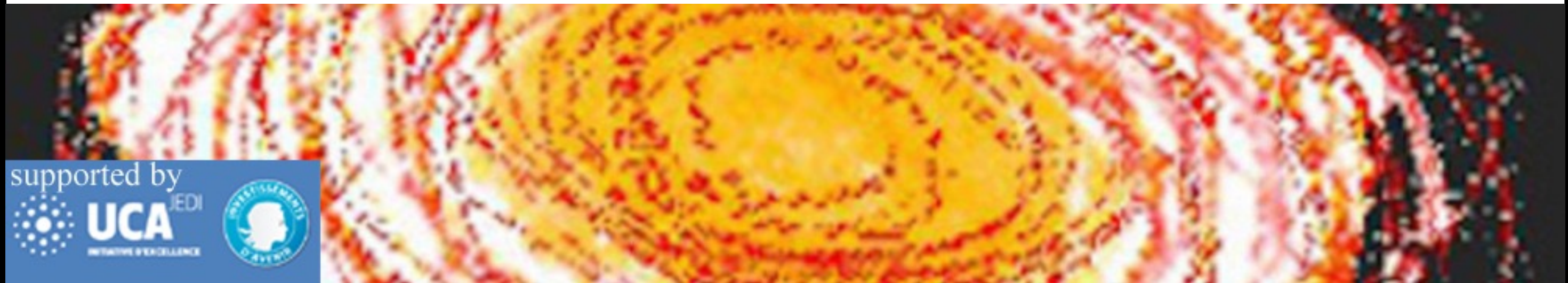


# Eastern Generative Grammar (EGG)

EGG 2021 online, 26 July to 6 August



Foundations of Contrastive Hierarchy Theory

B. Elan Dresher

**Class 5: Diachronic phonology and loan phonology in CHT**

# Eastern Generative Grammar (EGG)

Friday 30 July 2021



Department of Linguistics  
UNIVERSITY of TORONTO

## 1. From Proto-Germanic to Old English: The Short Vowels

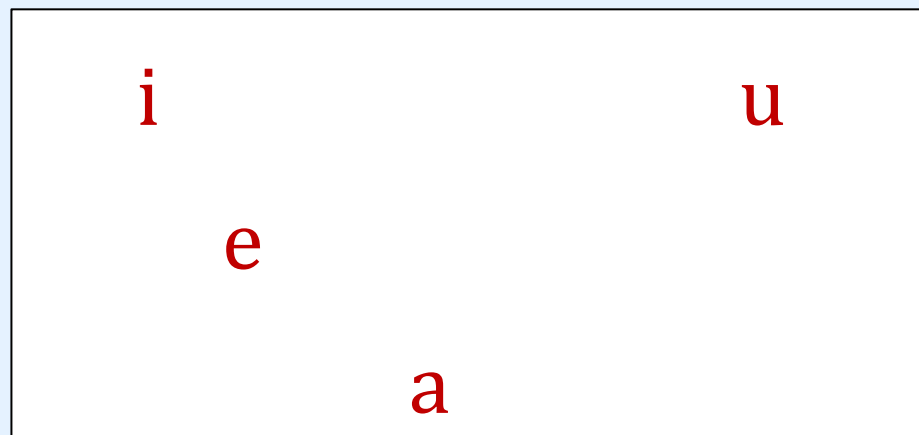
## Proto-Germanic short vowels

I would like to look at Proto-Germanic, which is commonly assumed to have had the four short vowels \*/i/, \*/e/, \*/a/, \*/u/ (Ringe 2006).

It also had long vowels, but these will not be relevant here (see Dresher 2018 for discussion of the long vowels).

Why Proto-Germanic? I pick the Proto-Germanic short vowel system to illustrate a CHT synchronic analysis for two reasons:

### Short vowels



First, because its later evolution into West Germanic and Old English raises some interesting diachronic issues that we will look soon.

## Proto-Germanic Contrastive Features

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And second, because all the ingredients of a CHT analysis have already been assembled by Antonsen (1972)!

Elmer Antonsen was an American linguist and runologist who made many contributions to the study of Germanic phonology.



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His utilization of a contrastive feature hierarchy is only implicit, and he does not discuss it at all; however, his article is a nice illustration of CHT argumentation *avant la lettre*.

## Proto-Germanic Contrastive Features

Antonsen proposes the feature specifications below for the short vowel system (1972: 133):

Notice that they show a pattern of underspecification that is characteristic of a branching tree: the first feature applies to all the phonemes, and the scopes of the remaining features get progressively smaller.

	<i>i</i>		<i>u</i>		<i>*/a/</i>	<i>*/u/</i>	<i>*/i/</i>	<i>*/e/</i>	
					Low	+	–	–	–
	<i>e</i>				Rounded		+	–	–
		<i>a</i>			High		+	–	

## Proto-Germanic Contrastive Features

Antonsen (1972: 132–133) supports these feature specifications by citing patterns of phonological activity (neutralizations, harmony, and distribution of allophones) and loan word adaptation from Latin.

Thus, based on the evidence from the descendant dialects, he assumes that \*/a/ had allophones \*[a, æ, ə, ʊ], which all have in common that they are [+low].

		*/a/	*/u/	*/i/	*/e/
i	u				
e		+	–	–	–
a [+low]			+	+	–
		Low			
		Rounded			
		High			

## Proto-Germanic Contrastive Features

Further, there is evidence that \*/i/ and \*/u/ had lowered allophones before \*/a/, again suggesting that \*/a/ had a [+low] feature that could affect vowel height.

And there is no evidence that \*/a/ had any other active features (that is, features that played a role in the phonology by affecting neighbouring segments, or that grouped \*/a/ with other segments as a natural class).

i	u	*/a/	*/u/	*/i/	*/e/	
e		Low	+	-	-	-
		Rounded		+	-	-
	a [+low]	High		+	-	-

## Proto-Germanic Contrastive Features

As the feature that distinguishes \*/u/ from \*/i/ and \*/e/ Antonsen chooses [rounded].

His reason is that all the allophones of \*/u/ were rounded.

We will return shortly to this specific aspect of the analysis.

			*/a/	*/u/	*/i/	*/e/
i		u	Low	+	-	-
e		[+rounded]	Rounded	+	-	-
a [+low]			High		+	-



## Proto-Germanic Contrastive Features

Antonsen observes that the contrast between \*/i/ and \*/e/ was neutralized in environments that affected tongue height (before high front vowels, low vowels, and before nasal clusters).

He argues that this supports distinguishing \*/i/ and \*/e/ by one feature, [high].

He notes that the negative specifications of \*/e/ are consistent with it being “the only vowel which does not cause umlaut assimilations in a preceding root syllable”.

i [+high]	u	*/a/	*/u/	*/i/	*/e/
e	[+rounded]	Low	+	–	–
		Rounded		+	–
a [+low]		High		+	–

## Proto-Germanic Contrastive Features

As elegant as this analysis is, I will follow the majority, including Lass (1994), Ringe (2006: 148), and Purnell & Raimy (2015), in assuming that the feature that distinguishes \*/i, e/ from \*/u/ is [front], not [rounded].

The reason is that \*/i/ could cause allophonic fronting of \*/u/, which suggests it had an active feature [+front].

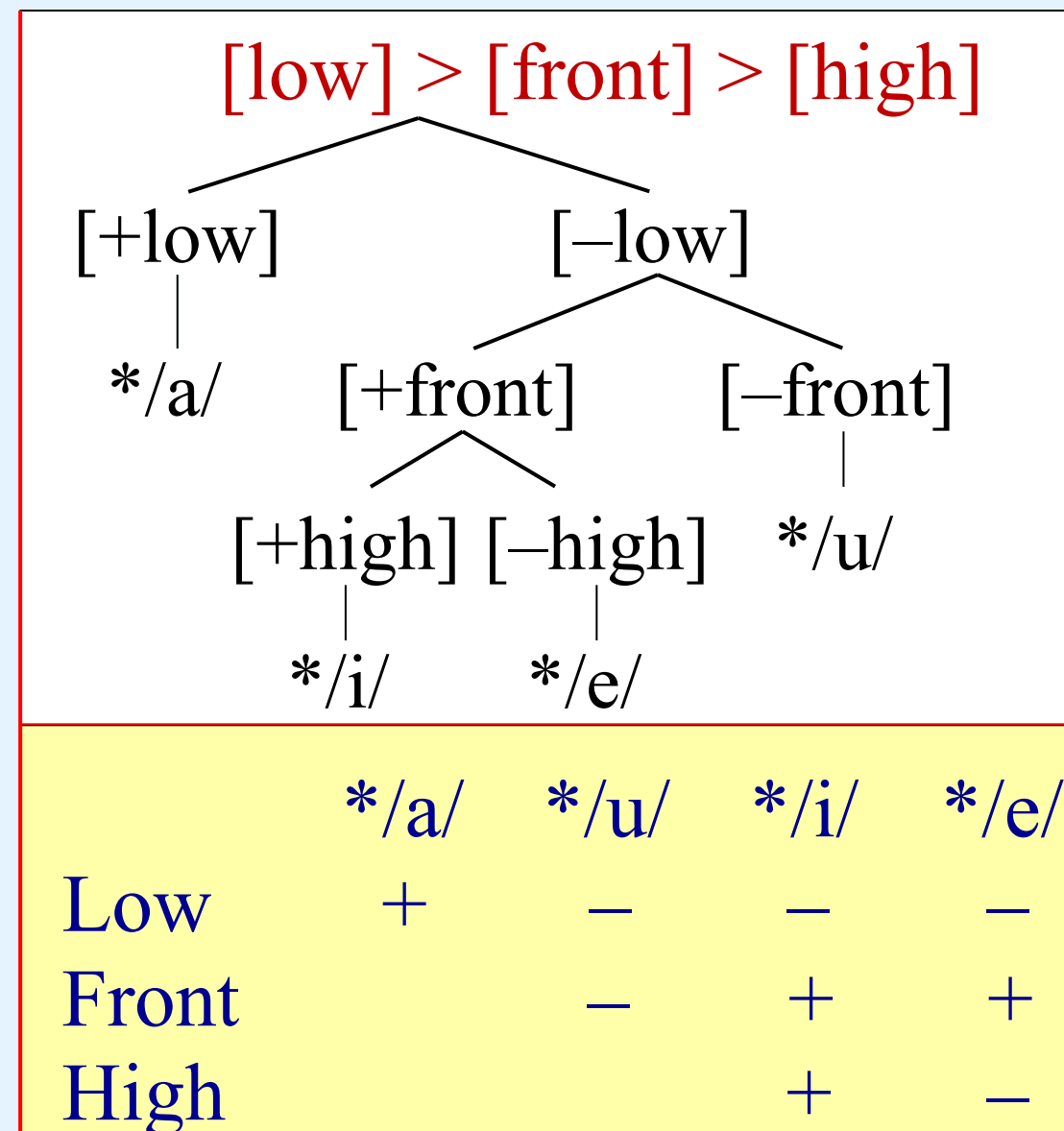
<i>i</i> [+high] <del>[+front]</del>	<i>u</i>	<i>*/a/</i>	<i>*/u/</i>	<i>*/i/</i>	<i>*/e/</i>
<i>e</i>		Low	+	-	-
		Front	-	+	+
<i>a</i> [+low]		High		+	-

## Proto-Germanic feature hierarchy

With this amendment, the contrastive feature hierarchy for the Proto-Germanic short vowels looks like this.

