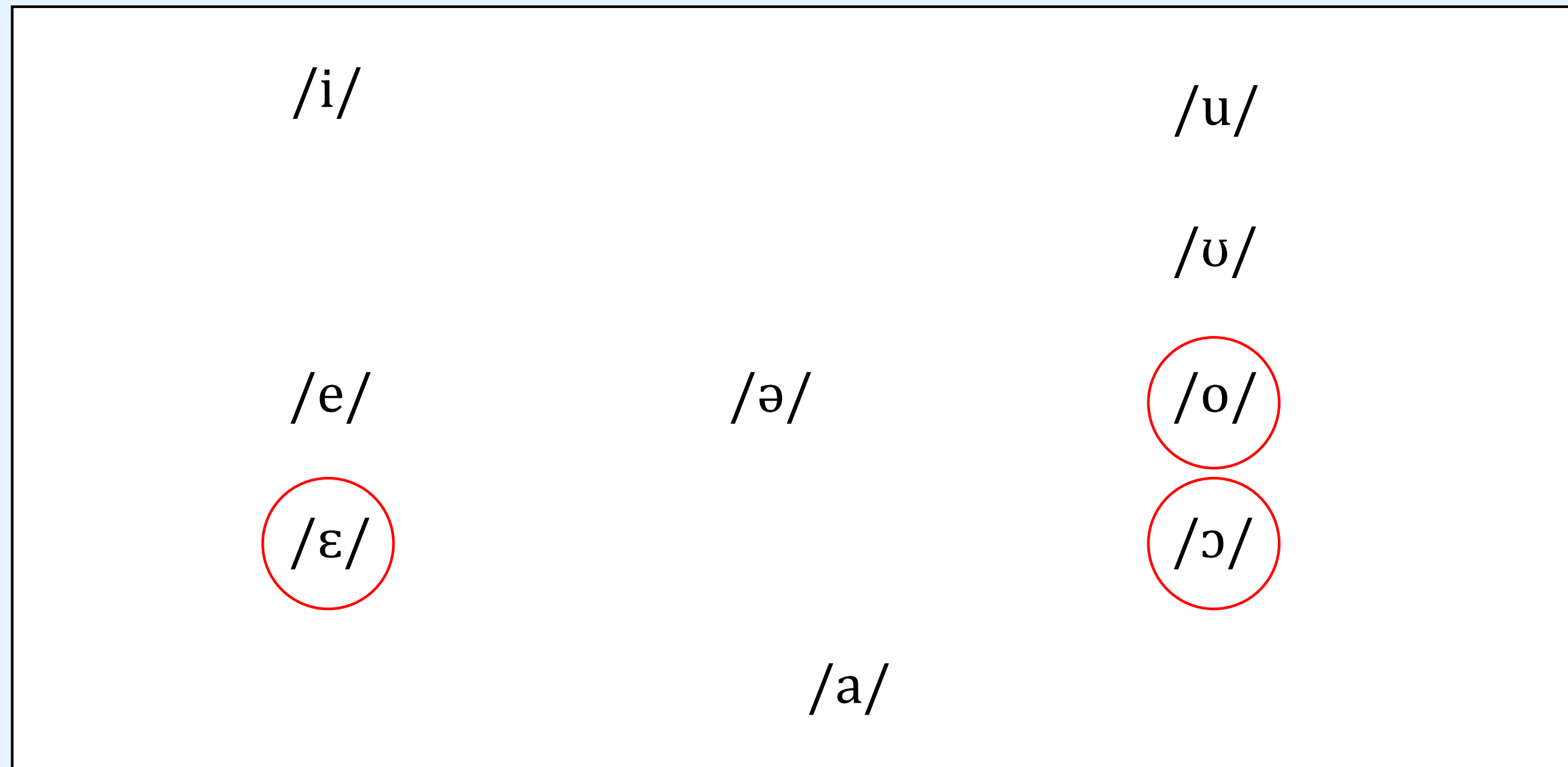/ɛ/   /ɔ/

                      /a/

One more contrast

We still need to distinguish /ə/ ~ /u/, /a/ ~ /ʊ/, and /e/ ~ /i/.
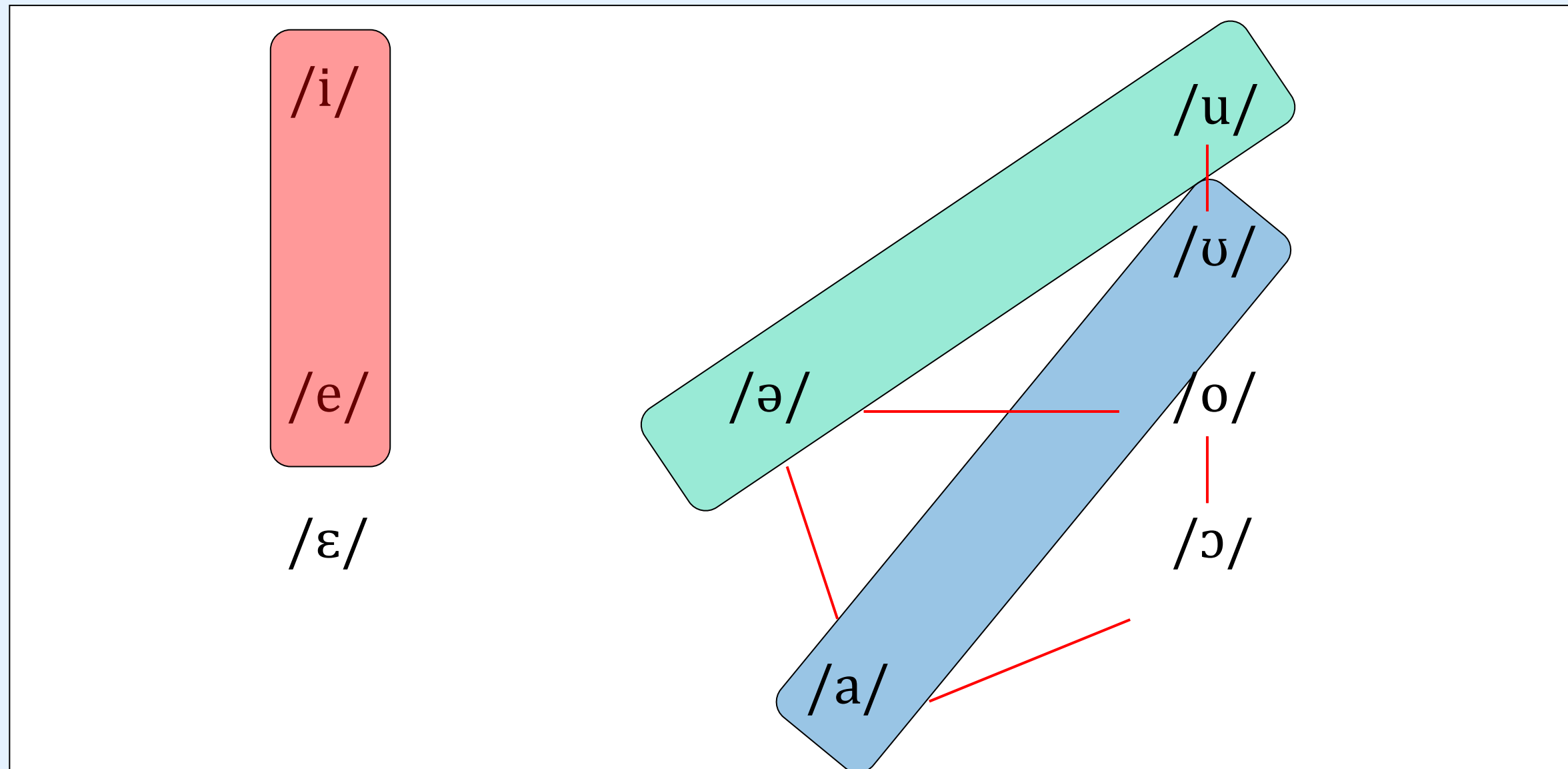
One more contrast

We have seen that /ə/ ~ /a/ ~ /o/ ~ /ɔ/ alternate with respect to [RTR] and [round]; this suggests they are the same height.

/i/   /u/

                             /ʊ/

/e/   /ə/ ————— /o/

/ɛ/   /ɔ/

        /a/

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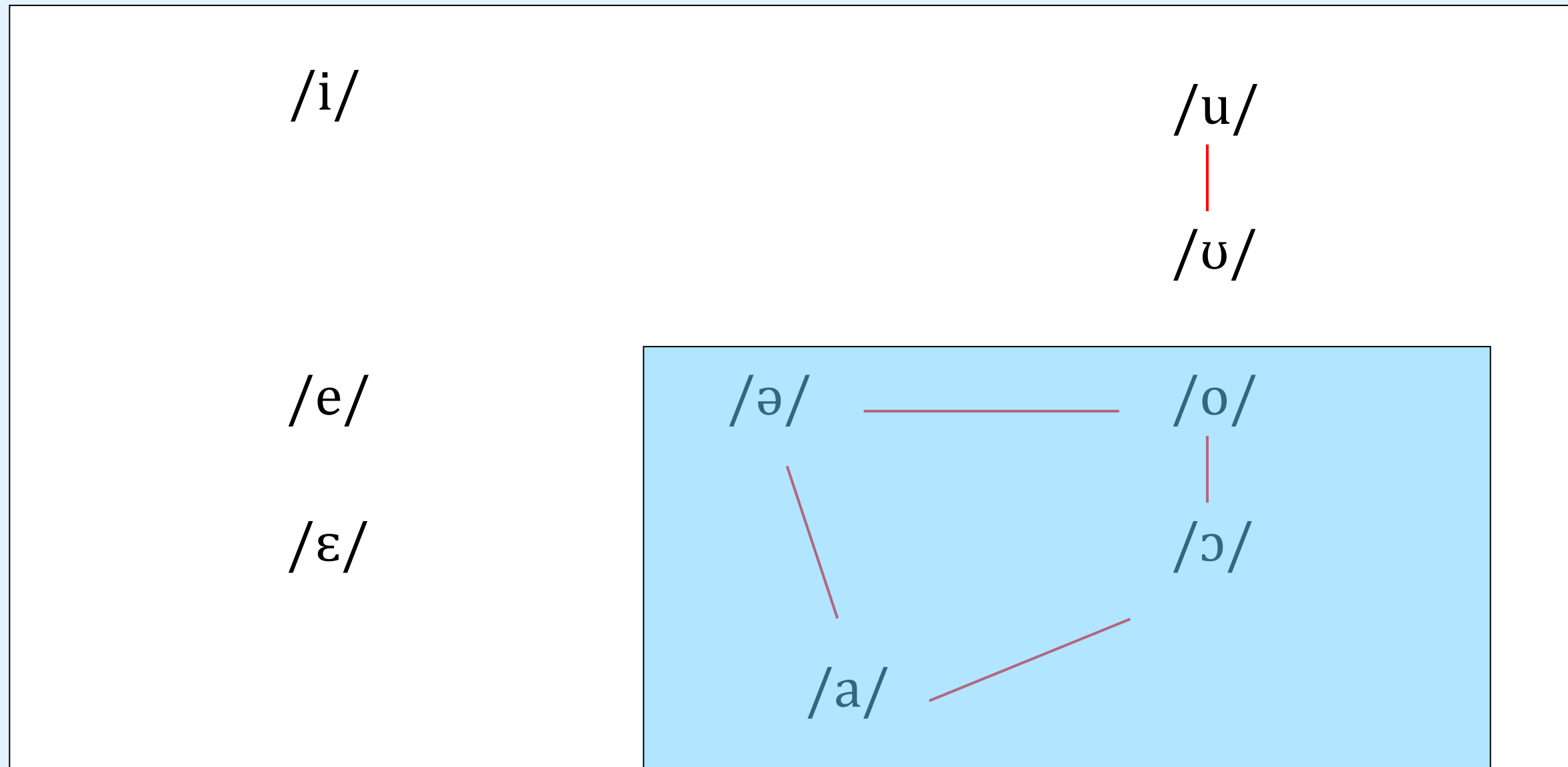
One more contrast

Similarly, /u/~ /ʊ/ are the same except for [RTR]; so they don't need to be distinguished by height.
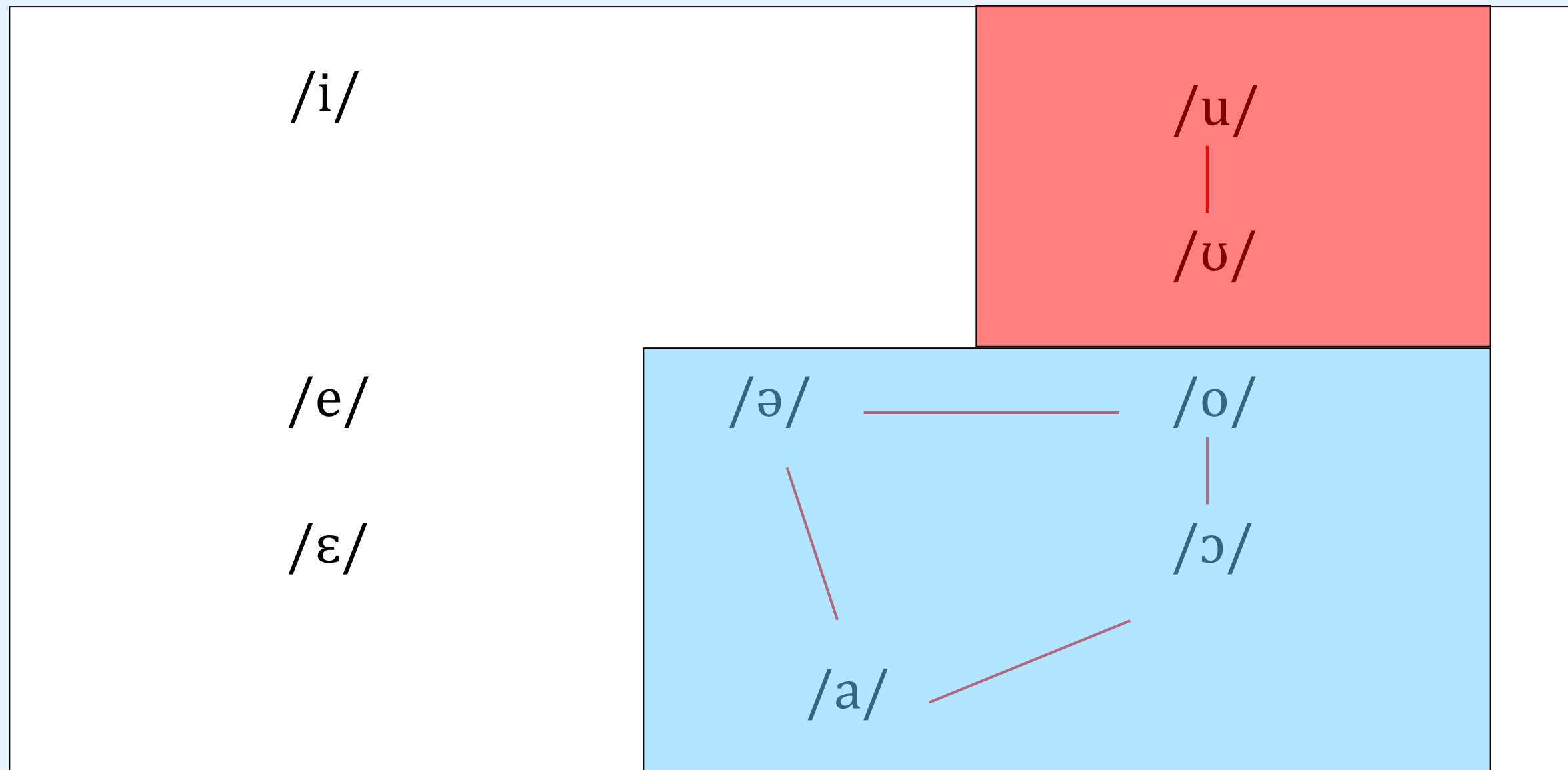
One height contrast

