BERKELEY GERMANIC LINGUISTICS ROUNDTABLE

University of California, Berkeley

April 1–2, 2016

Contrastive Features and the Phonologization of i-*Umlaut in West Germanic*

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Introduction

Contrast and Enhancement Theory proposes that phonology operates on contrastive features assigned by hierarchies that can vary across dialects and over time.

These contrastive features are enhanced post-phonologically by non-contrastive phonetic feature-like properties.

I will show how this theory makes available a new solution to a phonologization paradox involving *i*-umlaut in Old English and Old High German.

A Theory of Contrast

Contrast and Enhancement Theory (Dresher 2009; Hall 2011), also known as Modified Contrastive Specification or 'Toronto School' phonology (Dresher, Piggott & Rice 1994, Dresher & Rice 2007, Dresher 2009), or Contrastive Hierarchy Theory, builds on ideas developed by Trubetzkoy, Jakobson, and Halle.

These ideas were applied to the development of the Germanic vowel system by Benediktsson (1967) and Antonsen (1972), whose analyses I will build on, with some revisions.

There are two central principles to this approach:

The Contrastivist Hypothesis

- Only some properties of a segment are active, or relevant to the phonology, and these are the distinctive, or contrastive, properties.

This idea has been formulated by Hall (2007) as the Contrastivist Hypothesis:

The Contrastivist Hypothesis

> The phonological component of a language L operates only on those features which are necessary to distinguish the phonemes of L from one another.

Contrast and Phonological Activity

It follows from the Contrastivist Hypothesis that only contrastive features can be phonologically active, where feature activity is defined as follows (adapted from Clements (2001: 77):

Phonological Activity

A feature can be said to be active if it plays a role in the phonological computation; that is, if it is required for the expression of phonological regularities in a language, including both static phonotactic patterns and patterns of alternation.

Contrast and Phonological Activity

If only contrastive features can be active, then it follows as a corollary to the Contrastivist Hypothesis that

Corollary to the Contrastivist Hypothesis

If a feature is phonologically active, it must be contrastive.

Contrast and Hierarchy

- The second major building block is that contrastive features are computed hierarchically by ordered features that can be expressed as a branching tree.

Branching trees are generated by what I call the Successive Division Algorithm (Dresher 1998, 2003, 2009):

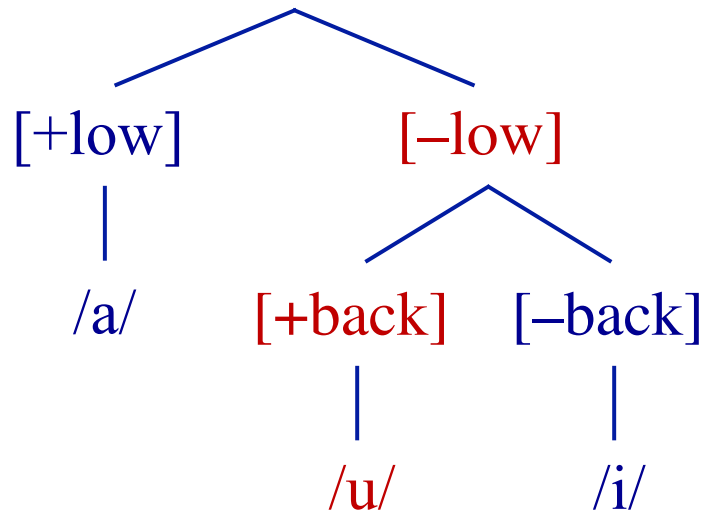
The Successive Division Algorithm

> Assign contrastive features by successively dividing the inventory until every phoneme has been distinguished.

Underspecified Features

Notice that on this view, lexical specifications are limited to contrastive features, so are not pronounceable.

[low] > [back]