All the active features are contrastive, as per the Contrastivist Hypothesis.

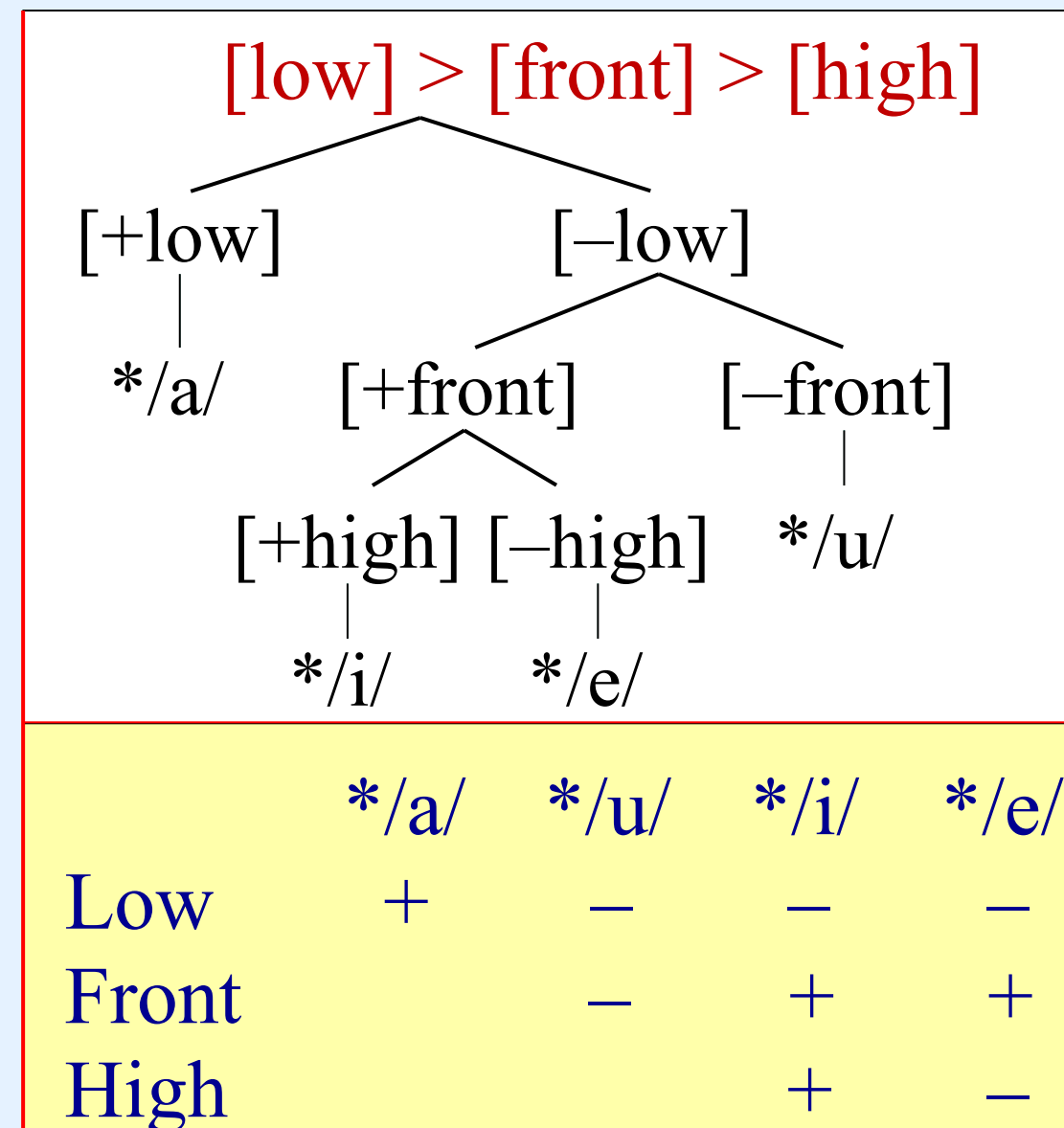
Moreover, this analysis **explains** why certain vowels participate in certain processes and others do not.



## Proto-Germanic feature hierarchy

Notice that the feature [round] plays no role in the contrastive phonology at this point.

This aspect of the analysis will soon become very significant!



## West Germanic *i*-umlaut

Contrastive Hierarchy Theory can shed new light on a long-standing conundrum in the history of West Germanic.

It concerns the rule of *i*-umlaut, and illustrates how a post-lexical phonetic rule can become lexical, and how an enhancement feature can become contrastive.

## The “Oops, I Needed That” Problem

It also provides a nice empirical test of what Nevins (2015) calls the “Oops, I Needed That” Problem.

This problem refers to a situation where a non-contrastive feature is needed by the phonology.

According to the Contrastivist Hypothesis, this situation should not arise, because only contrastive features should be active.

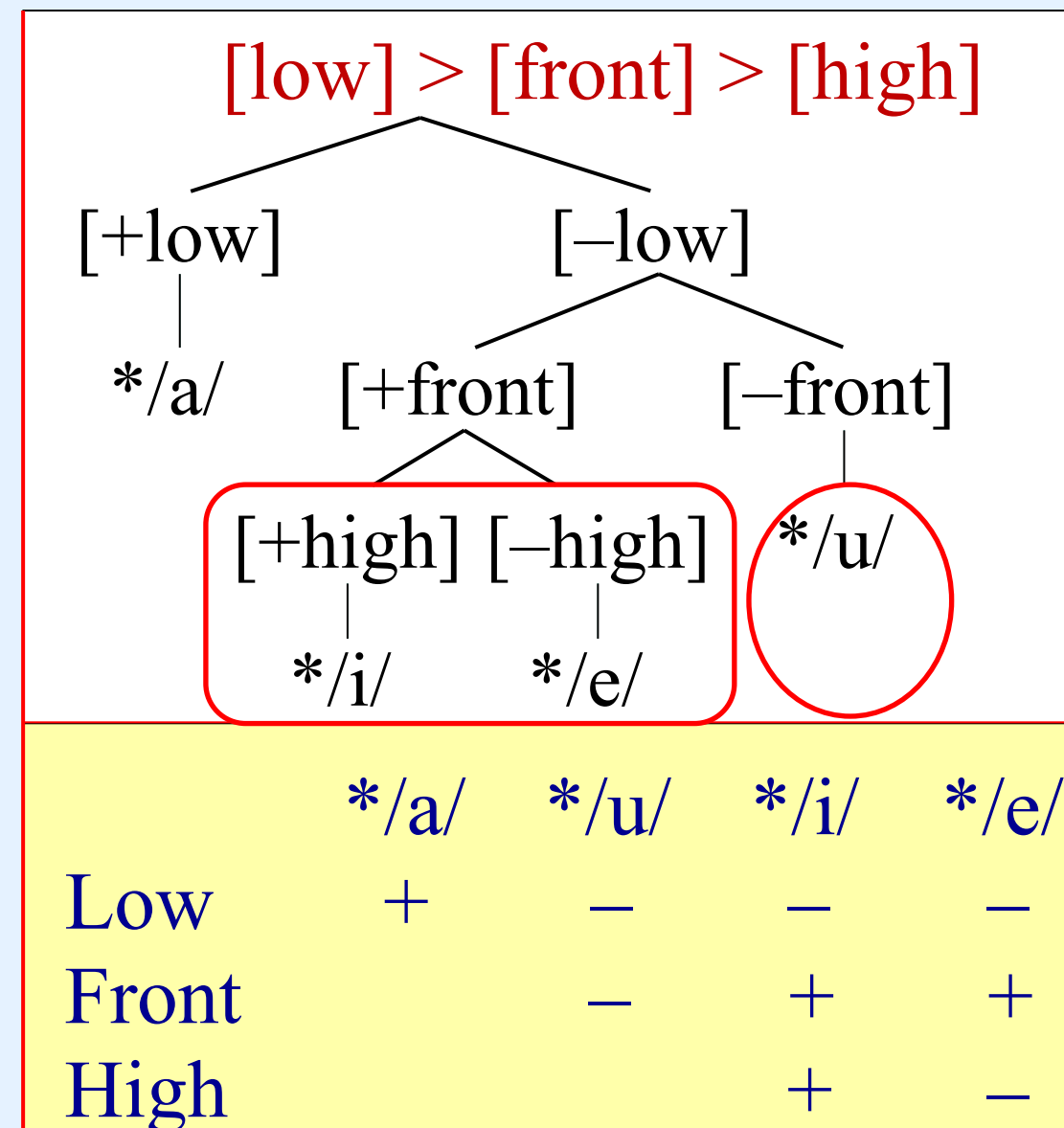
Thus, the “Oops, I Needed That” Problem would indicate an apparent counterexample to the Contrastivist Hypothesis.

## Proto-Germanic feature hierarchy

Recall that \*/i/ and \*/u/ had lowered allophones due to the influence of the [+low] \*/a/.

In West Germanic, the lowered allophone of \*/u/ developed into a new phoneme \*/o/.