These facts suggest that there is one height contrast which we call [low].
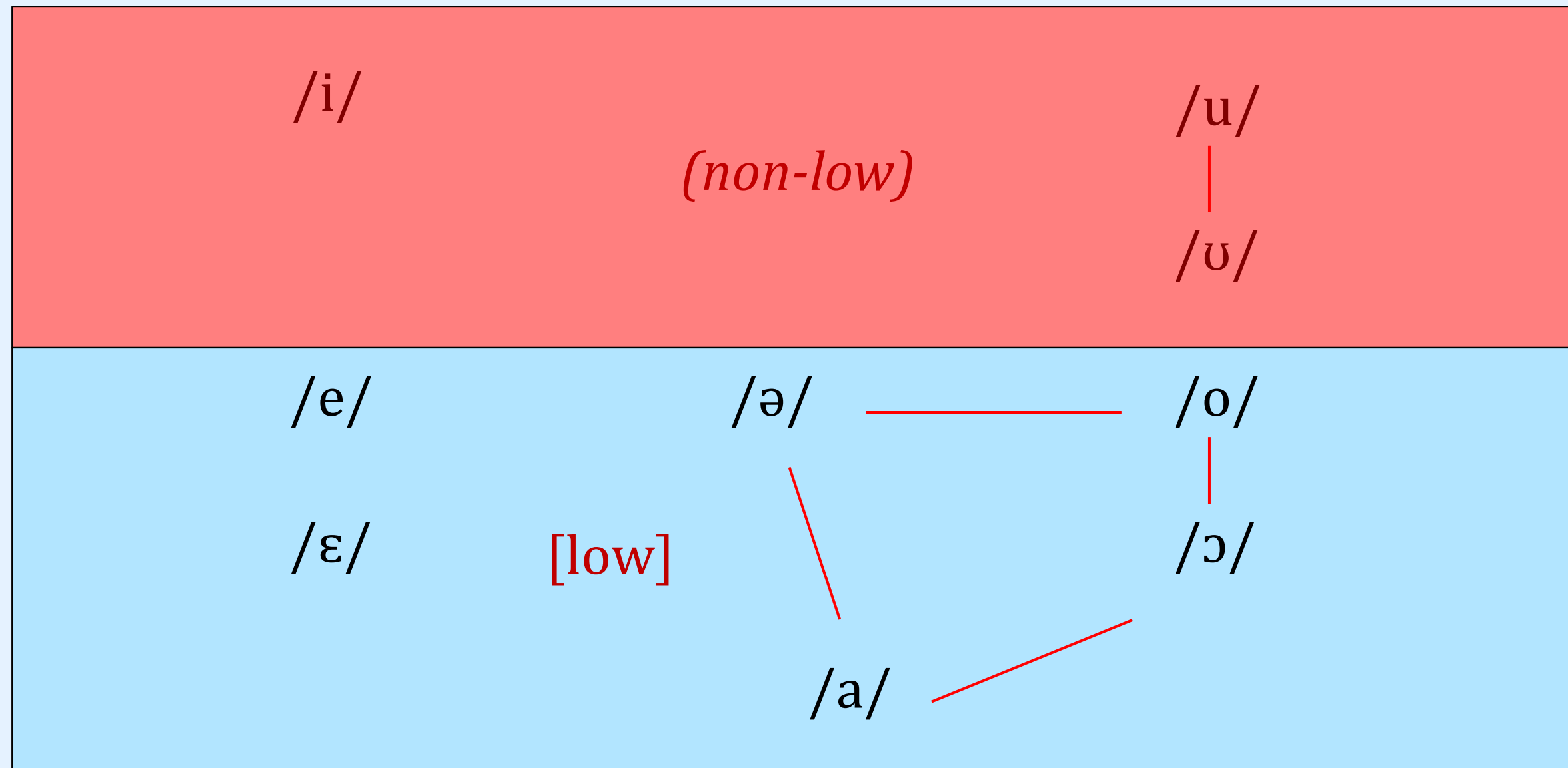
One height contrast

Since height is a relative property, it is not a problem to base the contrastive feature on a perceptible phonetic difference based on relative height or sonority.
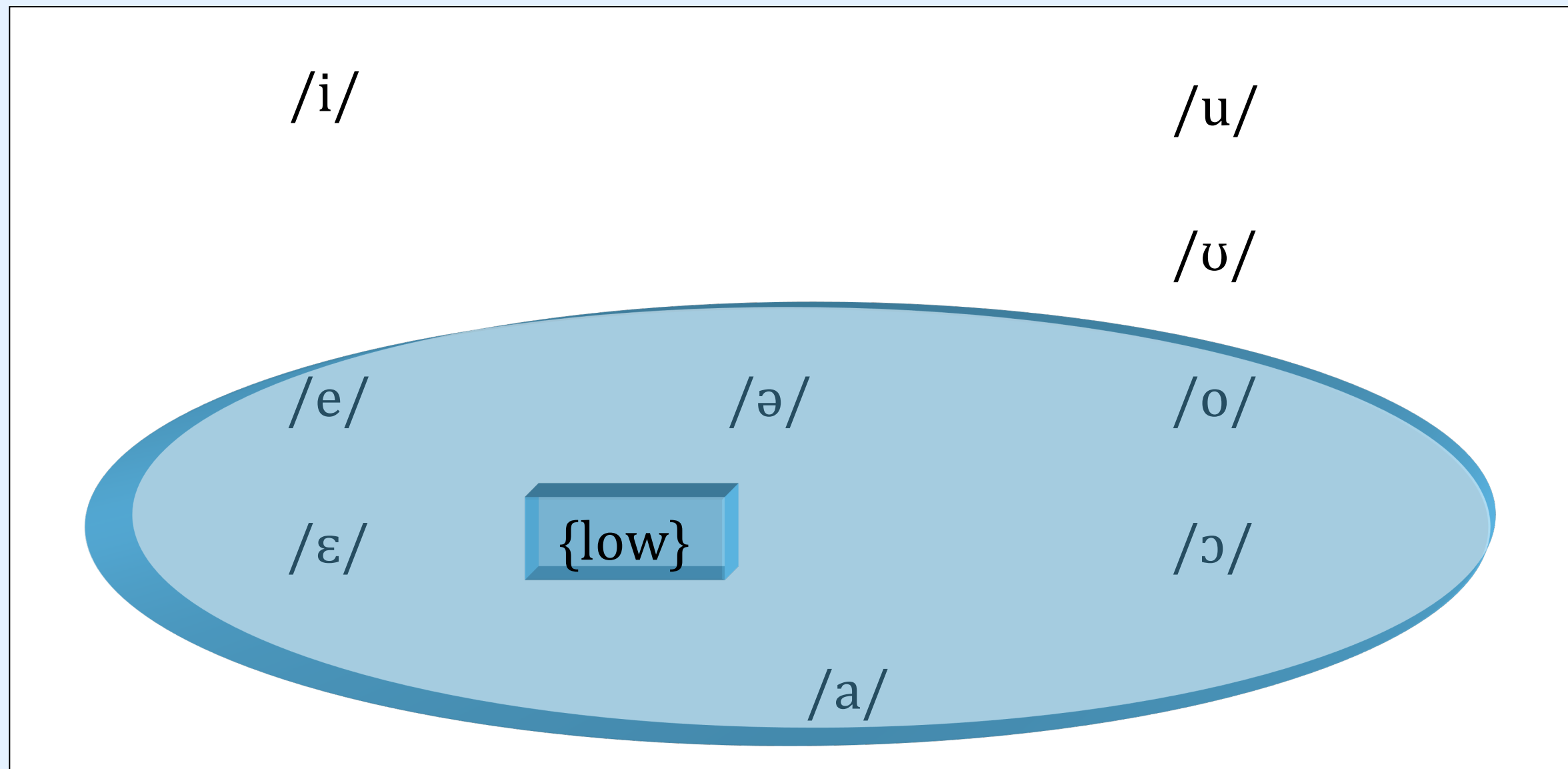
One height contrast

[high] would also be possible here. The hard part is knowing how many height categories there are (2), and where to draw the boundary between them.
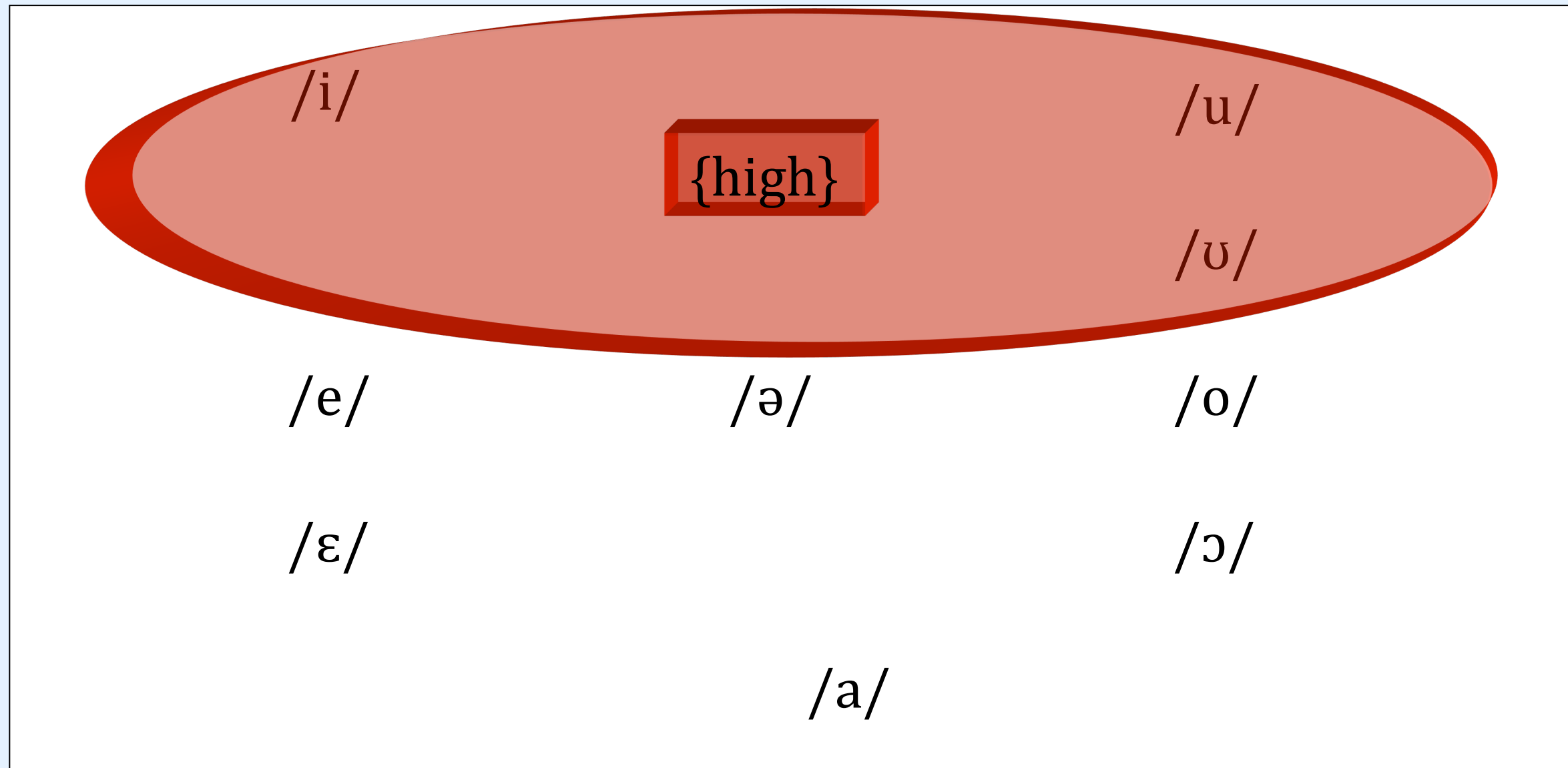
Xunke Oroqen contrastive features

Putting together the evidence of phonological activity surveyed to here, we need to arrive at a feature hierarchy that yields the required values.