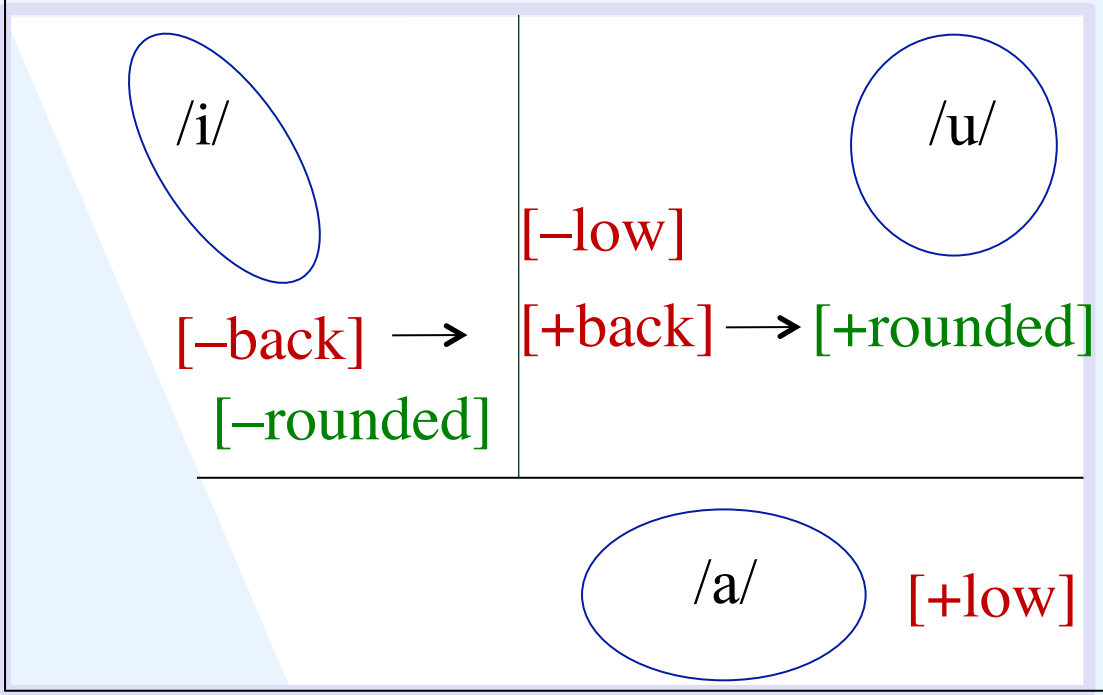
In this example, the phoneme designated /u/ has only two features: [–low] and [+back].

Unless the vowels are further specified in the phonology by other contrastive features, they are made more specific only in a postlexical (phonetic) component.

Enhancement of Underspecified Features

Stevens, Keyser & Kawasaki (1986) propose that feature contrasts can be enhanced by other features that have similar acoustic effects.

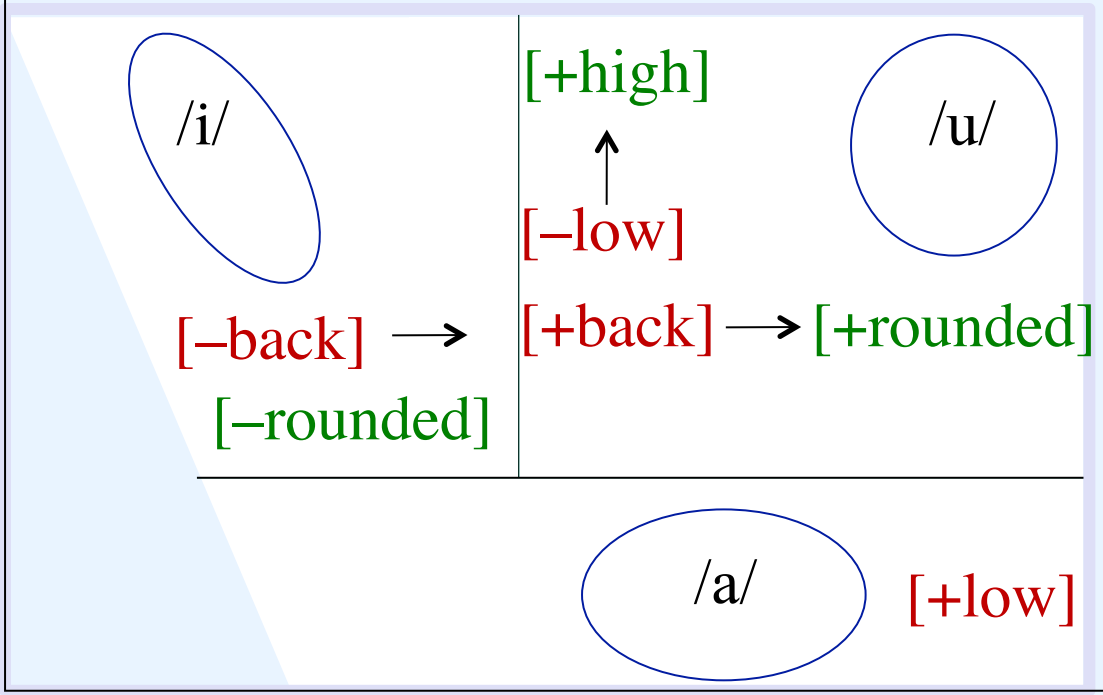
Thus, a non-low vowel can enhance its [+back] feature by adding [+rounded]; [–back] is enhanced by [–rounded].