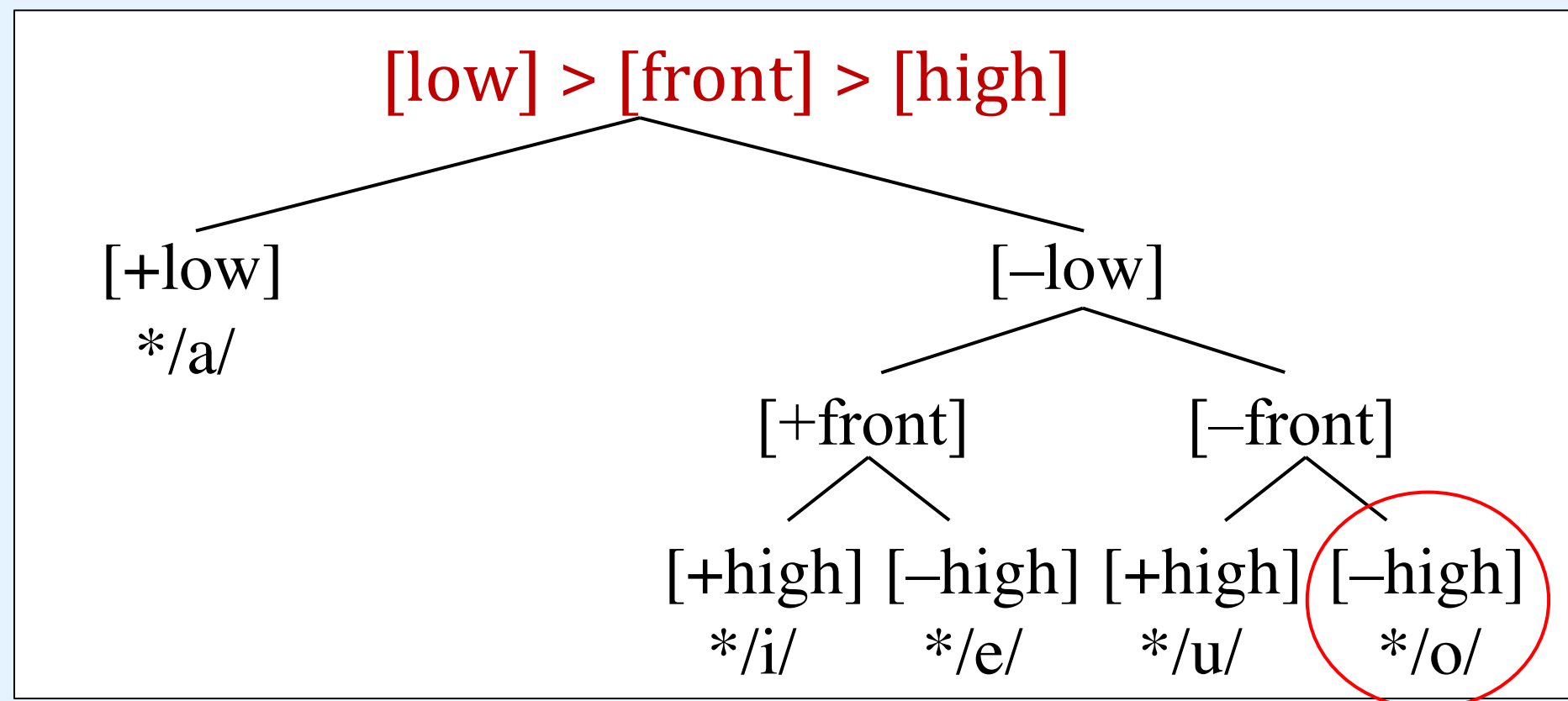
This new phoneme filled a gap in the system and brought the [-front] branch into symmetry with the [+front] branch.



## West Germanic feature hierarchy

Therefore, the new vowel did not require a change to the inherited Proto-Germanic short vowel feature hierarchy.

Note that the feature [round] is **still not** contrastive at this point.



And note also that \*/a/ has the feature [+low], which it needs to have because this feature is what created the new phoneme \*/o/.



## West Germanic *i*-umlaut

The rule of *i*-umlaut began in early Germanic as a phonetic process that created fronted allophones of the back vowels when \*/i(:)/ or \*/j/ followed (V. Kiparsky 1932; Twaddell 1938; Benediktsson 1967; Antonsen 1972; Penzl 1972).

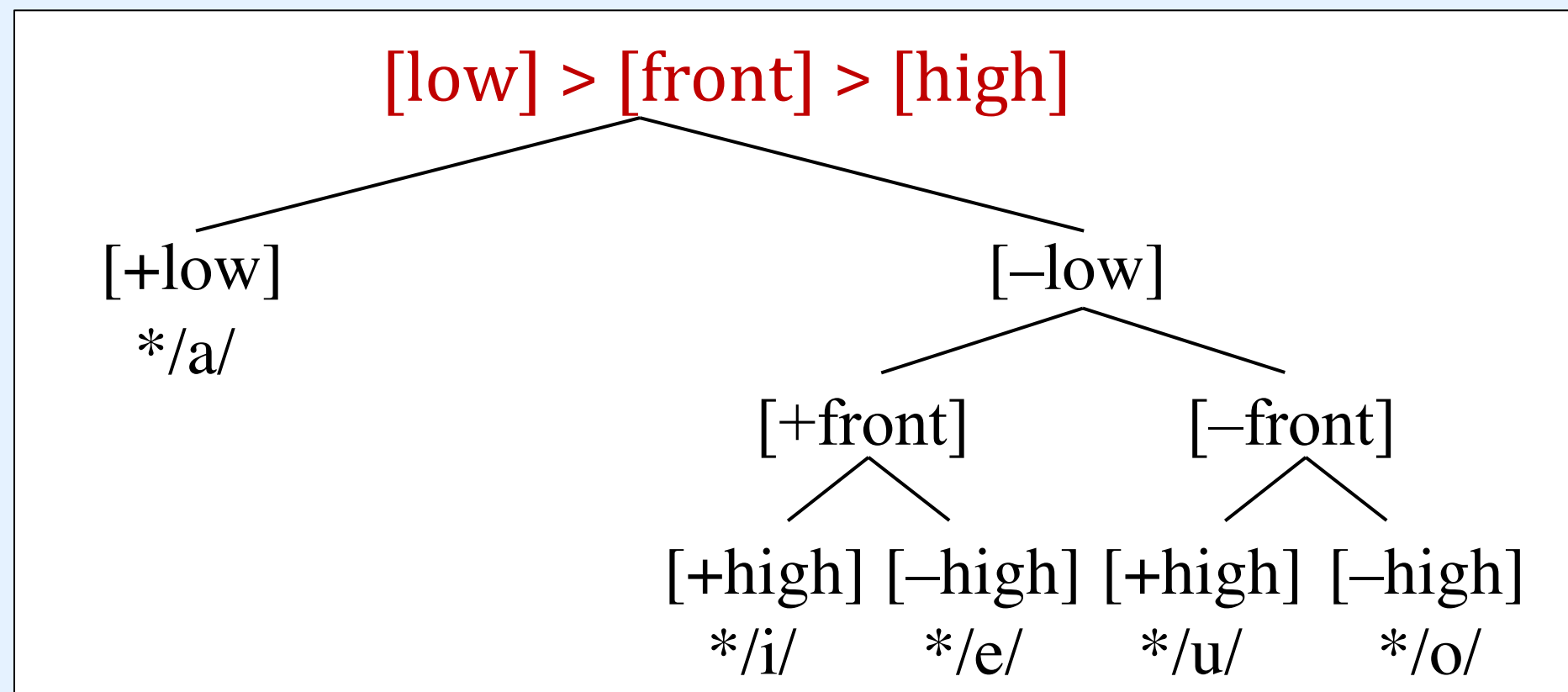
In the examples below, \*/u/ and \*/o:/ are both fronted (to \*[y] and \*[ø], respectively) before /i/ in the following syllable:

<i>Gloss</i>	'evil N.S.'	'foot N.P.'
West Germanic	*ubil	*fo:t+i
<i>i</i> -umlaut	*ybil	*fø:t+i

## *i*-umlaut: Oops, I needed that?

*i*-umlaut crucially preserves the rounded nature of the fronted vowels; but in our analysis of the West Germanic vowel system, [round] is not contrastive.

Uh-oh! Is this an “Oops, I Needed That” Problem?



## *i*-umlaut: I don't need it, it's an enhancement feature!

No! For independent reasons, many commentators, beginning with V. Kiparsky (1932) and Twaddell (1938), proposed that *i*-umlaut began as a late **phonetic** rule, and was **not** part of the contrastive phonology.

Therefore, **{round}** is available as an enhancement feature at the point that \*/u, o/ are fronted.

*u	b	i	l	→	*y	b	i	l
[-low]		[-low]			[-low]		[-low]	
[-front]		[+front]			[+front]		[+front]	
[+high]		[+high]			[+high]		[+high]	
{+round}		{-round}			{+round}		{-round}	

## Pre-Old English *i*-umlaut

Over time, however, there is evidence that *i*-umlaut became a lexical rule.

*Gloss*

‘evil N.S.’

‘foot N.P.’

Pre-Old English

\*ubil

\*fo:t+i

*i*-umlaut

\*ybil

\*fø:t+i

## *i*-umlaut becomes opaque

Already in early Old English, the unstressed /i/trigger of *i*-umlaut was either lowered after a light syllable, as in *yfel*,

or deleted after a heavy syllable, as in *fø:t*. These changes made *i*-umlaut **opaque** on the surface (i.e., its phonetic motivation is obscure on the surface).

In many cases, the *i*-umlaut trigger became unrecoverable to learners.

<i>Gloss</i>	'evil N.S.'	'foot N.P.'
Pre-Old English	*ubil	*fo:t+i
<i>i</i> -umlaut	*ybil	*fø:t+i
<i>i</i> -lowering/deletion	yfel	fø:t

## *i*-umlaut becomes opaque

According to standard accounts, this led to the **phonologization** of [y(:)] and [ø(:)] as new phonemes.

An example is 'evil', whose underlying form is restructured from /u $\phi$ il/ to /y $\phi$ el/.

	Older grammar	Newer grammar
<i>Gloss</i>	'evil N.S.'	'evil N.S.'
Underlying	/u $\phi$ il/	/y $\phi$ el/
<i>i</i> -umlaut	y $\phi$ il	—
<i>i</i> -lowering/deletion	y $\phi$ el	—
Surface	[y $\phi$ el]	[y $\phi$ el]

## Phonologization paradox

Several scholars have pointed out a problem with this account (Lieberman 1991; Fertig 1996; Janda 2003; P. Kiparsky 2015).

As long as *i*-umlaut remains a phonetic process, it is not clear how it could survive the loss of its triggering contexts; why doesn't /ufel/ surface as \*[ufel]?

### After loss of *i*-umlaut trigger

Underlying	/ufel/
Postlexical Phonology	
<i>i</i> -umlaut	—
<i>i</i> -lowering	—
Surface	*[ufel]

The only way for *i*-umlaut to persist is if it enters the lexical phonology while [y(:)] and [ø(:)] are still predictable allophones of /u(:)/ and /o(:)/, respectively.

## Phonologization paradox

This account raises two questions:

- First, **why** does *i*-umlaut enter the lexical phonology while its products are not contrastive?