Zhang (1996) proposes the feature hierarchy: [low] > [coronal] > [labial] > [RTR]

I adopt this analysis, substituting [front] for [coronal] and [round] for [labial]

Xunke Oroqen contrastive features
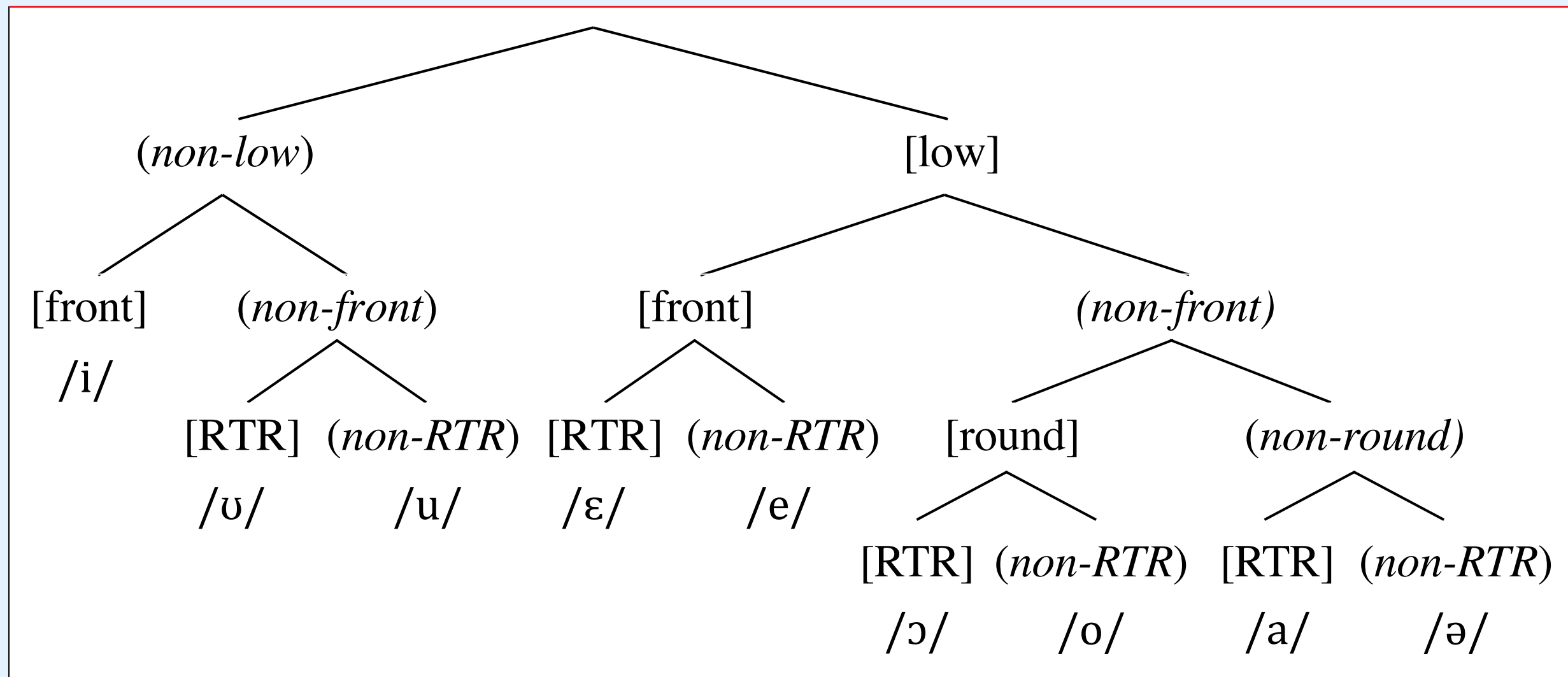
[low] > [front] > [round] > [RTR]

Xunke Oroqen contrastive features
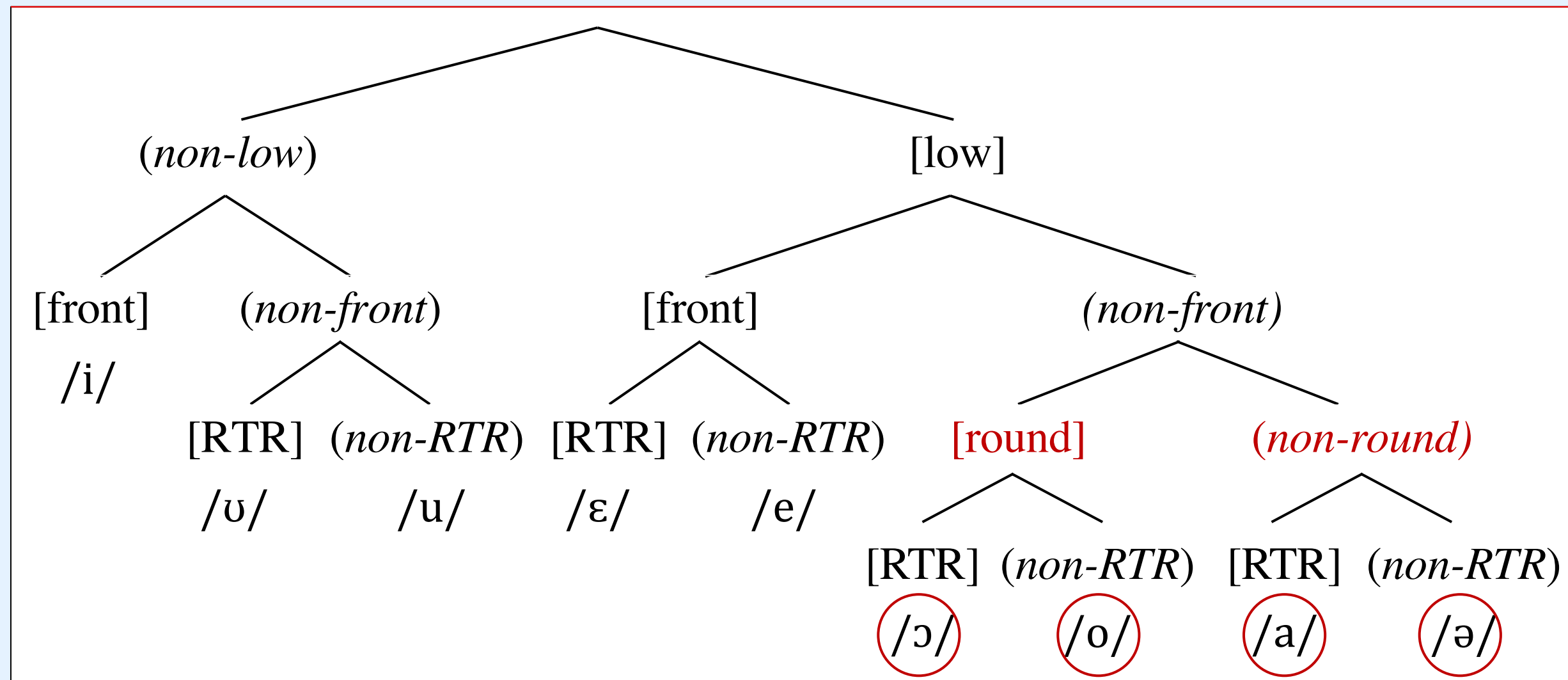
Only vowels with contrastive [±round] participate in labial harmony.

Xunke Oroqen contrastive features
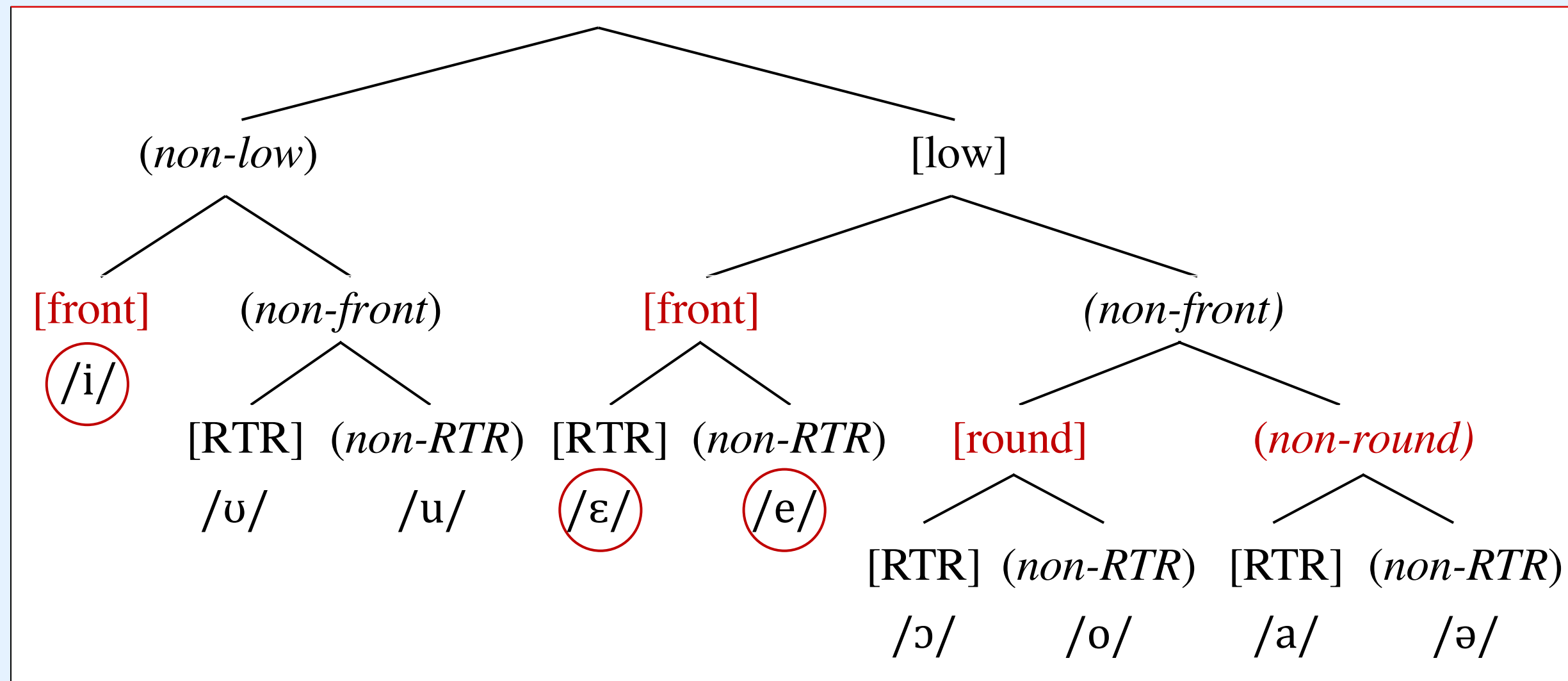
Only vowels with contrastive [front] cause palatalization.

Xunke Oroqen contrastive features
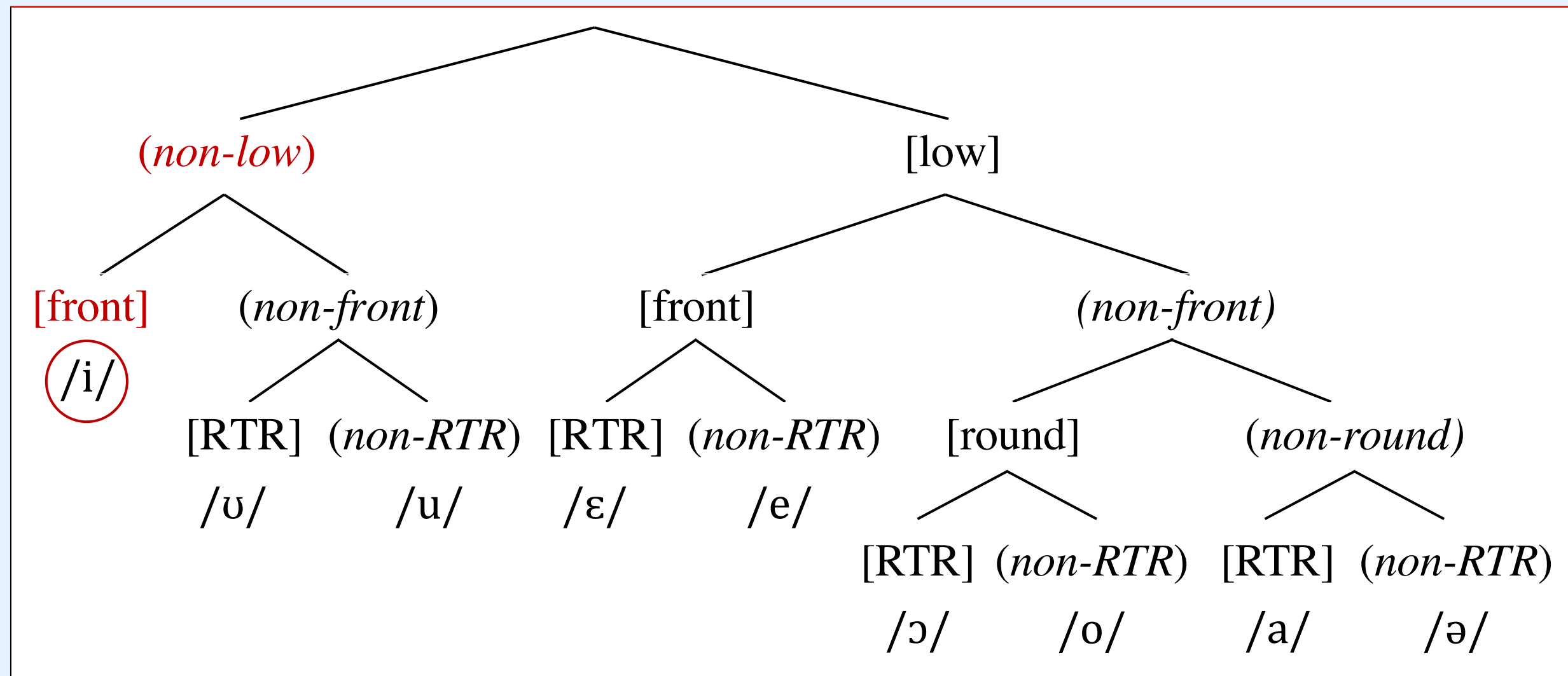
Though phonetically *{non-RTR}*, /i/ lacks the contrastive feature [±RTR], so does not participate in RTR harmony.