P. Kiparsky (2015) suggests that it is because the new front rounded allophones were perceptually more **salient** than their triggers (cf. Jakobson, Fant, & Halle 1952), which were becoming progressively weaker as time went on.



## Phonologization paradox

I find this explanation to be quite compelling; but it raises another question:

- **How** do the products of *i*-umlaut enter the lexical phonology when they involve non-contrastive features that originate in enhancement?

To this question Contrastive Hierarchy Theory can contribute an old/new solution based on the notion of **contrast shift**.

## Contrast and phonological change

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*“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...?”*



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Old, because we are carrying out the 1931 program proposed by Roman Jakobson that diachronic phonology must look at contrast shifts (Jakobson 1962 [1931]).

## Saliency and contrast shift

But also new, because that program was never carried out; CHT gives us a well-defined way to look at contrast shifts.

Let us revisit the stage when *i*-umlaut was still a post-enhancement rule.

Adapting Kiparsky's idea, I propose that the perceptual saliency of the front rounded allophones caused learners to hypothesize that **{round}** is a contrastive feature.

*u	b	i	l	→	*y	b	i	l
[-low]		[-low]			[-low]		[-low]	
[-front]		[+front]			[+front]		[+front]	
[+high]		[+high]			[+high]		[+high]	
{+round}		{-round}			{+round}		{-round}	

## Contrast shift in West Germanic

It was not part of the earlier West Germanic feature hierarchy.

But we can construct another contrastive hierarchy that includes **[round]**.

One such hierarchy is shown below.

Earlier hierarchy:      [low] > [front] > [high]

Later hierarchy:      [front] > [round] > [high]

## Contrast shift in West Germanic

This new hierarchy, however, requires demoting [low] to make room for [round].

This is how contrastive hierarchies work: one can introduce or promote a feature, but there is a trade-off: another feature has to be demoted.

Hopefully not a feature that we need!

Earlier hierarchy:

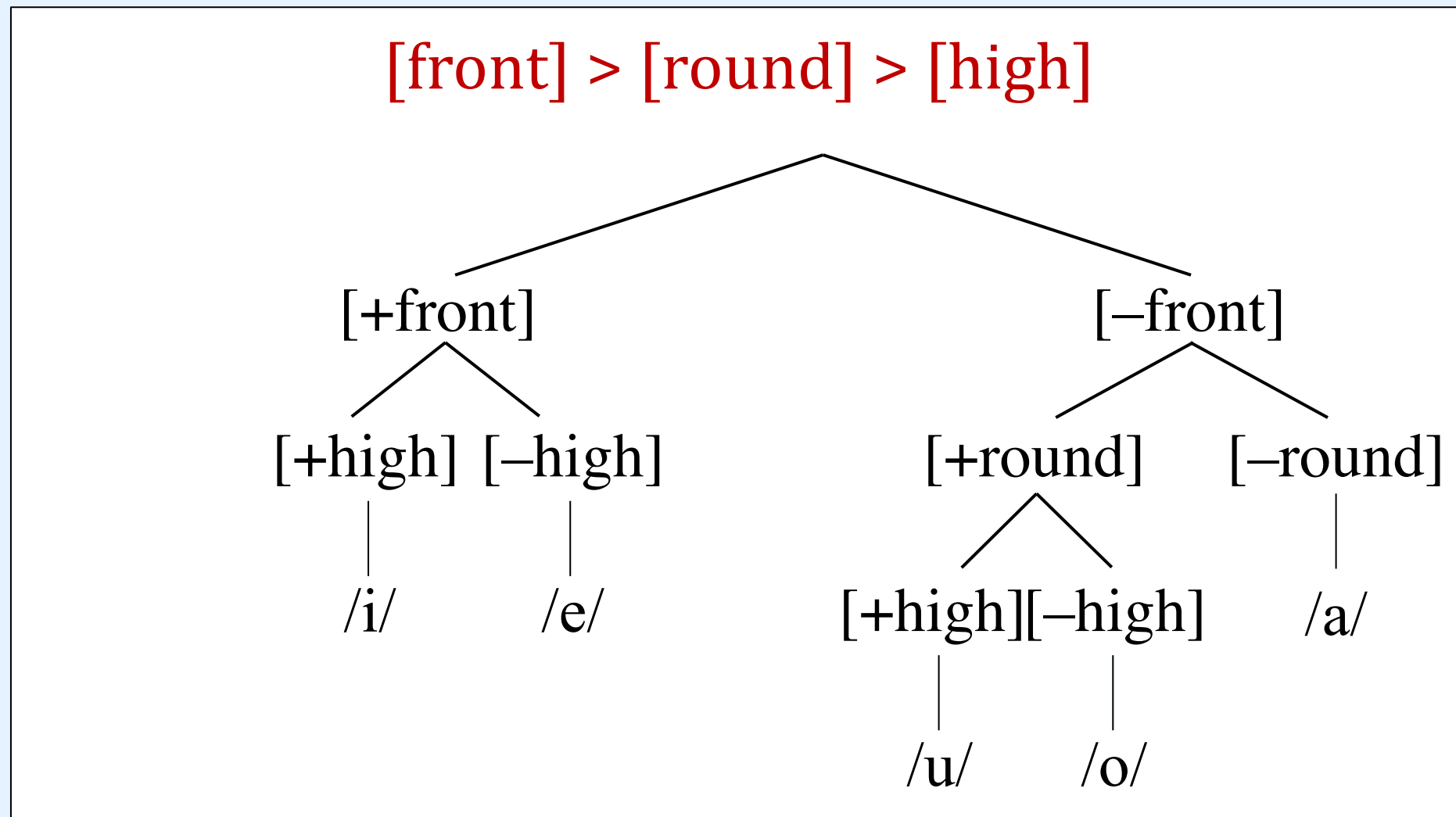
[low] > [front] > [high]

Later hierarchy:

[front] > [round] > [high]

## West Germanic feature hierarchy 2

In the new feature hierarchy, the vowels are first divided into [+front] /i, e/ and [-front] /u, o, a/.

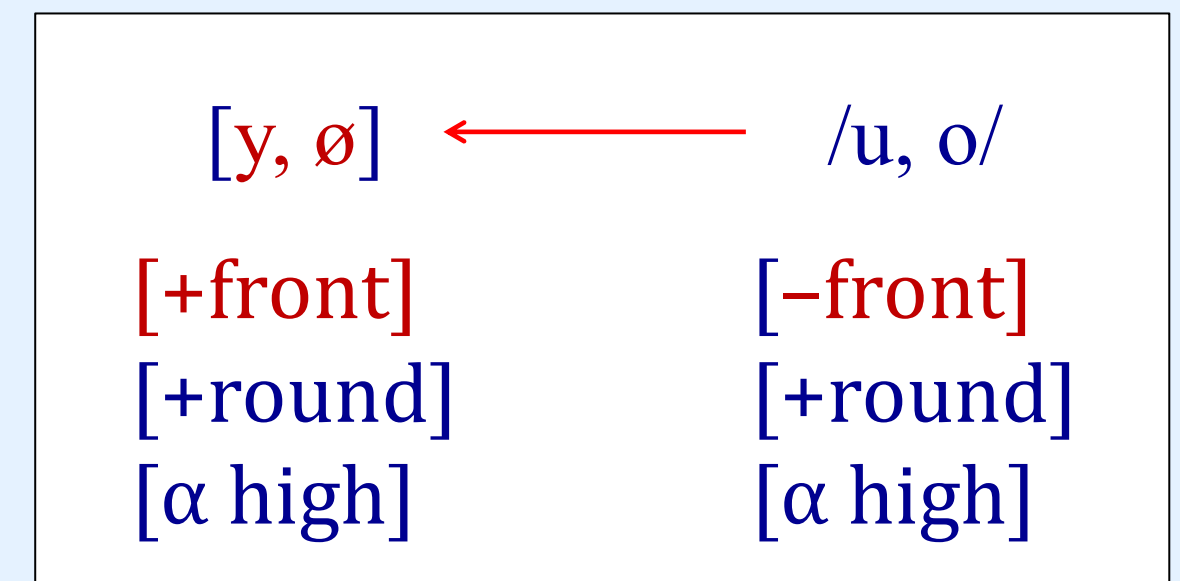


Then [ $\pm$ round] divides /u, o/ from /a/.

Finally, [ $\pm$ high] completes the contrastive features.

## West Germanic feature hierarchy 2

Now, when *i*-umlaut changes the **[-front, +round]** vowels /u, o/ to **[+front]**, the result is new front rounded vowels, which begin as allophones.









## Deep allophones

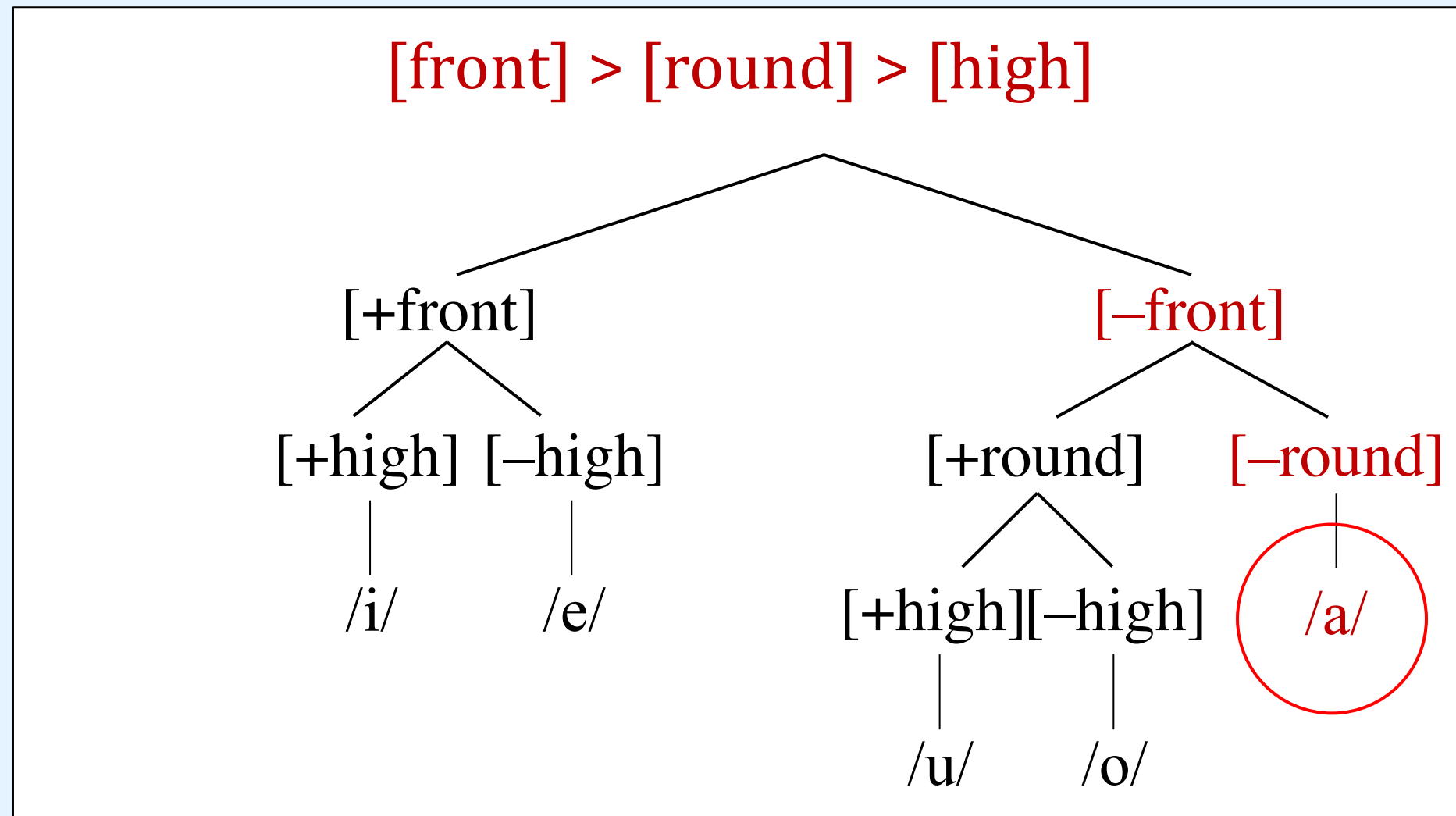
They are thus what Moulton (2003) calls ‘deep allophones’; he was referring to the Old English voiced fricatives, which also arise early in the contrastive (lexical) phonology as allophones of the voiceless fricatives.

Deep allophones are possible because contrastive features can be predictable in a hierarchical approach.

We have left hanging one question that you might be wondering about...

## West Germanic feature hierarchy 2: Oops, I needed that?

Recall the trade-off that this analysis requires:



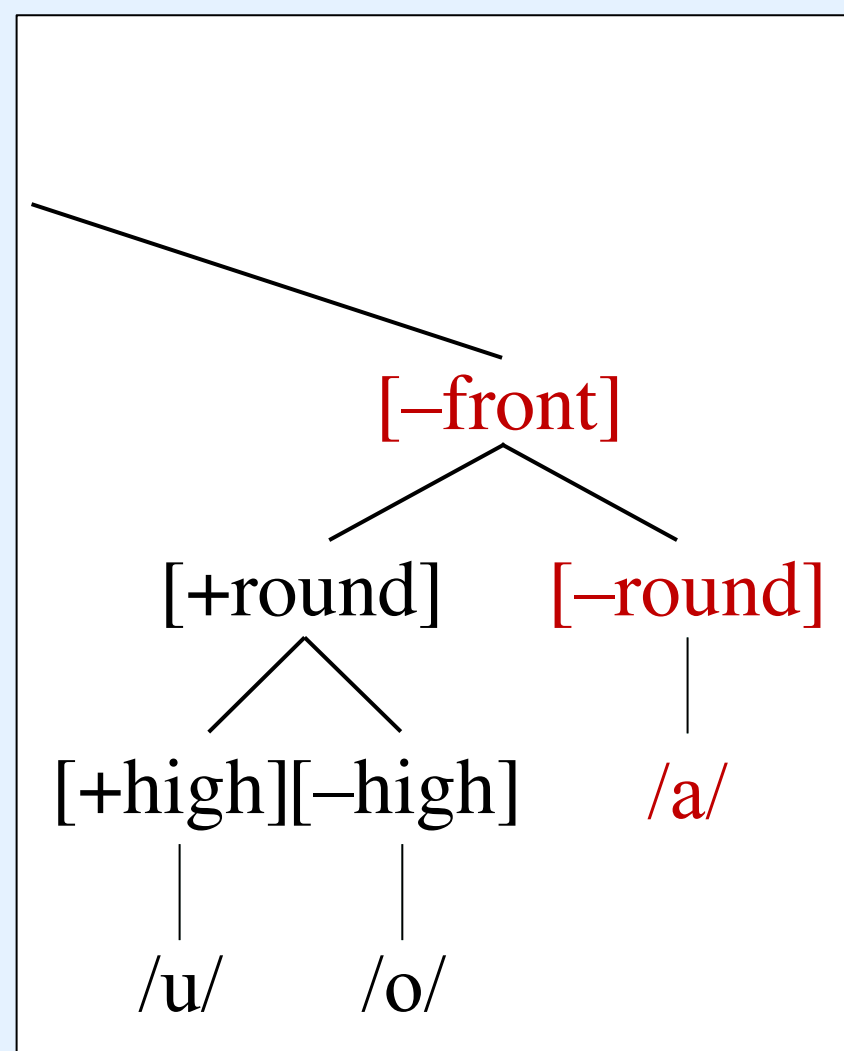
In the new hierarchy, /a/ no longer has a [+low] feature.

Recall that this feature was very important at an earlier period.

Uh oh! Do we now have a “Oops, I Needed That” Problem?

## West Germanic feature hierarchy 2: No, I don't need it!

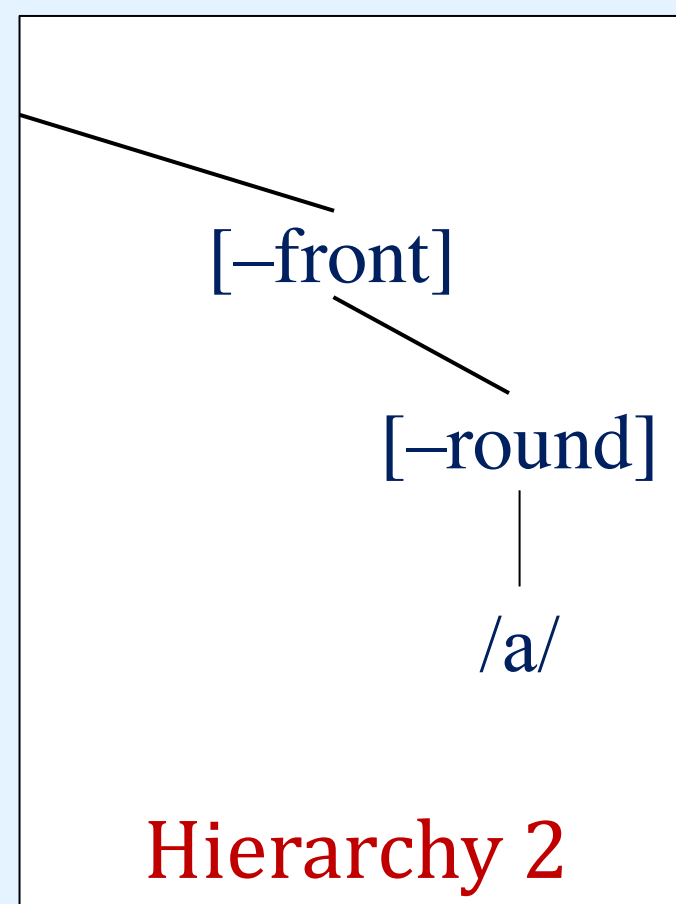
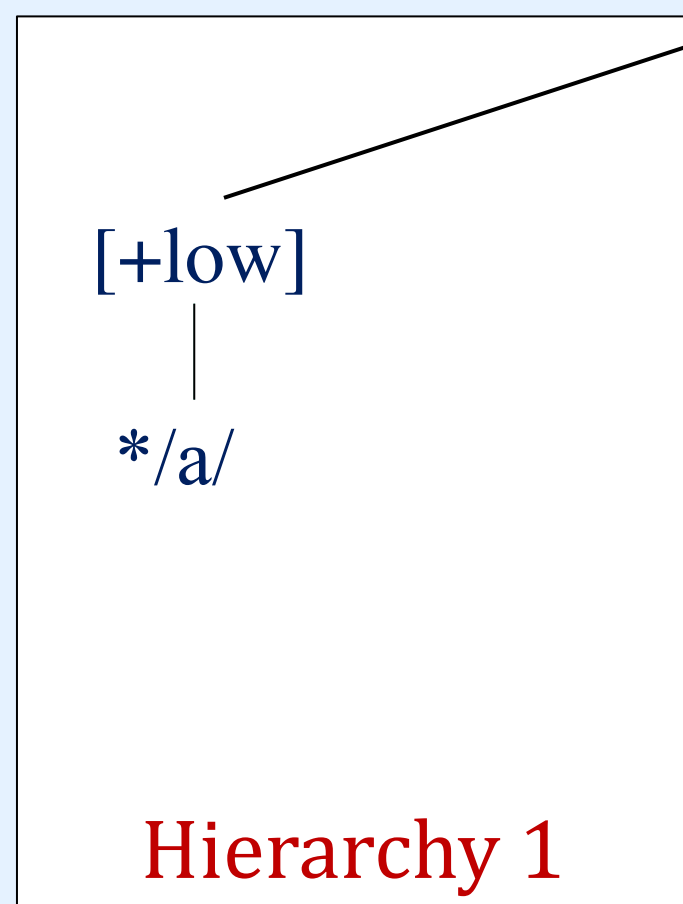
No! /a/ no longer needs a [+low] feature!



I know of no evidence— in Old English, for example— that /a/ causes lowering of other segments, or otherwise needs an active [+low] feature.

## West Germanic feature hierarchy 2: No, I don't need it!

Recall that this is in striking contrast to earlier stages of the language, where there is evidence that \*/a/ caused lowering.



This type of connection between contrast and activity is exactly what Contrastive Hierarchy Theory predicts.

## References and further reading

For further reading see Dresher (2018) :

Dresher, B. Elan. 2018. Contrastive Feature Hierarchies in Old English Diachronic Phonology. *Transactions of the Philological Society* 116(1): 1–29.

# Eastern Generative Grammar (EGG)

Friday 30 July 2021



Department of Linguistics  
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## 2. Loan Phonology in Hawaiian and N. Z. Māori

## Similar inventories, different contrasts in loanword phonology

Finally, we will look at how contrastive hierarchies can account for loanword adaptation in Hawaiian and New Zealand Māori, related Eastern Polynesian languages with famously small inventories.

They show interesting variation that points to different contrastive hierarchies.