Xunke Oroqen contrastive features
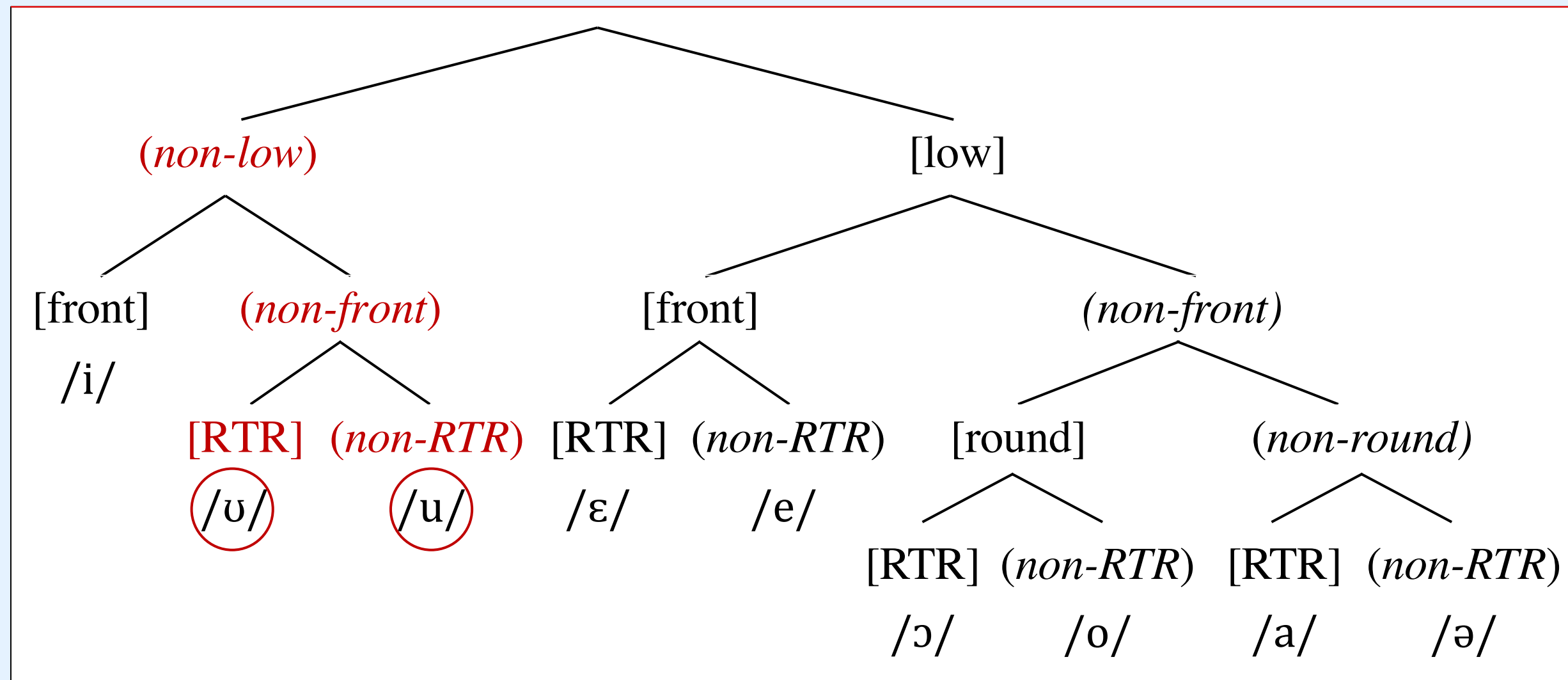
Though phonetically {round}, /u/ and /ʊ/ lack a contrastive feature [round], so they do not trigger rounding harmony.

Summary: synchronic phonology

To sum up, we have been able to give an account of the vowel phonology of Oroqen that is consistent with the Contrastivist Hypothesis: all the active features are contrastive.

Moreover, this analysis explains why certain vowels participate in certain processes and others do not, in ways that that are not obvious from their phonetic description.

While this may not be the only way to order the features, it can be shown that many other orders do not work.

Suppose we exchange [front] and [round] in the order, putting [round] first:

Xunke Oroqen contrastive features

```
                    _____/_____
              (non-low)                [low]
               __/\__
    (non-round)   [round]
        /i/         __/\__
              [RTR]   (non-RTR)
               /ʊ/       /u/
```
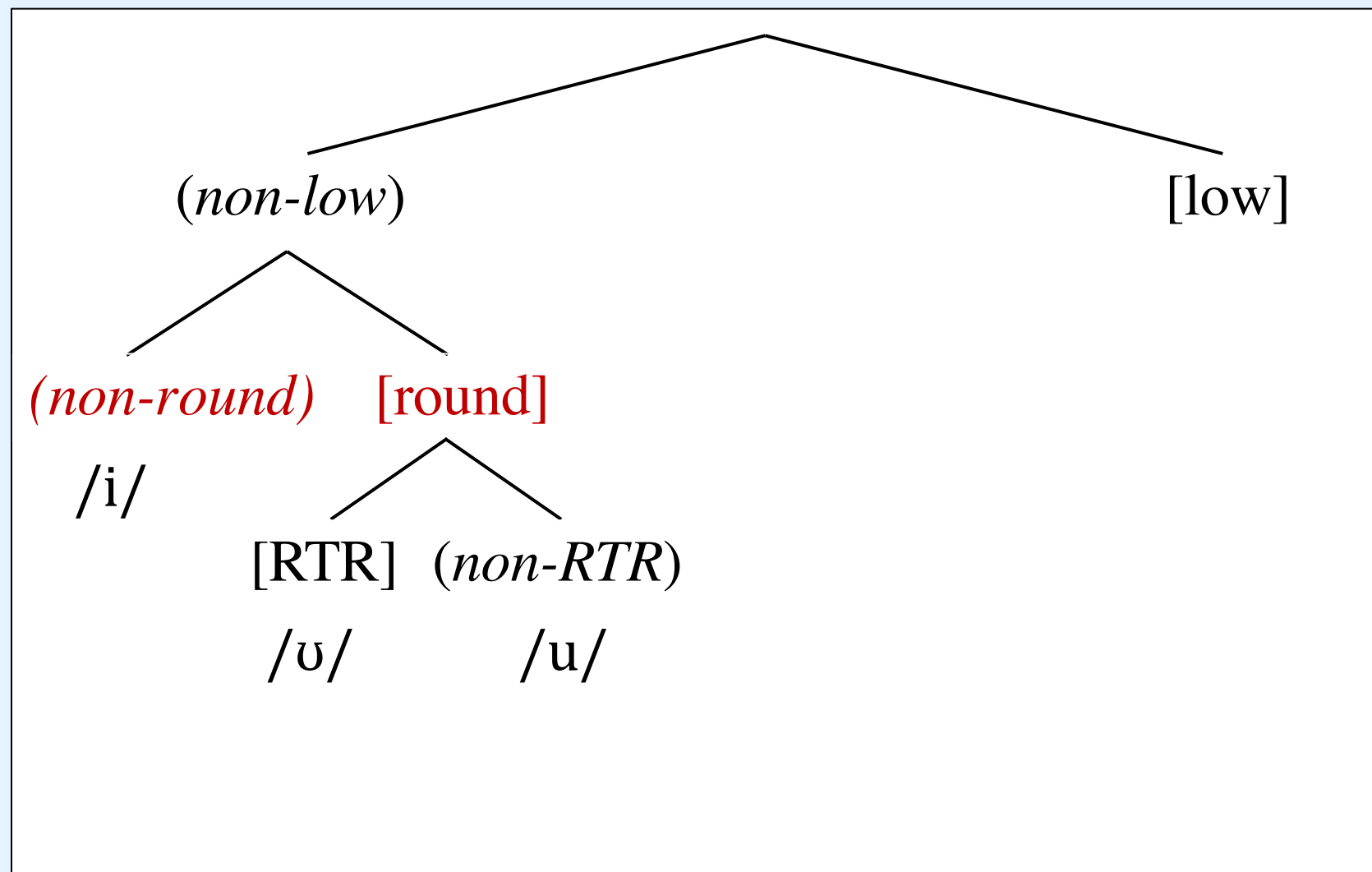
*[low] > [round] > [front] > [RTR]

In this order, [round] takes the place of [front] in the (non-low) part of the tree.

This is bad because
1. /i/ does not have a feature that can trigger palatalization.

2. /u, ʊ/ have a [round] feature they don't need.

References and further reading

For further reading see Dresher & Nevins (2017); Dresher (2018b); Ko (2018: Chap. 4):

Dresher, B. Elan & Andrew Nevins. 2017. Conditions on iterative rounding harmony in Oroqen. *Transactions of the Philological Society* 115(3), 365–394.

Dresher, B. Elan. 2018b. Contrastive hierarchy theory and the nature of features. In Wm. G. Bennett, Lindsay Hracs, & Dennis Ryan Storoshenko (eds.), *Proceedings of the 35th West Coast Conference on Formal Linguistics*, 18–29. Somerville, MA: Cascadilla Proceedings Project.

Ko, Seongyeon. 2018. *Tongue root harmony and vowel contrast in Northeast Asian languages.* Wiesbaden: Harrassowitz Verlag.

Department of Linguistics
UNIVERSITY of TORONTO

2. Laryngeal Harmony in Chadic

Phonetic and Phonological Properties of Inventories

The Successive Division Algorithm (SDA) does not stipulate an ordering of features.

With variation in feature ordering, phonetically similar inventories may be phonologically distinct, even if the same features are used to specify them.

We will illustrate this point with Ngizim and Hausa, two Chadic languages with distinct systems of laryngeal harmony (based on Mackenzie 2012, 2013).

Laryngeal Harmony in Ngizim and Hausa

Based on inventories in Schuh (1972, 2002) and Newman (2000), both languages have a three-way laryngeal contrast among coronals with voiced, voiceless, and implosive stops resulting in the inventory /t, d, ɗ/.

Ngizim stop inventory (Schuh, 2002)

	labial	alveolar	(alveo)palatal	lateral	velar	lab.velar
voiceless stop	p	t	tʃ		k	kʷ
voiced stop	b	d	dʒ		g	gʷ
glot. stop	ɓ	ɗ	dˠ/ˀy			

Hausa stop inventory (Newman, 2000)

	lab.	cor.	pal.	vel.	lab-vel.	pal-vel.	laryn.
vl	(f, fy)	t	c	k	kw	ky	
vd	b	d	j	g	gw	gy	
gl	ɓ	ɗ	ˀy	ƙ	ƙw	ƙy	ˀ

Ngizim Voicing Harmony

Ngizim has a cooccurrence restriction which prohibits voiced pulmonic obstruents from following voiceless ones (Schuh 1997; Hansson 2004, 2010; Mackenzie 2012, 2013).

gâ:zá	'chicken'	*k…z		kùtə́r	'tail'	*k…d
də́bâ	'woven tray'	*t…b		tàsáu	'find'	*t…z
zədù	'six'	*s…d				

voiceless stop	p	t	tʃ		k	kʷ
voiced stop	b	d	dʒ		g	gʷ
glot. stop	ɓ	ɗ	ɗˠ/'y			

Ngizim Voicing Harmony

Although phonetically voiced, implosives do not participate in the restriction and occur freely following voiceless stops (Schuh 1997).

kìːɗú	'eat (meat)'	√k…ɗ	pə́ɗə́k 'morning' √p…ɗ

The voiced and voiceless stops interact in voicing harmony to the exclusion of the implosives.

voiceless stop	p	t	tʃ		k	kʷ
voiced stop	b	d	dʒ		g	gʷ
glot. stop	ɓ	ɗ	ɗʸ/'y			

Ngizim Contrastive Hierarchy

This patterning can be accounted for with a hierarchy in which the feature [constricted glottis] is ordered above the feature [voice].

In the proposed hierarchy, implosive /ɗ/ is not contrastively specified for the feature [voice].

[constricted glottis] > [voice]

```
                /\
          [+c.g.]    [−c.g.]
           /ɗ/         /\
                 [+voice]  [−voice]
                   /d/        /t/
```
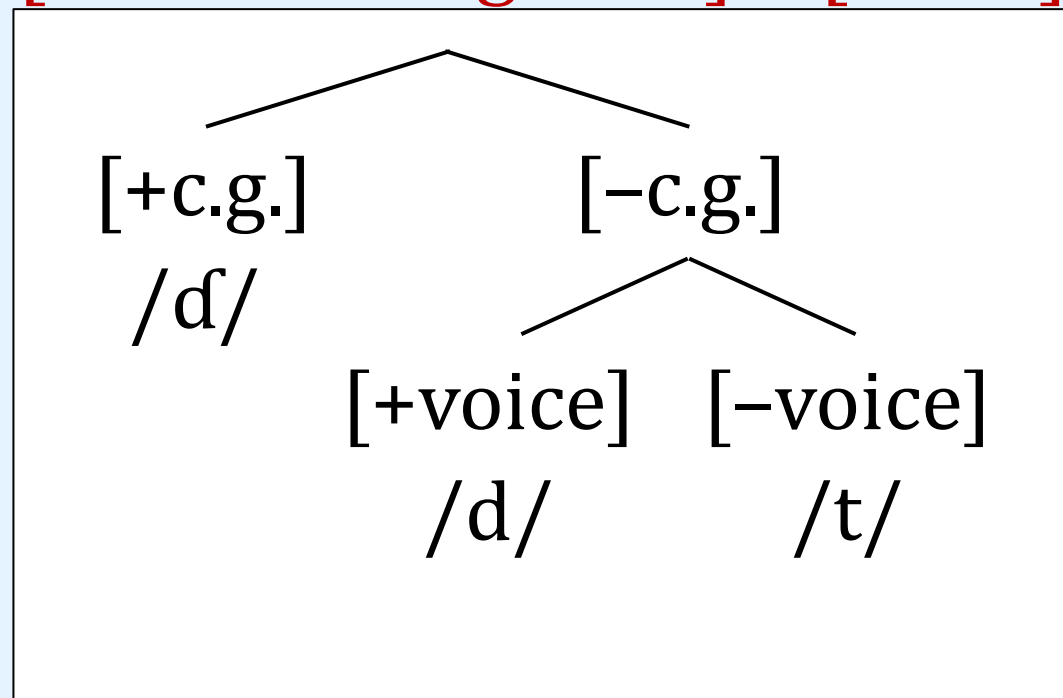
Ngizim Contrastive Hierarchy

If voicing harmony follows from a restriction barring [+voice] segments from occurring after [−voice] ones, the implosive is expected to be neutral.

The absence of a [+voice] specification for Ngizim /ɗ/ is supported by other aspects of phonological patterning.