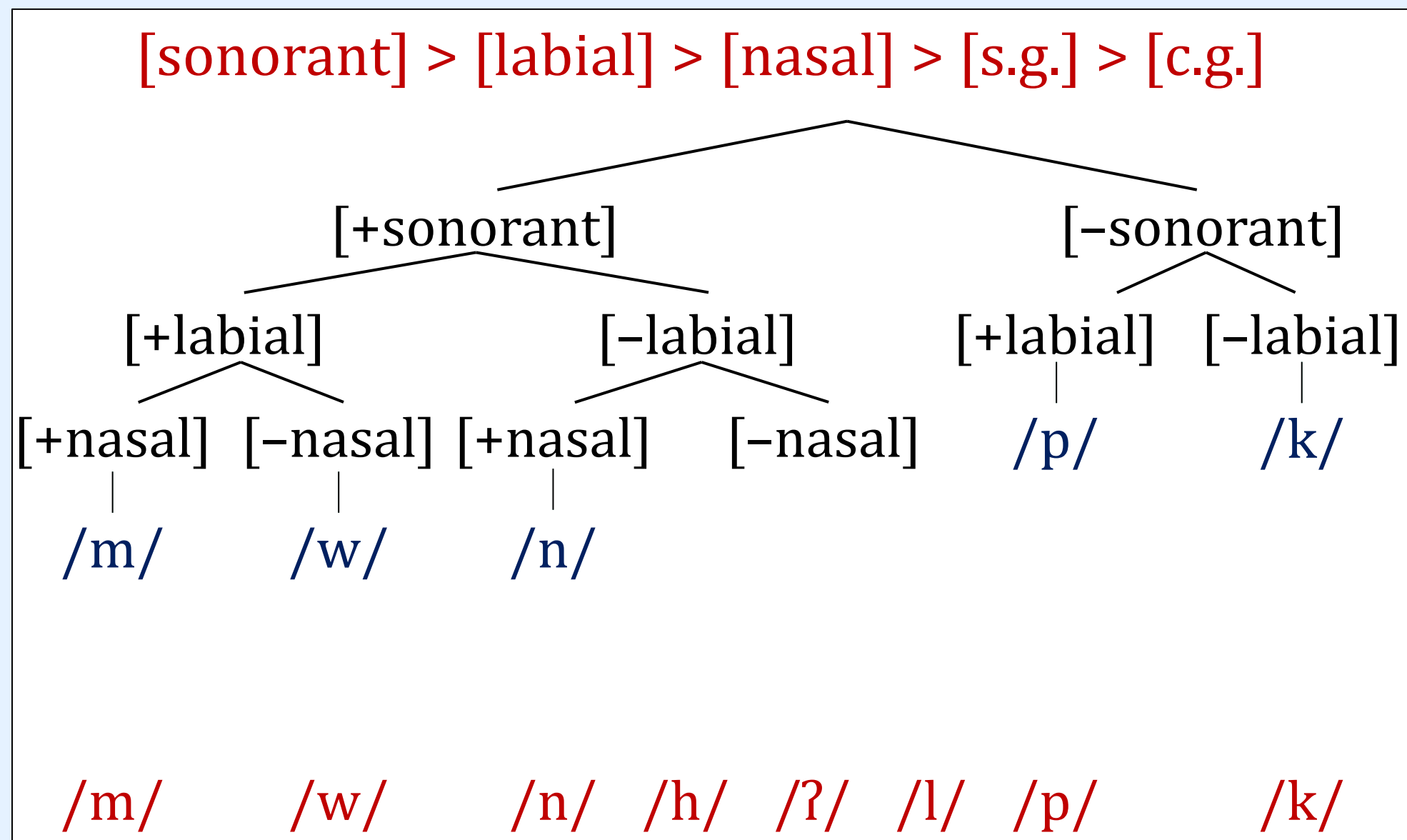
Hawaiian			
p		k	ʔ
			h
m	n		
w	l		

N. Z. Māori			
p	t	k	
f			h
m	n	ŋ	
w	r		



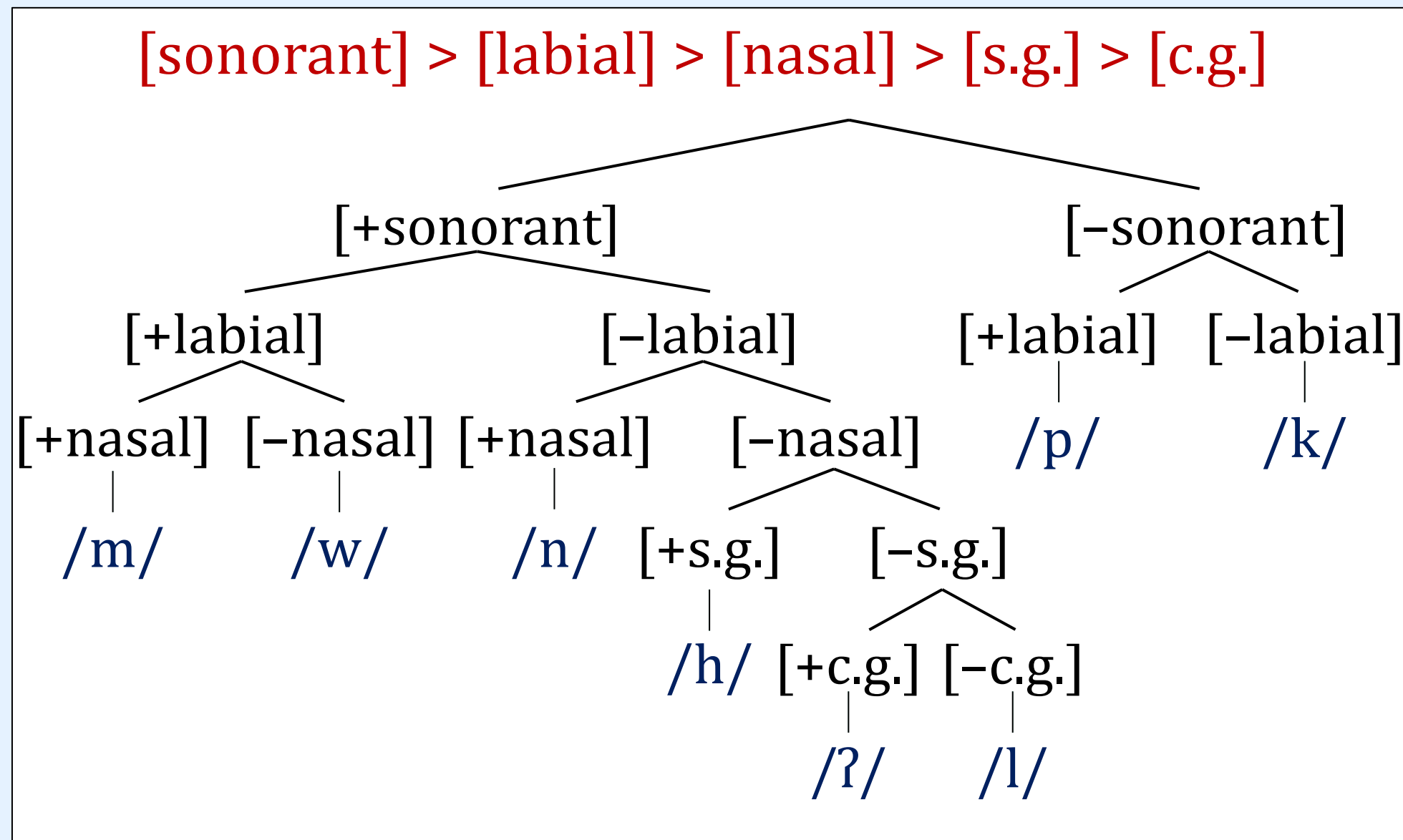
## Loanword adaptation and contrastive hierarchies

Clements (2001: 86) advances evidence from loanword adaptations to support a hierarchical assignment of feature specifications to the consonants of Hawaiian.



## Loanword adaptation in Hawaiian

Clements (2001: 86) advances evidence from loanword adaptations to support a hierarchical assignment of feature specifications to the consonants of Hawaiian.



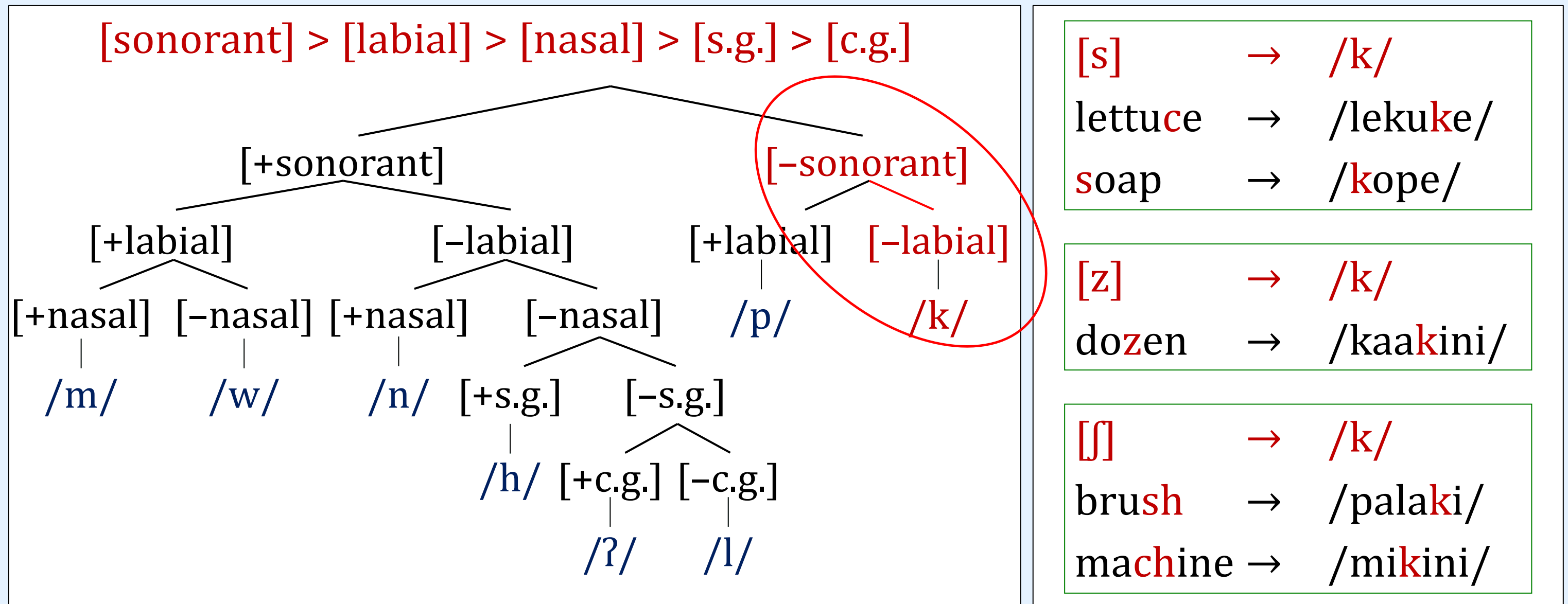
Then, [spread glottis] makes /h/ unique.