[constricted glottis] > [voice]
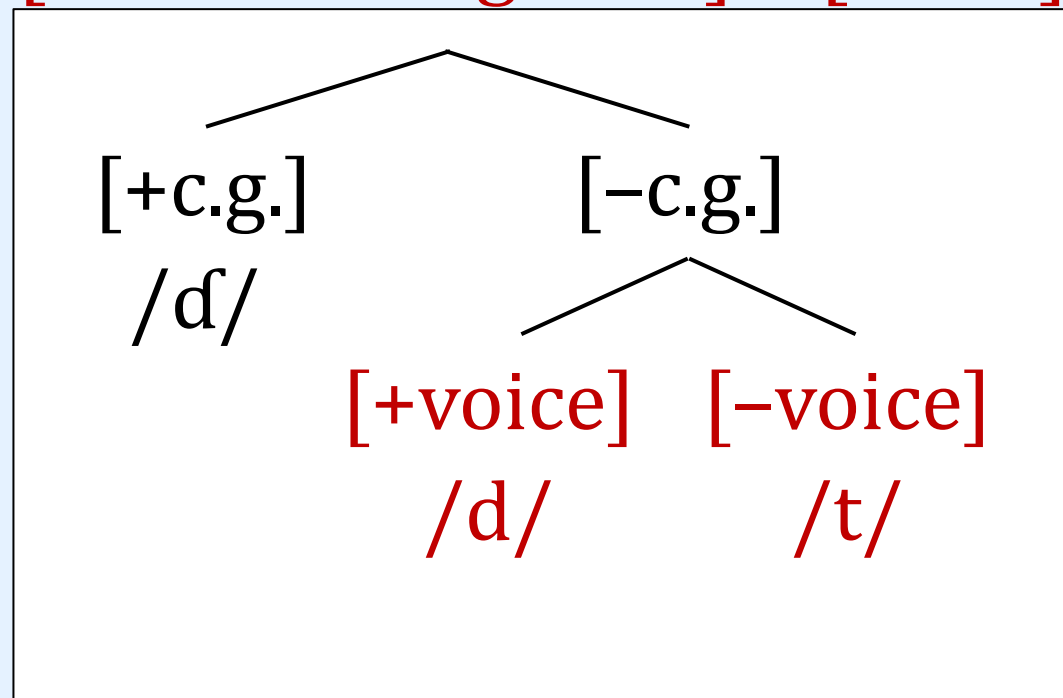
Ngizim implosives fail to pattern with voiced stops in restrictions on consonant clusters (Schuh 1997), local assimilation processes, and consonant-tone interaction (e.g. Tang 2008).

Hausa [constricted glottis] Harmony

Hausa implosives may not co-occur with their homorganic pulmonic counterparts (Newman 2000).

| ɓaɓe | 'quarrel' | *ɓaba | | ɗaɗa | 'to strike a blow' | *ɗadi |

This pattern has been analyzed as harmony in the feature [constricted glottis] which is parasitic on place (e.g. Hansson 2010; Rose & Walker 2004).

	lab.	cor.	pal.	vel.	lab-vel.	pal-vel.	laryn.
vl	(f, fy)	t	c	k	kw	ky	
vd	b	d	j	g	gw	gy	
gl	ɓ	ɗ	'y	ƙ	ƙw	ƙy	'

Hausa [constricted glottis] Harmony

Significantly, implosives may occur with homorganic stops that differ in voicing (Newman 2000).

ɗata	'a small, bitter, green tomato'	√ɗ…t

The implosive and pulmonic voiced stops interact in [constricted glottis] harmony to the exclusion of the voiceless stop.

	lab.	cor.	pal.	vel.	lab-vel.	pal-vel.	laryn.
vl	(f, fy)	t	c	k	kw	ky	
vd	b	d	j	g	gw	gy	
gl	ɓ	ɗ	'y	ƙ	ƙw	ƙy	'

Hausa Contrastive Hierarchy

/d/ and /ɗ/are partners which share a specification for [voice] and differ only in the feature [constricted glottis].

This pattern can be accounted for with a hierarchy in which the feature [voice] is ordered above the feature [constricted glottis] (Mackenzie 2012, 2013).

[voice] > [constricted glottis]

```
              [+voice]        [−voice]
                                 /t/
          [+c.g.]    [−c.g.]
           /ɗ/         /d/
```

56
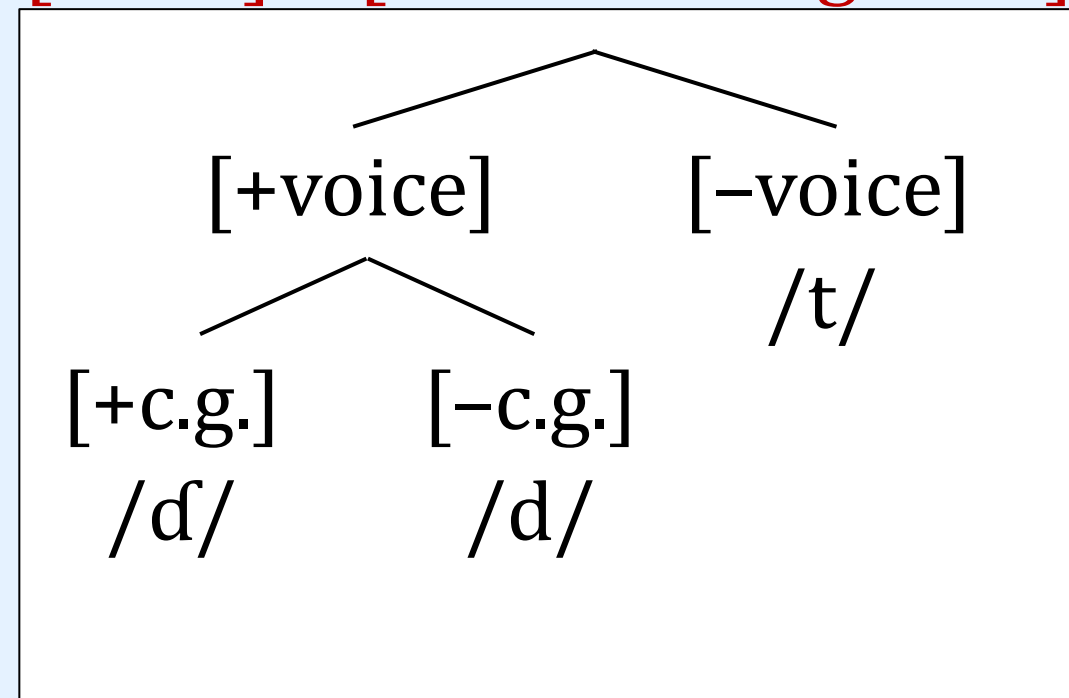
Hausa Contrastive Hierarchy

In the proposed hierarchy, /t/ is not contrastively specified for the feature [constricted glottis].

If harmony follows from a restriction barring segments which differ only in [constricted glottis] from co-occurring, we expect /t/ to pattern as neutral.

[voice] > [constricted glottis]

57
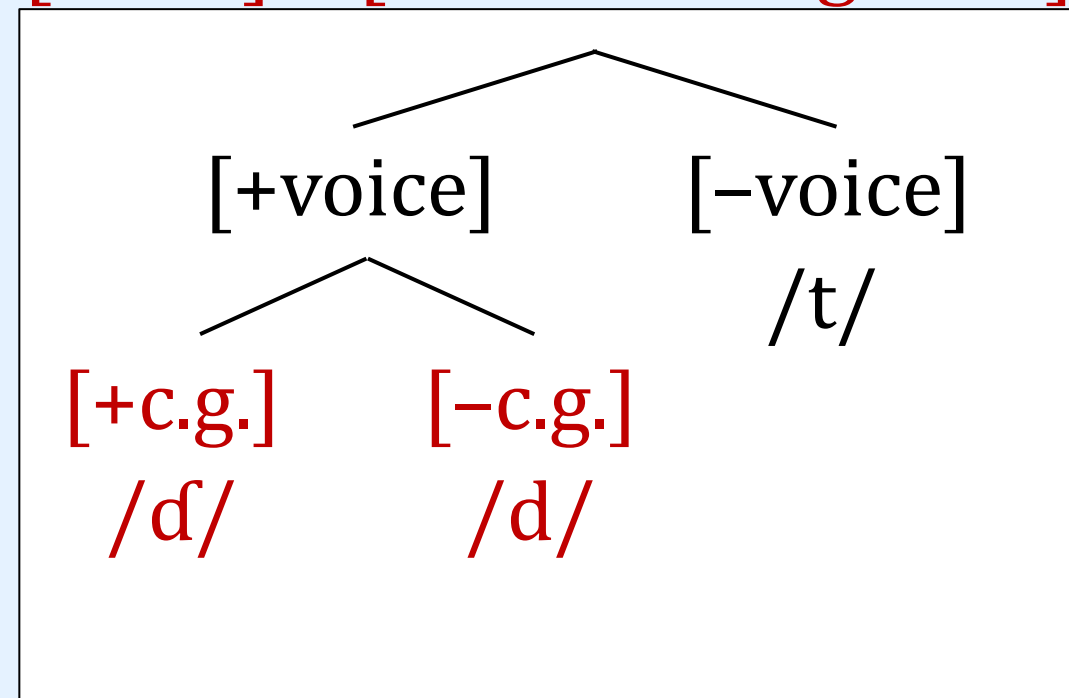
Phonetic and Phonological Properties of Inventories

Ngizim and Hausa have phonetically similar inventories of coronal stops.

Differences in the order of features in their contrastive hierarchies result in differences in feature specifications for phonetically similar segments.

[constricted glottis] > [voice]

```
              /\
    [+c.g.]       [–c.g.]
     /ɗ/            /\
           [+voice]   [–voice]
             /d/         /t/
```

Ngizim

[voice] > [constricted glottis]

```
              /\
    [+voice]       [–voice]
       /\             /t/
[+c.g.]   [–c.g.]
  /ɗ/       /d/
```

Hausa

58
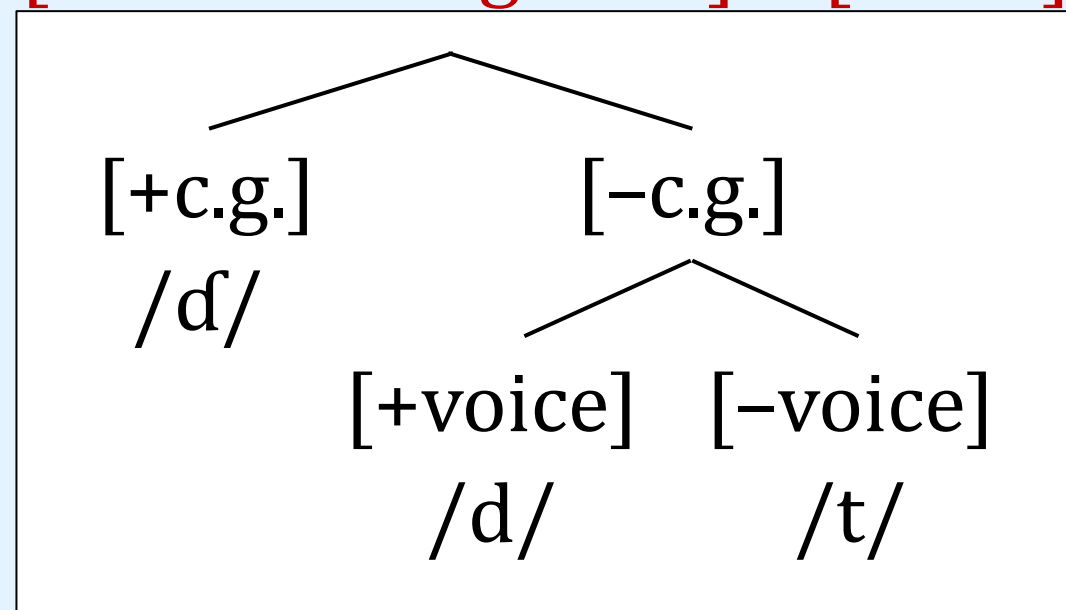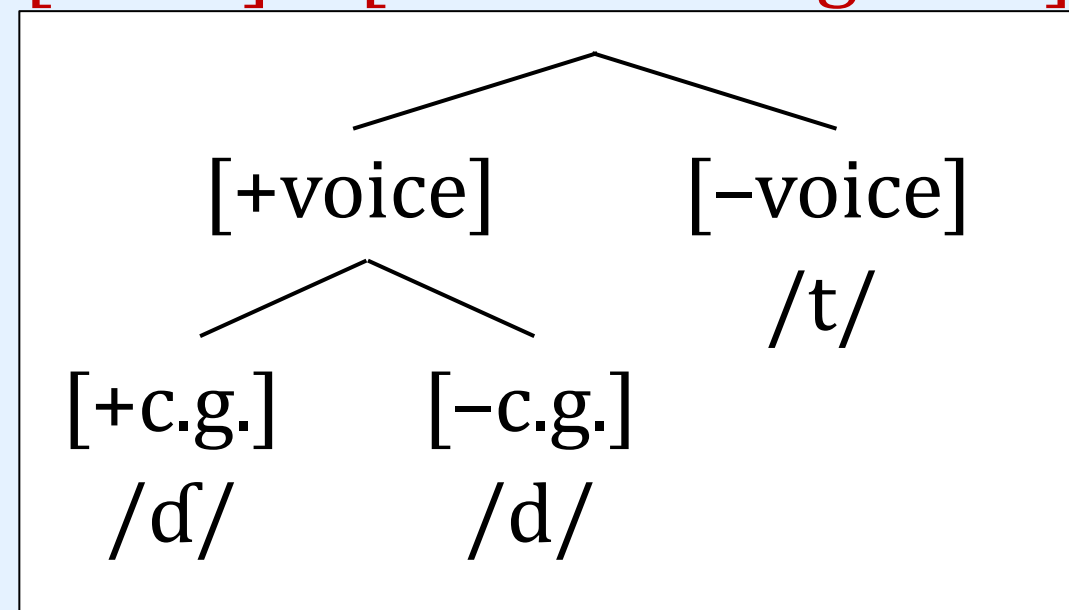
Ngizim and Hausa Implosives in PHOIBLE

PHOIBLE (Moran & McCloy 2019) represents the voiced, glottalized, coronal stop in Ngizm as /ɗ̰/, a symbol representing a laryngealized, voiced plosive (Moran 2012: 617).

The voiced, glottalized, coronal stop in Hausa is represented as /ɗ/, which is a voiced implosive (Moran 2012: 620).

These different symbols are accompanied by different feature specifications:

Ngizim /ɗ̰/
[+constricted glottis]
[–lowered larynx implosive]
[+periodic glottal source]

Hausa /ɗ/
[–constricted glottis]
[+lowered larynx implosive]
[+periodic glottal source]

Ngizim and Hausa Implosives in PHOIBLE

This raises the question of whether these implosives have distinct phonetic properties that could play a role in their differing phonological behaviour.

However, a number of points suggest that the distinct feature specifications used in PHOIBLE are not motivated by phonetic facts.

Instead, the different features likely follow from a principle of PHOIBLE that "if two phonemes differ in their graphemic representation, then they necessarily differ in their featural representation as well" (Moran & McCloy, 2019).

Ngizim /ɗ̰/	Hausa /ɗ/
[+constricted glottis]	[−constricted glottis]
[−lowered larynx implosive]	[+lowered larynx implosive]
[+periodic glottal source]	[+periodic glottal source]

Ngizim Implosives in PHOIBLE

Whereas PHOIBLE gives several sources for the Hausa inventory, the Ngizim inventory is based on UPSID; both databases give a single source, Schuh 1972.

Schuh (1972) lists /ɗ/ as a glottalized stop in the consonant chart, but provides no phonetic description in the phonological sketch of Ngizim.

Elsewhere (e.g. Schuh 1997), he uses the feature [implosive] to characterize /ɗ/.

Ngizim /ɗ̰/
[+constricted glottis]
[–lowered larynx implosive]
[+periodic glottal source]

There is therefore no phonetic description in the source that motivates the choice of [–lowered larynx implosive] for Ngizim /ɗ/.

Hausa Implosives in PHOIBLE

The PHOIBLE feature specifications also pose a challenge for the characterization of the class of glottalized stops in Hausa.

In PHOIBLE, Hausa /ɗ/ and /k'/ do not share any laryngeal features.

Hausa /k'/

[+constricted glottis]
[–lowered larynx implosive]
[–periodic glottal source]
[+raised larynx ejective]

Hausa /ɗ/

[–constricted glottis]
[+lowered larynx implosive]
[+periodic glottal source]
[–raised larynx ejective]

Hausa Implosives in PHOIBLE

Yet /ɗ/ and /k'/ both participate in laryngeal harmony in Hausa which is parasitic on place and voicing (Newman 2000).

k'uk'uta 'try hard' *k'aka	ɗaɗa 'strike a blow' *ɗadi

Both segments also participate in a general restriction on the cooccurrence of multiple, unlike glottalized segments.

*ɓak'a	*s'aɓa	*k'aɗa

Hausa laryngeal features across place of articulation

- In Hausa, the laryngeal contrast among stops is not uniform across place of articulation.

- Whereas the coronal series is /t, d, ɗ/, with a voiced implosive, the velar series is /k, g, k'/, with a voiceless ejective.

- If place features are ordered above laryngeal features, and [voice] is ordered above [c.g.], [–c.g.] will be contrastive for /k/ but not for /t/.

	lab.	cor.	pal.	vel.	lab-vel.	pal-vel.	laryn.
vl	(f, fy)	t	c	k	kw	ky	
vd	b	d	j	g	gw	gy	
gl	ɓ	ɗ	'y	ƙ	ƙw	ƙy	'

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Hausa laryngeal features across place of articulation

[dorsal] > [voice] >[constricted glottis]
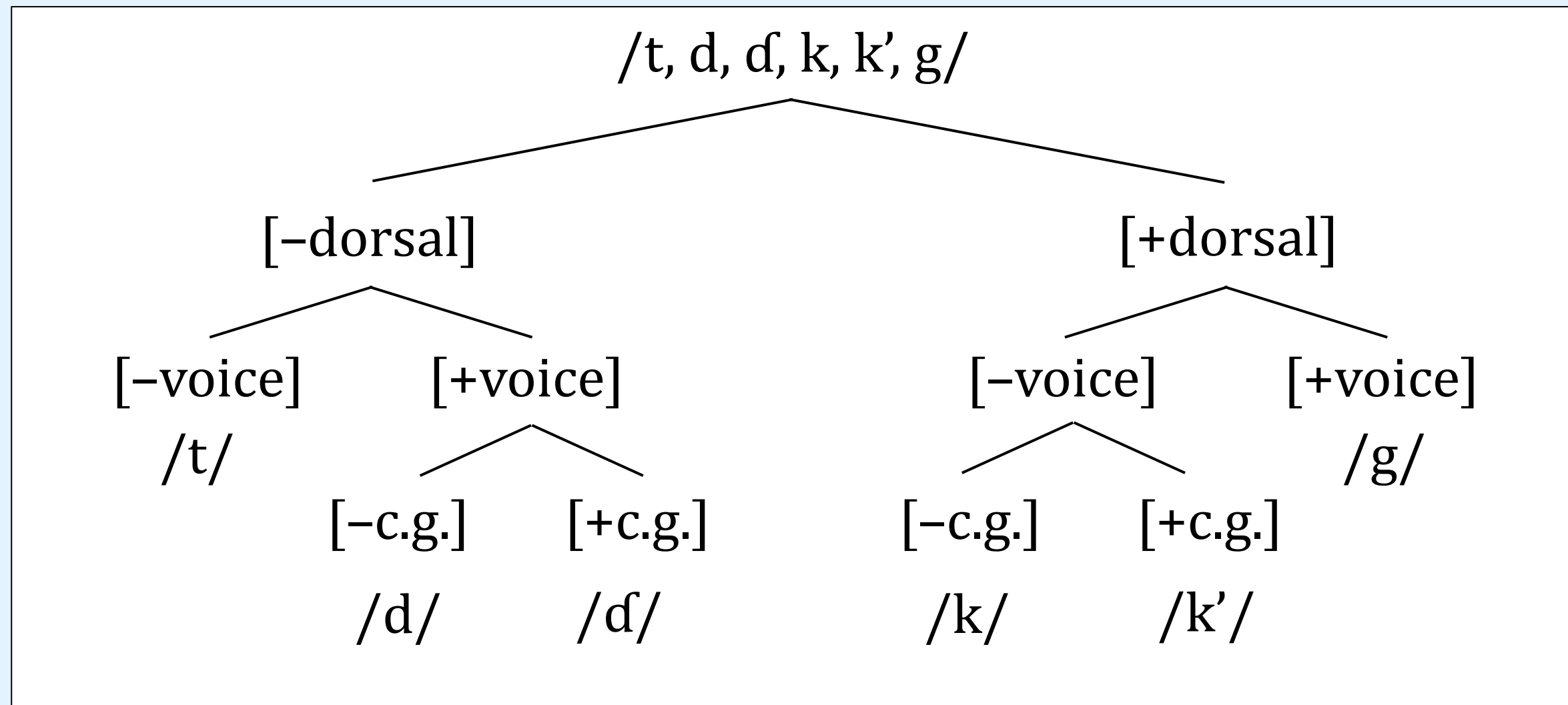
Ngizim and Hausa Implosives in PHOIBLE

The use of [+constricted glottis] to characterize Ngizim /ɗ/ and [+lowered larynx implosive] to characterize Hausa /ɗ/ follows only from differences in informal descriptions in the source documents and PHOIBLE's commitment to representing graphemic distinctions as feature-based ones, not from phonetic or phonological factors.

Nonetheless, in the theory of the contrastive hierarchy, it is not crucial that the feature used to distinguish relevant segments be 'the same' across languages.

Ngizim /ɗ̰/
[+constricted glottis]
[–lowered larynx implosive]
[+periodic glottal source]

Hausa /ɗ/
[–constricted glottis]
[+lowered larynx implosive]
[+periodic glottal source]

Ngizim and Hausa Implosives in Contrastive Hierarchy Theory

In the case of Ngizim and Hausa, it is not important whether [constricted glottis] or [implosive] is the relevant feature distinguishing /ɗ/ from /d/.

It is a feature's role in language-specific systems of oppositions that is crucial, rather than its phonetic definition, which may be more or less abstract.

[constricted glottis] > [voice]
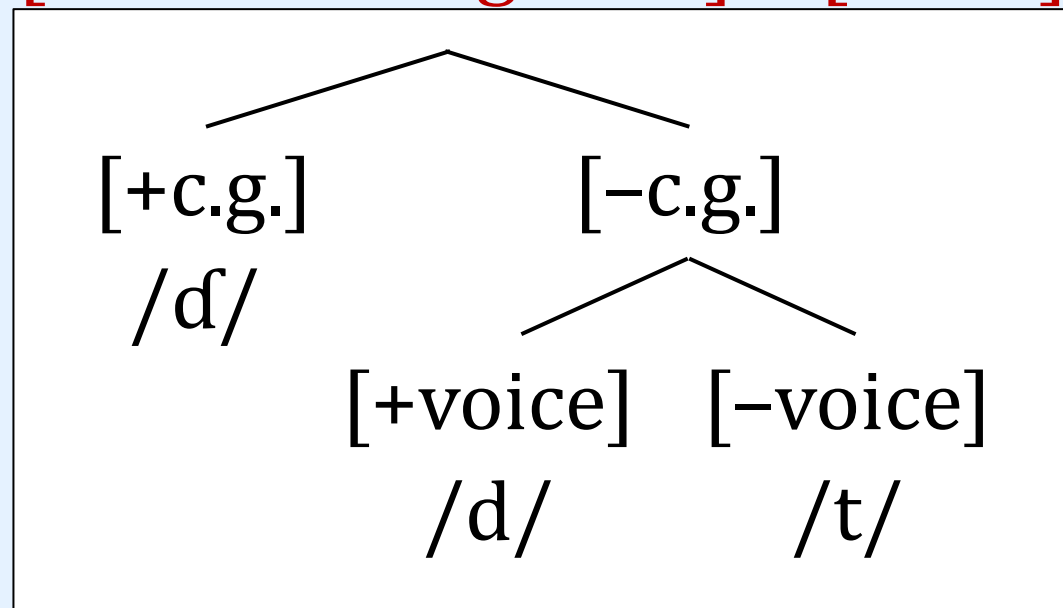
[+c.g.]   [−c.g.]
  /ɗ/
        [+voice]   [−voice]
          /d/   /t/

Ngizim

[voice] > [constricted glottis]

[+voice]   [−voice]
                     /t/
[+c.g.]   [−c.g.]
  /ɗ/   /d/

Hausa

67
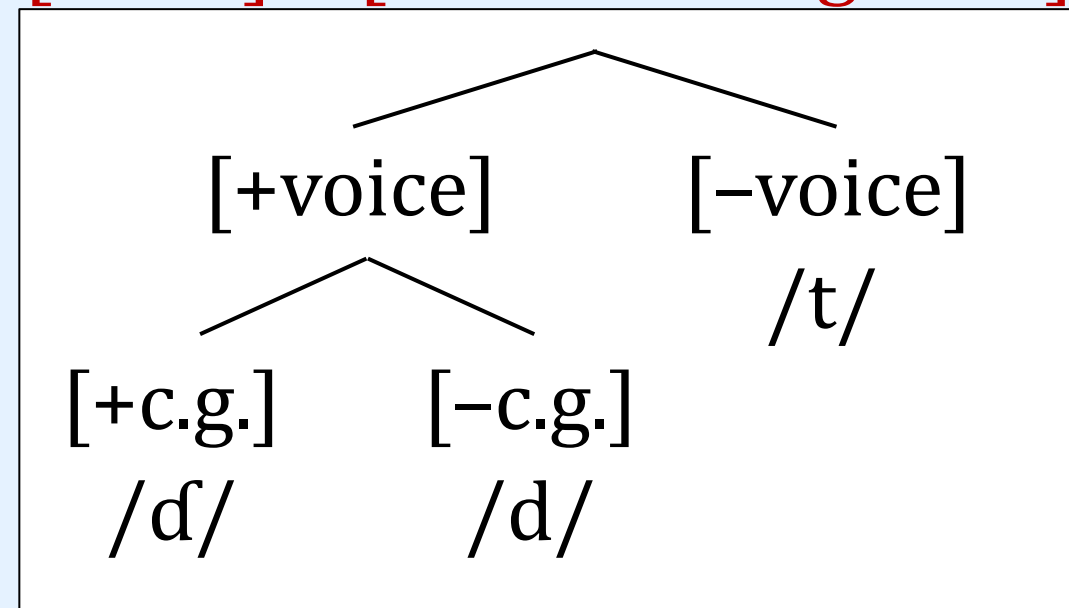
References and further reading

For further reading see Mackenzie (2012, 2013):

Mackenzie, Sara. 2012. Near-identity and laryngeal harmony. *McGill Working Papers in Linguistics* 22.

Mackenzie, Sara. 2013. Laryngeal co-occurrence restrictions in Aymara: Contrastive representations and constraint interaction. *Phonology* 30(2): 297–345.

3. /h/ in German and Czech

Trubetzkoy's *Grundzüge der Phonologie (1939)*
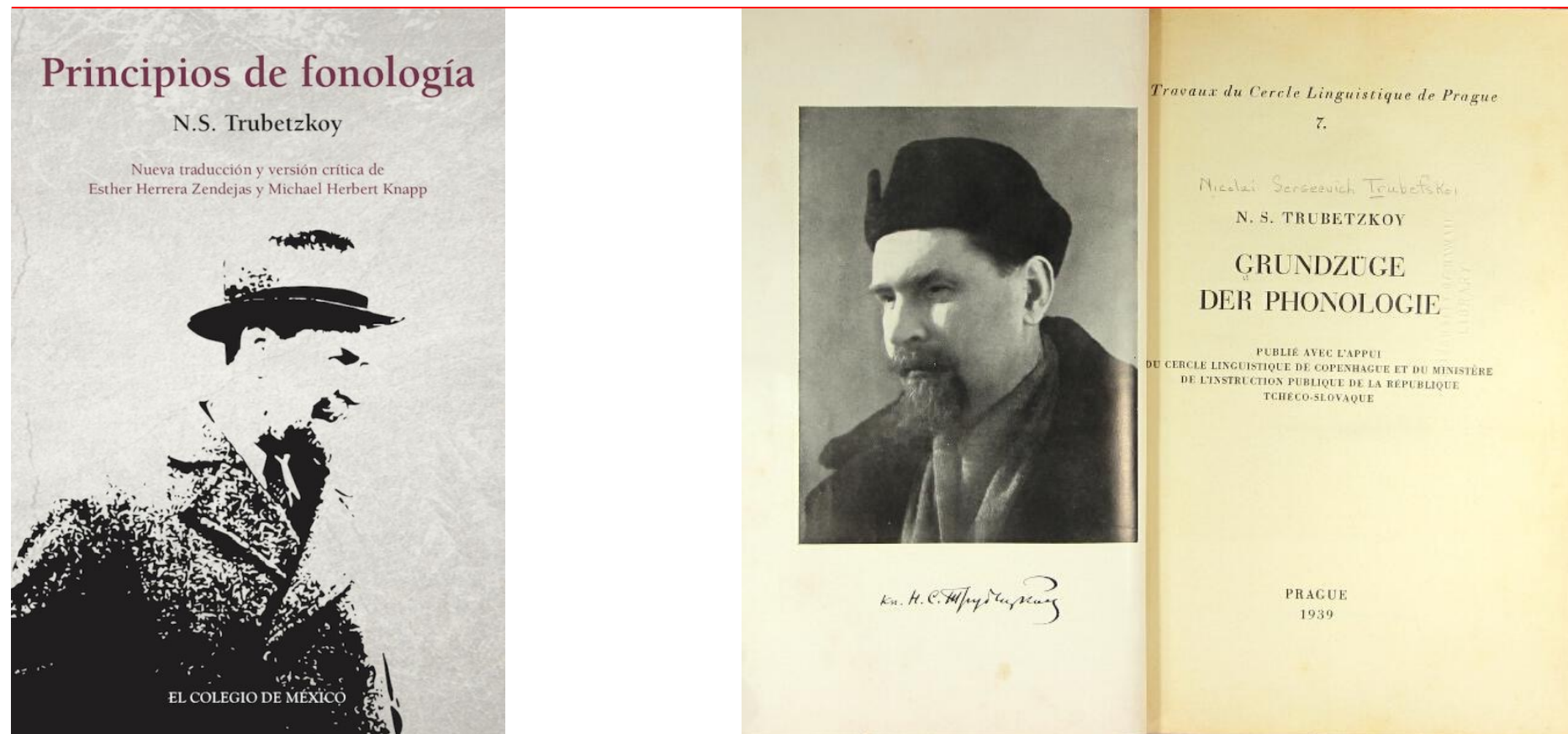
Trubetzkoy (1939) has an interesting discussion of the difference in contrastive status of German /h/ and Czech /ɦ/.