Finally [constricted glottis] divides /ʔ/ from /l/.

This leaves /k/ as the default consonant that is [-sonorant, -labial].

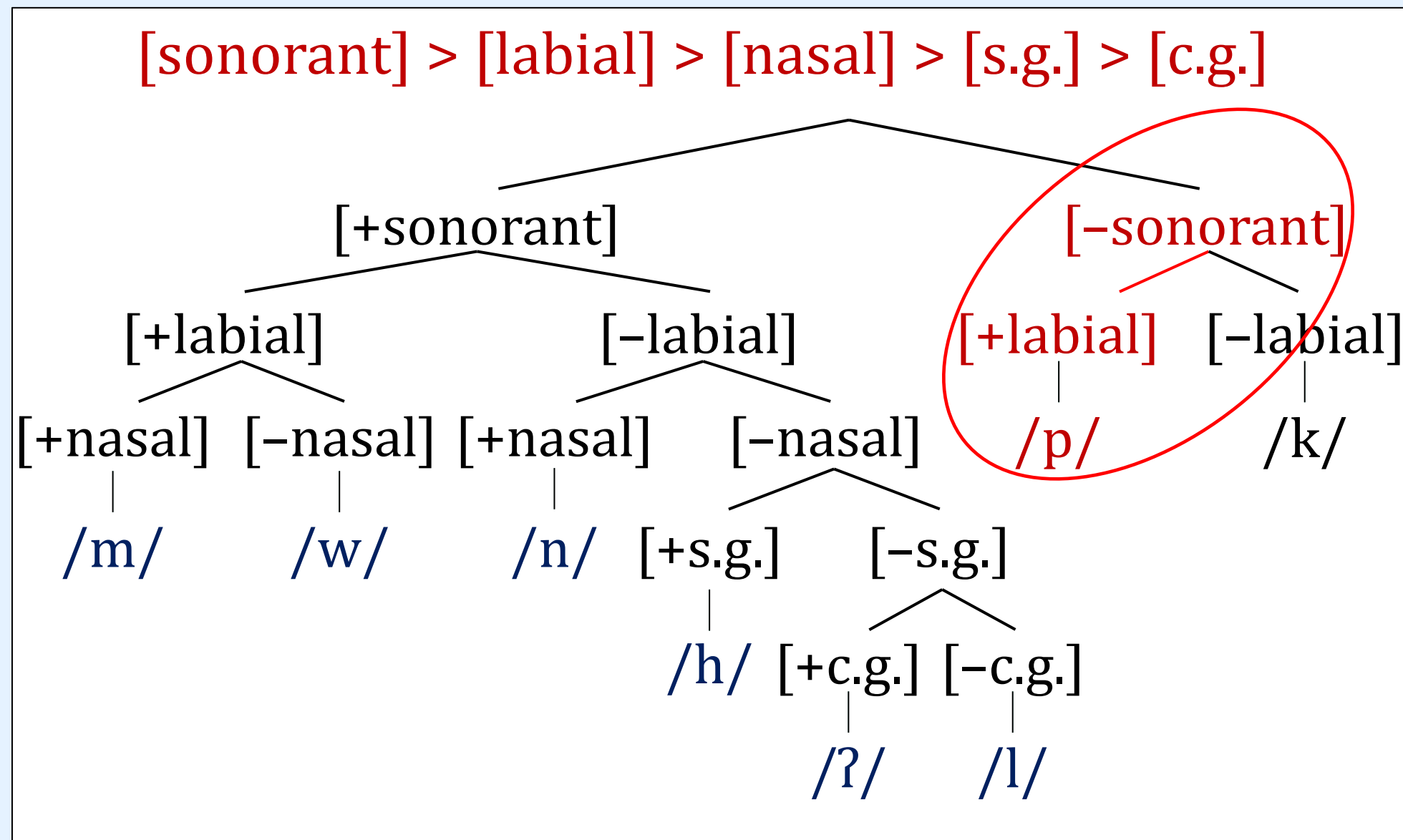
## Loanword adaptation in Hawaiian

In Hawaiian, all coronal obstruents and [g] are borrowed as /k/: they are [-son] and [-labial], which = /k/! No other features are relevant, it's the only option.



## Loanword adaptation in Hawaiian

One more example: [b] and [f] are borrowed as /p/: they are [-sonorant] and [+labial], which = /p/. Again, it's the only option if we follow the hierarchy.



Herd (2005) builds on Clements's analysis, and looks at patterns of loanword adaptation in several related Polynesian languages.

## Extending the analysis

Here I will pick one of these, New Zealand (N. Z.) Māori; see Herd (2005) for the full details, and Dresher (2015) for more discussion of this case.

In New Zealand Māori, with a slightly larger consonant inventory, coronal obstruents are adapted as /h/, not as /k/ like in Hawaiian, and not as /t/.

Hawaiian			
p		<b>k</b>	ʔ
			h
m	n		
w	l		

N. Z. Māori			
p	t	k	
f			<b>h</b>
m	n	ŋ	
w	r		

## Hawaiian

[s] → /k/  
lettuce → /lekuke/  
soap → /kope/

[z] → /k/  
dozen → /kaakini/

[ʃ] → /k/  
brush → /palaki/  
machine → /mikini/

## N. Z. Māori

[s] → /h/  
glass → /karaahe/  
sardine → /haarini/

[z] → /h/  
weasel → /wiihara/  
rose → /roohi/

[ʃ] → /h/  
brush → /paraihe/  
sheep → /hipi/

## Why this difference?

Why do English [s, z, ʃ] sound like /k/ to Hawaiians but like /h/ to N. Z. Māori?  
Both languages have /k/ as well as /h/.

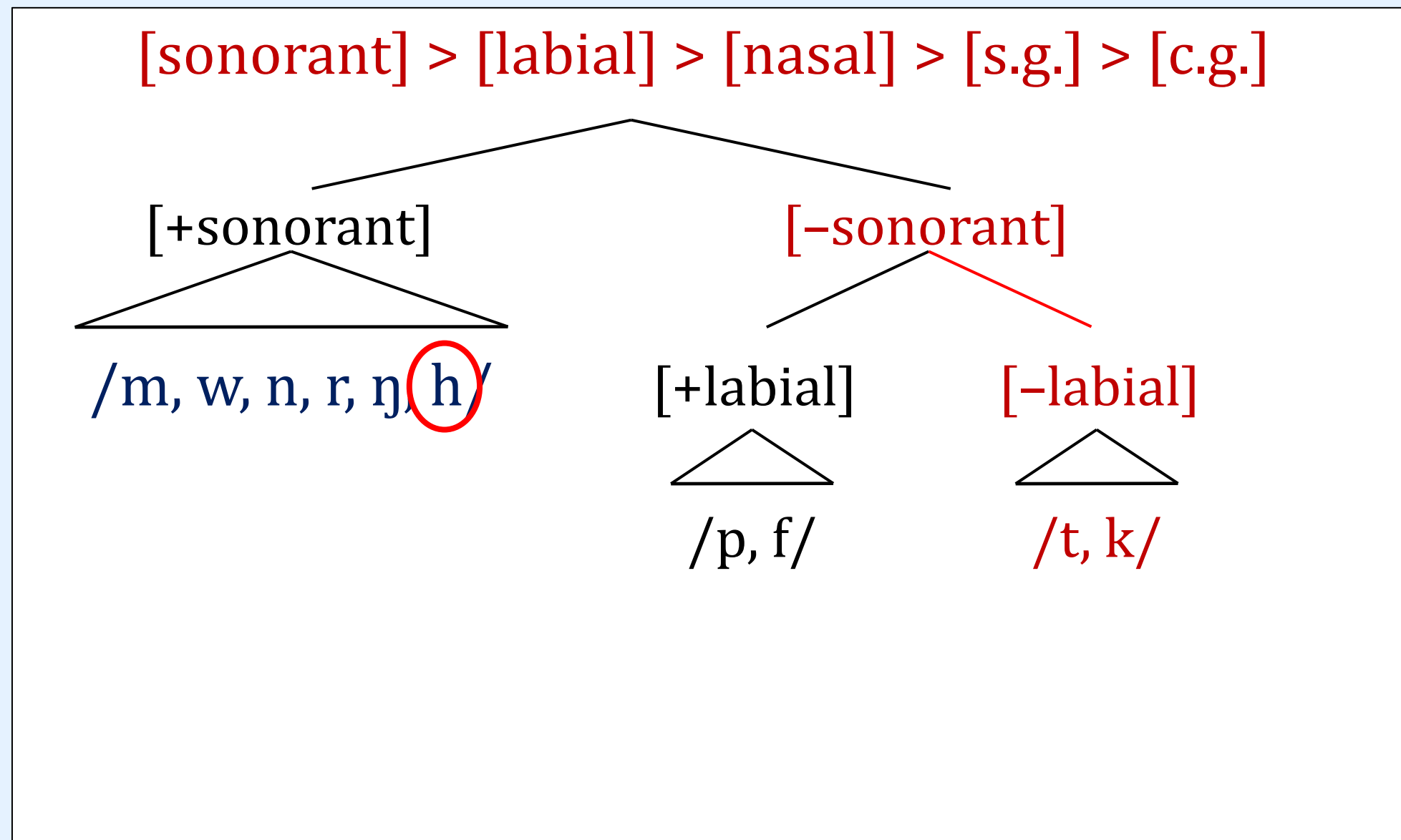
The N. Z. Māori adaptation of these segments is also surprising because the hierarchy we used for Hawaiian will not give this result.

Hawaiian			
p		<b>k</b>	ʔ
			<b>h</b>
m	n		
w	l		

N. Z. Māori			
p	t	<b>k</b>	
f			<b>h</b>
m	n	ŋ	
w	r		

## Loanword adaptation in N. Z. Māori

If we follow the Hawaiian order, we again select [-sonorant] and then [-labial].



The result will be either \*/t/ or \*/k/, which are not correct.

The answer we want, /h/, is on the [+sonorant] branch, and so cannot stand in for [-sonorant] [s, z, ʃ].

We need to make some changes to the hierarchy.



## Why this difference?

Herd (2005) proposes that the contrastive status of /h/ is different in these languages. Hawaiian has both /h/ and /ʔ/.

Following Avery and Idsardi (2001), the existence of this contrast activates a laryngeal dimension they call **Glottal Width**.

Hawaiian		
p	k	ʔ h

N. Z. Māori			
p	t	k	
f			h

Glottal Width has two values, **[constricted glottis]** for /ʔ/, and **[spread glottis]** for /h/. This is as in Clements's analysis.

## Why this difference?

But N. Z. Māori has no /ʔ/, so there is no Glottal Width contrast; Herd therefore proposes that [spread glottis] is not accessible in this system.

We can propose a slightly simpler version of this analysis: the presence of both /ʔ/ and /h/ in Hawaiian make their **laryngeal** place salient.

Hawaiian		
p	k	ʔ h

N. Z. Māori			
p	t	k	h
f			

In N. Z. Māori /h/ is not contrastively [laryngeal]; in this respect, Hawaiian /h/ is like German /h/ and N. Z. Māori /h/ is like Czech /ɦ/ (see slides of Class 3).

## Why this difference?

A further change is required to make this analysis work: we must assume that /h/ (and /ʔ/ in Hawaiian) are [-sonorant], contrary to Clements's analysis.

Parker (2011) observes that /ʔ, h/ pattern with sonorants in some languages, but in most languages they pattern with obstruents; see also Botma (2011).

Hawaiian		
p	k	ʔ
		h

N. Z. Māori		
p	t	k
f		h

Assigning /ʔ, h/ to [-sonorant] in Hawaiian requires a small modification to the Hawaiian contrastive hierarchy, but I won't go into that here.

## Why this difference?

We also need to introduce a feature to distinguish between /k, ŋ/ and /t, n/. Herd proposes [dorsal]. To distinguish /t/ from /h/ he proposes [dental].

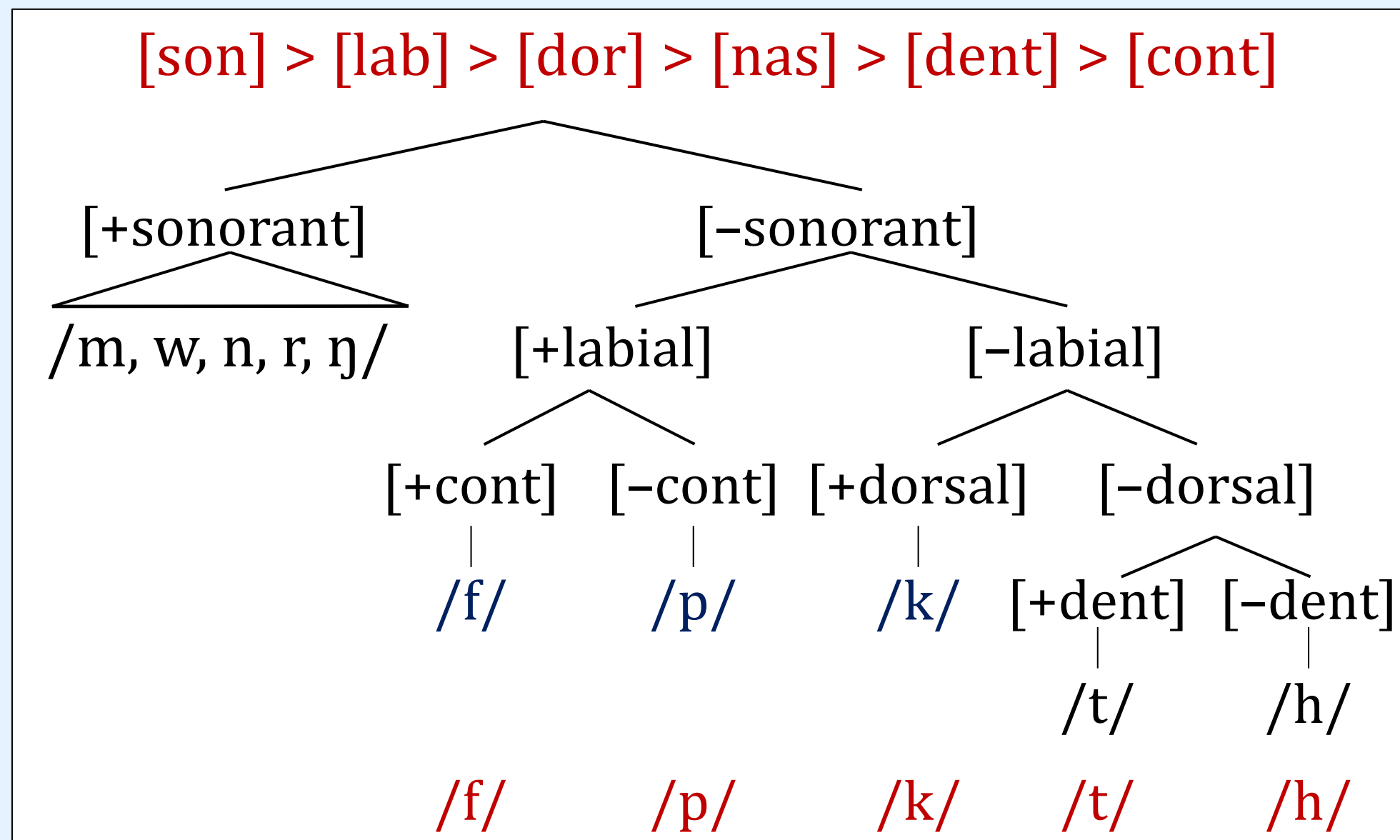
This is because English interdental fricatives [θ, ð] are adapted as /t/ in N. Z. Māori, not as /h/; apparently, [dental] is more salient than [continuant].

Hawaiian			
p		k	ʔ
			h
m	n		
w	l		

N. Z. Māori			
p	t	k	
f			h
m	n	ŋ	
w	r		

## The N. Z. Māori contrastive hierarchy

As before, [sonorant] is first. We need not look further at [+sonorant].



[-sonorant] is divided by [labial], also as before.

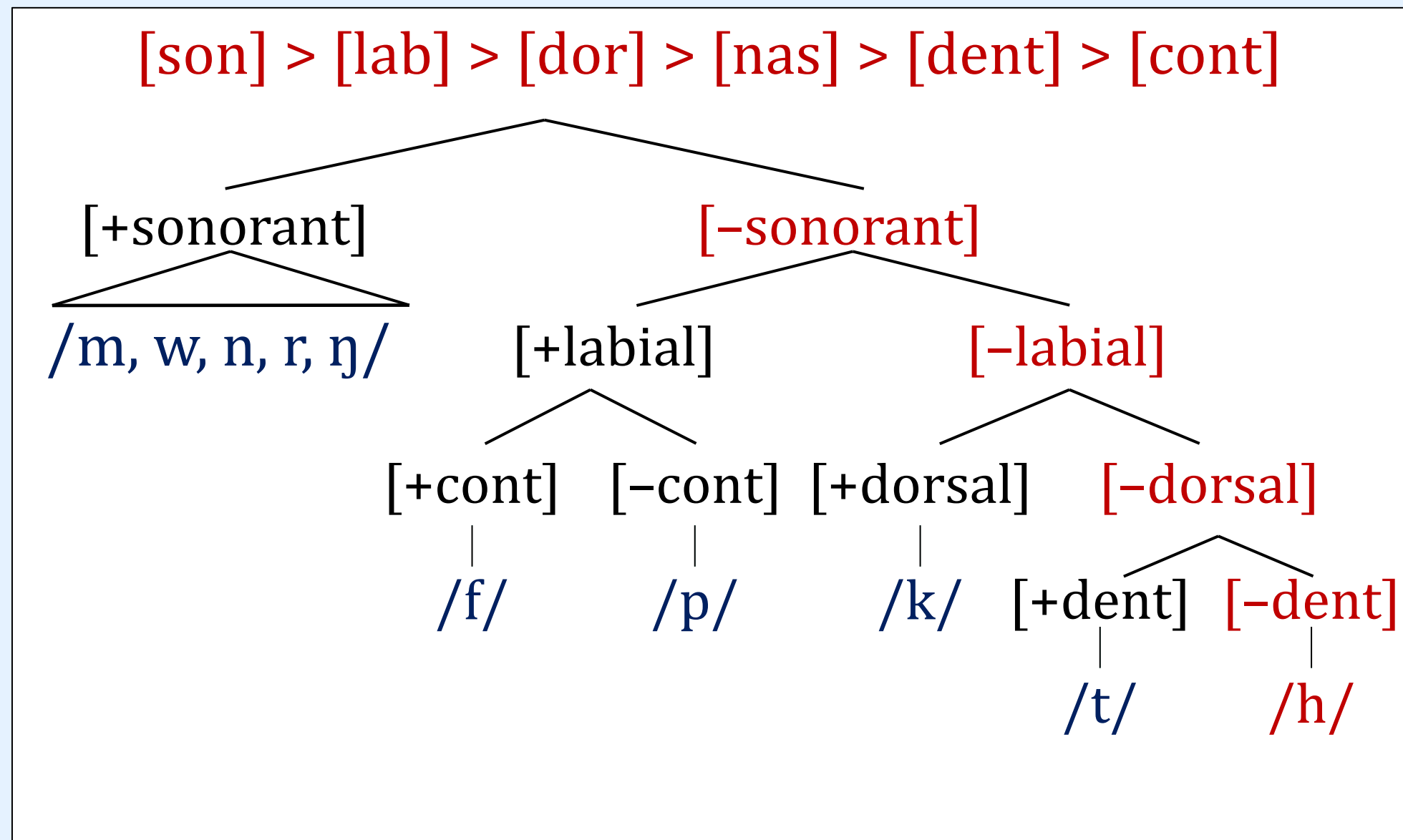
[-labial] is split by [dorsal], which divides /k/ ~ /t, h/.

Then [dental] divides /t/ from /h/.

Finally, [continuant] divides /f/ from /p/.

## N. Z. Māori adaptation of English coronals

Now we can account for the adaptation of English /s, z, ʃ/ into N. Z. Māori.



Going down the tree,  
/s, z, ʃ/ are:

[-sonorant]

[-labial]

[-dorsal]

[-dental]

/h/ is all that's left!

## References and further reading

For further reading see Herd (2005); Dresher (2015):

Herd, Jonathon. 2005. Loanword adaptation and the evaluation of similarity. *Toronto Working Papers in Linguistics* 24: 65–116. Department of Linguistics, University of Toronto.

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