Oppositions

An important concept in Trubetzkoy's theory is that of an opposition.

Every phoneme of a language enters into an opposition with every other phoneme; an opposition holds between pairs of phonemes, e.g. p ~ b and p ~ ŋ.

p	pf	t	ts		k	
b		d			g	
	f		s	ʃ	x	h
	v		z			
m		n			ŋ	
		l			r	
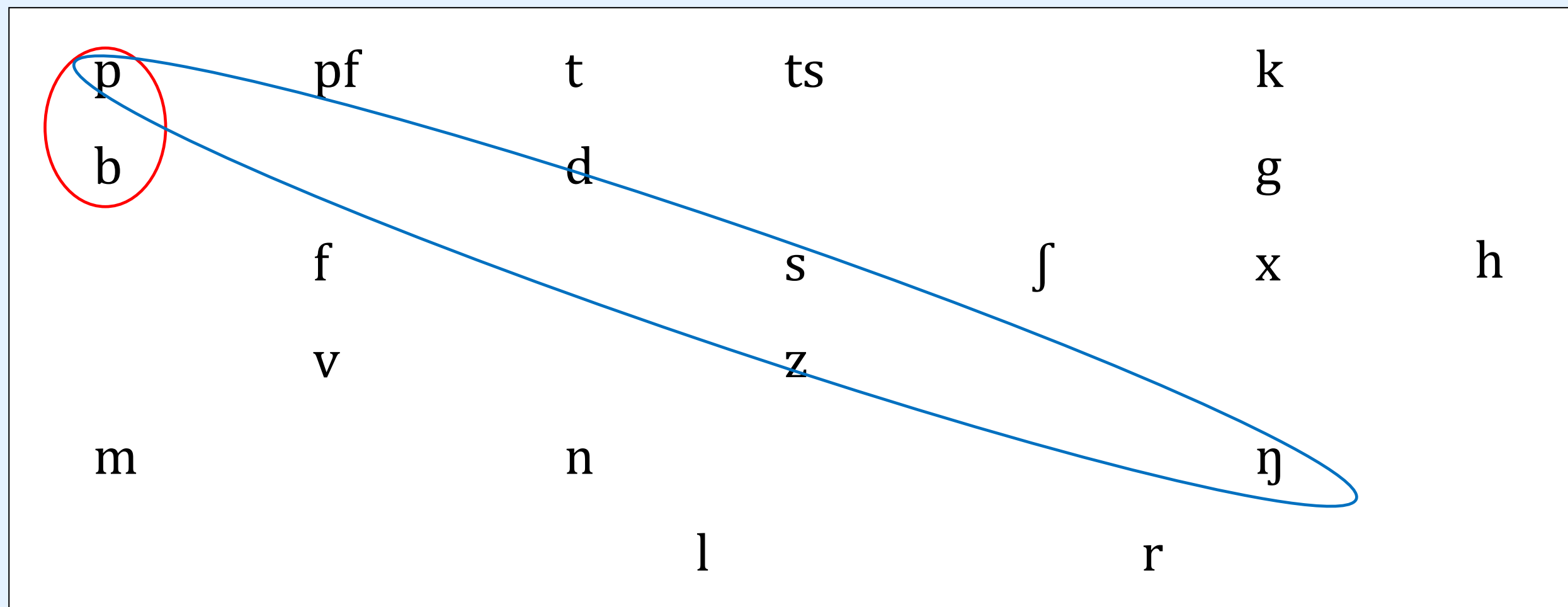
Bilateral and multilateral oppositions

Trubetzkoy classifies oppositions in terms of their "basis of comparison", those properties that the opposition members share: whether the shared properties are unique to those two members or not. (1969: 68; 2019: 109)

"In the case of bilateral oppositions ... the sum of the properties common to both opposition members, is common to these two opposition members alone."
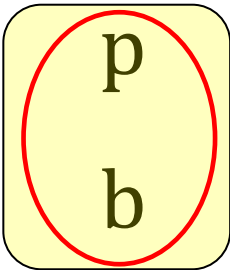
"The basis of comparison of a multilateral opposition, on the other hand, is not limited exclusively to the two respective opposition members."

The German opposition *p ~ b* is bilateral

An example of a bilateral opposition is p ~ b in the language below, which shows the consonants of standard German.

They are the only bilabial stops in this language, so the basis of comparison is unique to them alone.

p	pf	t	ts		k
b		d			g
bilabial stops	f		s	ʃ	x	h
	v		z		
m		n			ŋ
		l		r	

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The German opposition *p ~ z* is multilateral

The opposition between p ~ z is multilateral: let us assume that they have the following features:

p is   obstruent   bilabial   stop   voiceless
z is   obstruent   alveolar   fricative   voiced

p   pf   t   ts   k

b   d   g

       f   s   ʃ   x   h

       v   z

m   n   ŋ

                  l   r
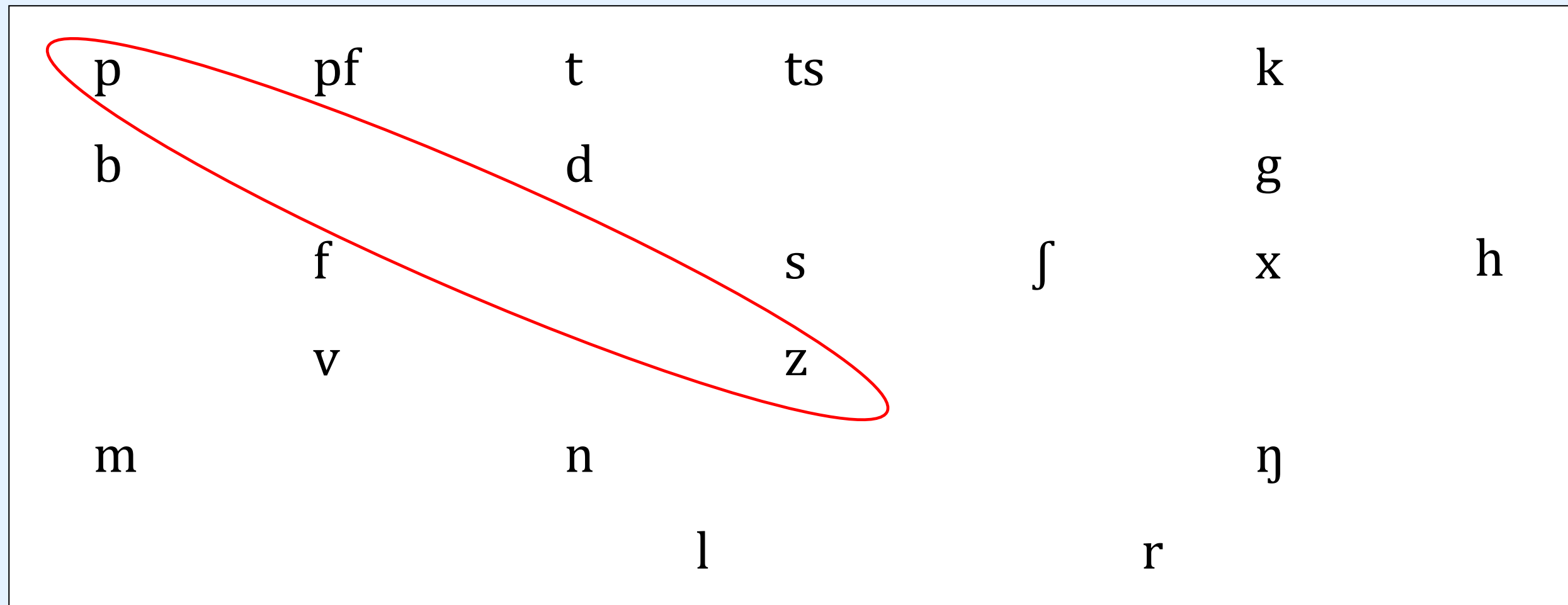
The German opposition *p ~ z* is multilateral

The only feature they have in common is obstruent; but this property is shared by many other phonemes in this language, making p ~ z a multilateral opposition.

p is   obstruent   bilabial   stop   voiceless

z is   obstruent   alveolar   fricative   voiced

p	pf	t	ts		k	
b		d		*obstruents*	g	
f		s	∫		x	h
v		z				
m		n			ŋ	
		l			r	
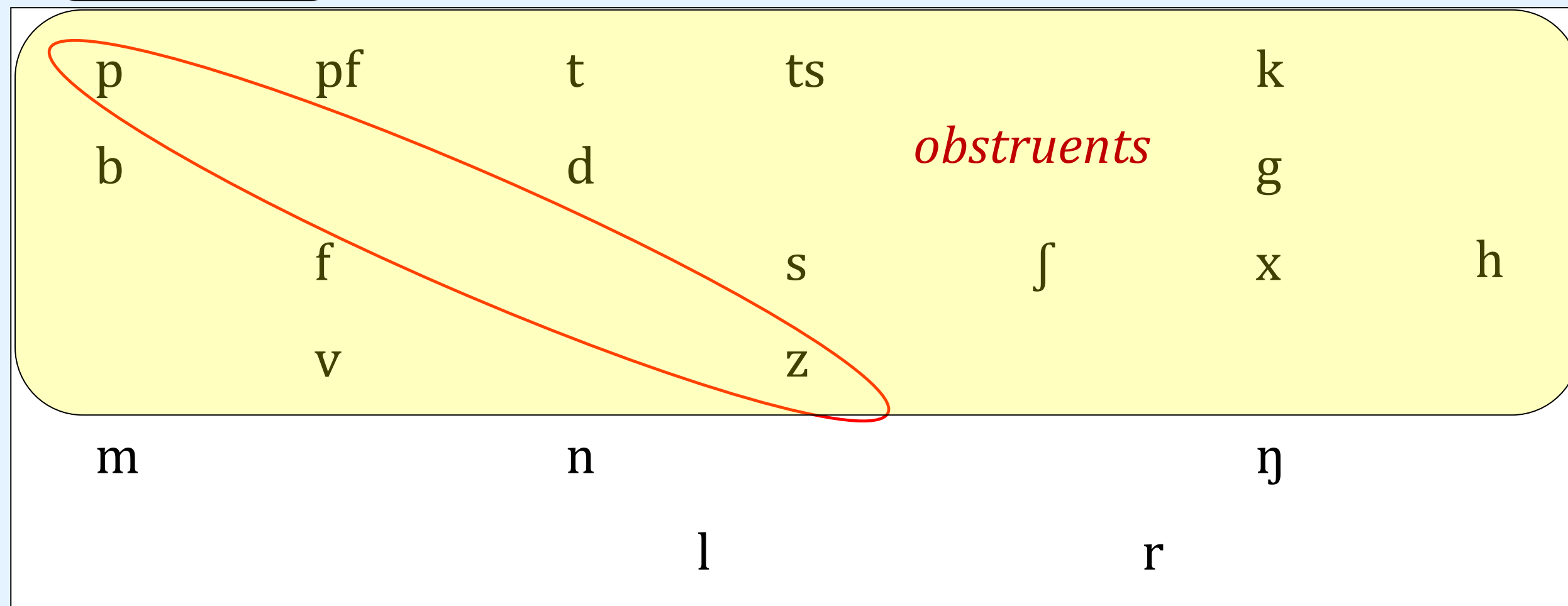
The German opposition *h ~ x*

According to Trubetzkoy (1969: 69), German h does not take part in any bilateral oppositions.

This is because h is set apart by being the only consonant with laryngeal place, and it has no other feature that it shares with only one other consonant.

p	pf	t	ts		k	
b		d			g	
	f		s	ʃ	x	h
	v		z			
m		n			ŋ	
		l		r		

The German opposition *h ~ x*

In particular, it is not in a bilateral opposition with x; Trubetzkoy proposes the following distinctive features:

h	is	obstruent	laryngeal	fricative	voiceless
x	is	obstruent	velar	fricative	voiceless

p		pf		t		ts				k	
b				d						g	
		f				s		ʃ		x	h
		v				z					
m				n						ŋ	
				l						r	

The German opposition *h ~ x*

The features they share are obstruent, fricative, and voiceless.

h is [obstruent] laryngeal [fricative   voiceless]

x is [obstruent] velar [fricative   voiceless]

p	pf	t	ts		k
b		d			g
	f		s	ʃ	x h
	v		z		
m		n			ŋ
		l		r	

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The German opposition *h ~ x*

These features are shared by other phonemes, so the opposition is multilateral.

h is obstruent   laryngeal   fricative   voiceless

x is obstruent   velar   fricative   voiceless

p	pf	t	ts		k
b		d			g
f	*voiceless fricatives*	s	ʃ	x	h
v		z			
m		n			ŋ
		l		r	

The Czech opposition *ɦ ~ x*

Looking at the Czech consonant inventory, one might suppose that Czech ɦ is similarly isolated. Comparing ɦ and x:

p	t	c	k	
b	d	ɟ	g	
	ts	tʃ		
f	s	ʃ	x	ɦ
v	z	ʒ		
m	n	ɲ		
	r	r̝		
	l			
	j			

The Czech opposition *ɦ ~ x*

We might think their distinctive features are similar to German:

ɦ is obstruent   laryngeal   fricative   voiced
x is obstruent   velar   fricative   voiceless

p	t	c	k
b	d	ɟ	g
	ts	tʃ	
f	s	ʃ	x
v	z	ʒ	ɦ
m	n	ɲ	
	r	r̝	
	l		
	j		

The Czech opposition *ɦ ~ x*

If so, then the features they share are obstruent and fricative.

ɦ	is	obstruent	laryngeal	fricative	voiced
x	is	obstruent	velar	fricative	voiceless

p	t	c	k
b	d	ɟ	g
	ts	tʃ	
f	s	ʃ	x ɦ
v	z	ʒ	
m	n	ɲ	
	r	r̝	
	l		
		j	

The Czech opposition *ɦ ~ x*

The ɦ ~ x opposition thus appears to be multilateral.

ɦ   is   obstruent   laryngeal   fricative   voiced
x   is   obstruent   velar   fricative   voiceless

p	t	c	k
b	d	ɟ	g
	ts	tʃ	
f	s *obstruent* ʃ		x
v	z *fricatives* ʒ		ɦ
m	n	ɲ	
	r	r̝	
	l		
	j		

The Czech opposition *ɦ ~ x*

However, Trubetzkoy (124) proposes that Czech h (or more properly, voiced ɦ), forms a bilateral opposition with x.

p	t	c	k
b	d	ɟ	g
	ts	tʃ	
f	s	ʃ	x
v	z	ʒ	ɦ
m	n	ɲ	
	r	r̝	
	l		
		j	

The Czech opposition *ɦ ~ x*

The reason is that the distinction between these phonemes can be neutralized, for they behave phonologically like a voiced-voiceless pair, like the other such pairs in Czech.

p	t	c	k
b	d	ɟ	g
	ts	tʃ	
f	s	ʃ	x
v	z	ʒ	ɦ
m	n	ɲ	
	r	r̝	
	l		
		j	
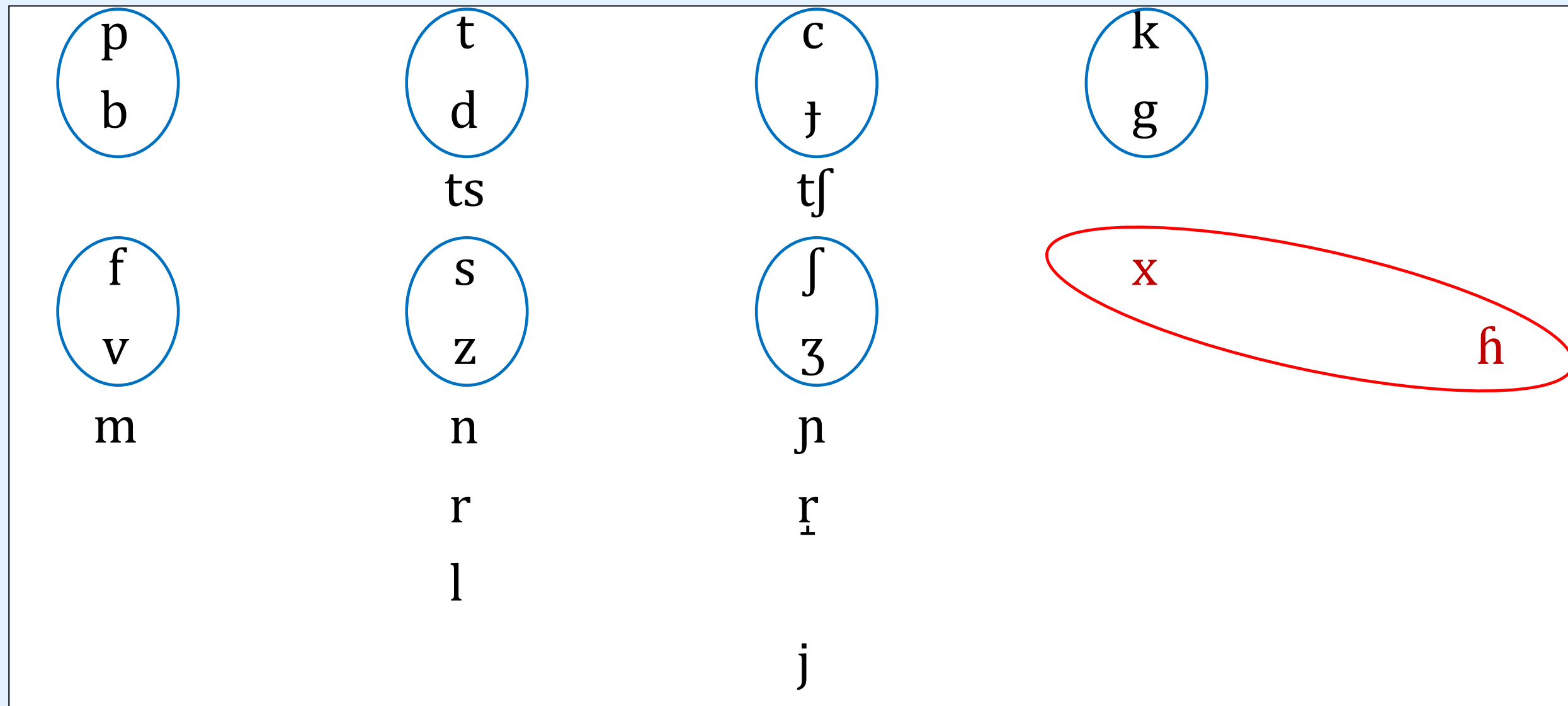
The Czech opposition *ɦ ~ x*

That is, in certain positions voiced obstruents are devoiced to their voiceless partner: b becomes p, d becomes t, and similarly for the other circled pairs, including ɦ which becomes x.

p		t		c		k
b		d		ɟ		g
		ts		tʃ		
f		s		ʃ		x
v		z		ʒ		ɦ
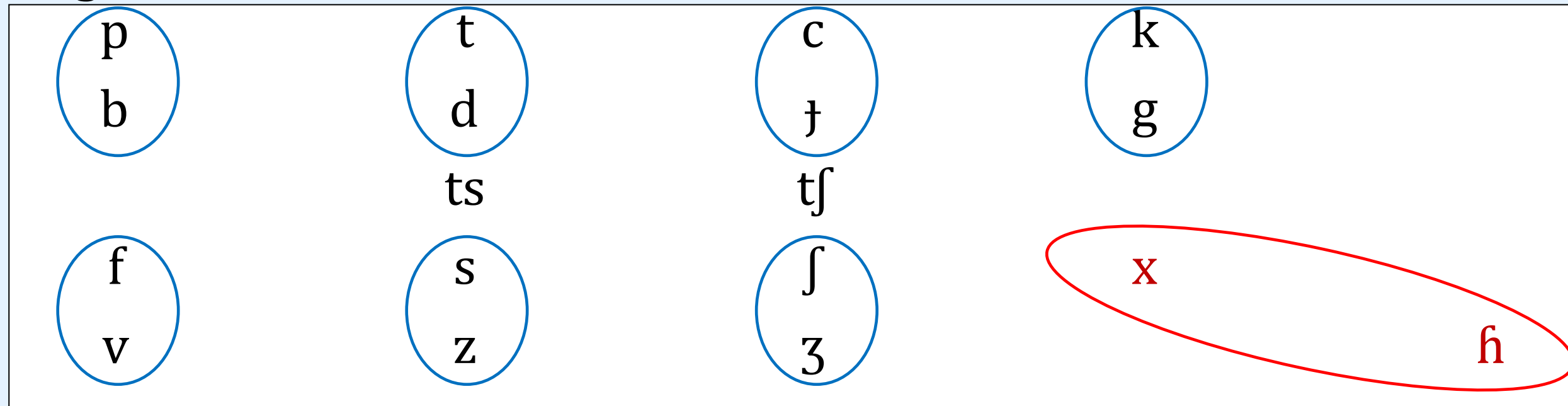
According to Trubetzkoy: "The *h* in Czech thus does not belong to a special laryngeal series, which does not even exist in that language."

The Czech opposition *ɦ ~ x*

"It belongs to the guttural series, for which, from the standpoint of the Czech phonological system, only the fact that lips and tip of tongue do not participate is relevant". (1969: 124)

p b	t d	c ɟ	k g
	ts	tʃ	
f v	s z	ʃ ʒ	x ɦ *guttural fricatives*

Therefore, the opposition between ɦ ~ x is bilateral: they are the only phonemes that are guttural and fricative.

Similar inventories, different contrasts

The German and Czech examples demonstrate that for Trubetzkoy, it is the phonological behaviour of the phonemes that is the key to the analysis of their distinctive features.

Similar-looking inventories can have different contrastive structures; that is, we can't tell what the contrastive features are just by looking at the set of segments.

Trubetzkoy expressed this important insight in a memorable way in a 1936 article addressed to psychologists and philosophers (Trubetzkoy 2001 [1936]: 20):

Contrast depends on point of view

> The correct classification of an opposition "depends on one's point of view"; but "it is neither subjective nor arbitrary, for the point of view is implied by the system."

What does this mean? To say that the correct classification depends on one's point of view means that phonological contrasts can vary from language to language.

However, that is not to say that the system of contrasts is whatever you want it to be; the patterns of phonological activity give us evidence as to what they are.

References and further reading

This section is based on Dresher (2007; 2009: Section 3.3):

Dresher, B. Elan. 2007. Variability in Trubetzkoy's Classification of Phonological Oppositions. *The LACUS Forum* 33, 133–142.

Dresher, B. Elan. 2009. *The contrastive hierarchy in phonology*. Cambridge: Cambridge University Press.

4. Contrasts in French

and Greek Obstruents

Contrast by feature ordering

It is possible to adduce many more examples from the *Grundzüge* where feature ordering, though not referred to explicitly, allows us to capture Trubetzkoy's analysis in a systematic way.

I will conclude with Trubetzkoy's discussion of the different types of oppositions that bilabial and labiodental consonants enter into in Greek and French. As with German and Czech *x* and *h*, the question to be answered is: are bilabials and labio-dentals to be classified as a single place of articulation, or two?

Greek obstruent phonemes

Labials and apicals differ in both place and occlusion.

	Labial		Apical			
	Bilabial	Labiodental	Interdental	Alveolar	Sibilant	Dorsal
voiceless stops	p			t	ts	k
voiceless fricatives		f	θ		s	x
voiced fricatives		v	ð		z	ɣ

Greek obstruent phonemes

So are the relevant contrasts based on occlusion...

	Labial	Apical	Sibilant	Dorsal
voiceless stops	p	t	ts	k
voiceless fricatives	f	θ	s	x
voiced fricatives	v	ð	z	ɣ

Greek obstruent phonemes

...or are they based on place distinctions?

	Bilabial	Labiodental	Interdental	Alveolar	Sibilant	Dorsal
voiceless stops	p			t	ts	k
voiceless fricatives		f	θ		s	x
voiced fricatives		v	ð		z	ɣ

Greek obstruent phonemes

Trubetzkoy argues that sibilants and dorsals differ only in occlusion;

| | Labial | | Apical | | Sibilant | Dorsal |
	Bilabial	Labiodental	Interdental	Alveolar		
voiceless stops	p			t	ts	k
voiceless fricatives		f	θ		s	x
voiced fricatives		v	ð		z	ɣ

Greek obstruent phonemes

so by parallelism, so should the labials and apicals.

| | Labial | | Apical | | Sibilant | Dorsal |
	Bilabial	Labiodental	Interdental	Alveolar		
voiceless stops	p			t	ts	k
voiceless fricatives		f	θ		s	x
voiced fricatives		v	ð		z	ɣ

Greek obstruent phonemes

so by parallelism, so should the labials and apicals.

	Labial	Apical	Sibilant	Dorsal
voiceless stops	p	t	ts	k
voiceless fricatives	f	θ	s	x
voiced fricatives	v	ð	z	ɣ

French obstruent phonemes

In French, all obstruents differ in both place and occlusion...

	Labial		Coronal		Back	
	Bilabial	Labiodental	Dental	Alveolar	Prepalatal	Dorso-velar
voiceless stops	p		t			k
voiced stops	b		d			g
voiceless fricatives		f		s	ʃ	
voiced fricatives		v		z	ʒ	

French obstruent phonemes

so while occlusion can be taken as the primary contrast, as in Greek ...

	Labial		Coronal		Back	
	Bilabial	Labiodental	Dental	Alveolar	Prepalatal	Dorso-velar
voiceless stops	p		t			k
voiced stops	b		d			g
voiceless fricatives		f		s	ʃ	
voiced fricatives		v		z	ʒ	

French obstruent phonemes

so while occlusion can be taken as the primary contrast, as in Greek ...

	Labial	Coronal	Back
voiceless stops	p	t	k
voiced stops	b	d	g
voiceless fricatives	f	s	ʃ
voiced fricatives	v	z	ʒ

French obstruent phonemes

Trubetzkoy argues that place should take priority over occlusion.

	Bilabial	Labiodental	Dental	Alveolar	Prepalatal	Dorso-velar
voiceless stops	p		t			k
voiced stops	b		d			g
voiceless fricatives		f		s	ʃ	
voiced fricatives		v		z	ʒ	

Variability in feature ordering

We can express the above analyses formally if Greek and French have different orderings of the occlusion feature, which we can call [continuant], relative to the minor place features that distinguish bilabial from labiodental place:

French: minor place features > [continuant]

Greek: [continuant] > minor place

Moreover, Trubetzkoy's discussion of these cases suggests a principle that guides the choice of ordering:

Place features take scope over occlusion (French) unless an occlusion contrast is needed anyway (parallelism, Greek).

References and further reading

This section is based on Dresher (2007; 2009: Section 3.3):

Dresher, B. Elan. 2007. Variability in Trubetzkoy's Classification of Phonological Oppositions. *The LACUS Forum* 33, 133–142.

Dresher, B. Elan. 2009. *The contrastive hierarchy in phonology*. Cambridge: Cambridge University Press.

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Dresher, B. Elan. 2007. Variability in Trubetzkoy's Classification of Phonological Oppositions. *The LACUS Forum* 33, 133–142.

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Dresher, B. Elan. 2018b. Contrastive hierarchy theory and the nature of features. In Wm. G. Bennett, Lindsay Hracs, & Dennis Ryan Storoshenko (eds.), *Proceedings of the 35th West Coast Conference on Formal Linguistics*, 18–29. Somerville, MA: Cascadilla Proceedings Project.

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