Enhancement of Underspecified Features

And the feature [–low] can be enhanced by adding [+high].

These enhancements take place after the lexical (contrastive) phonology, in the postlexical component.

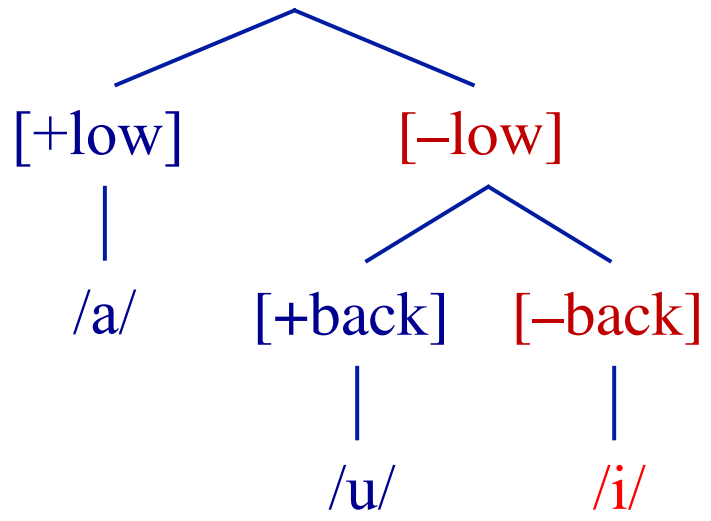


They are not necessary, however, and other realizations are possible (see Dyck 1995 and Hall 2011 for discussion).

Contrastive ≠ Unpredictable

Notice also that on this approach to contrast, it is possible for a feature to be contrastive while also being predictable.

[low] > [back]



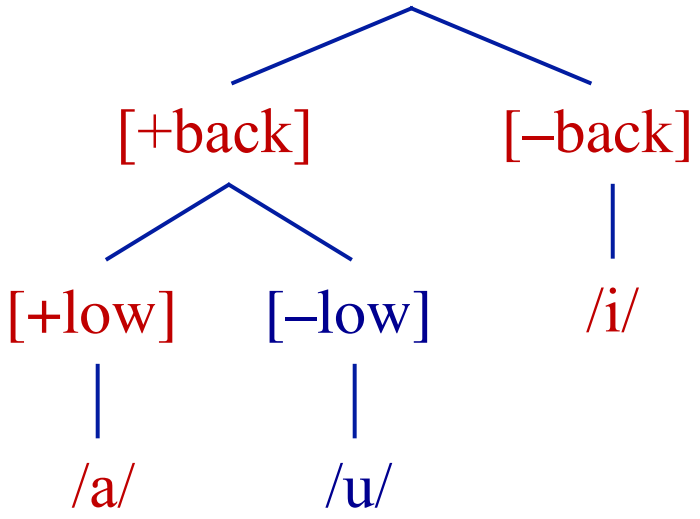
In this vowel system, /i/ is the only [–back] vowel; therefore, its [–low] feature is predictable, thus technically redundant.

Nevertheless, it is designated as contrastive in this feature ordering.

Contrastive ≠ Unpredictable

In the ordering [back] > [low], /i/ is contrastive only for [back].

[back] > [low]



Now /a/ is contrastively [+back], though it is the only [+low] vowel.

This non-equivalence between the notions of contrast and predictability will be important in solving one of the paradoxes posed by *i*-umlaut.

West Germanic Vowel System

Let us consider the West Germanic vowel system at the point where it had five short and five long vowels (Antonsen 1965; Ringe & Taylor 2014: 106).

I assume that the contrasts in the two subsystems are symmetrical; hence, I will disregard length when assigning features.

Short vowels	Long vowels
i u	iː uː
e o	eː oː
a	aː

West Germanic Contrastive Features

Based on the evidence from the descendant dialects, Antonsen (1972: 132–133) assumes that *[a] had allophones *[a, æ, ə, ɒ], which all have in common that they are [+low].

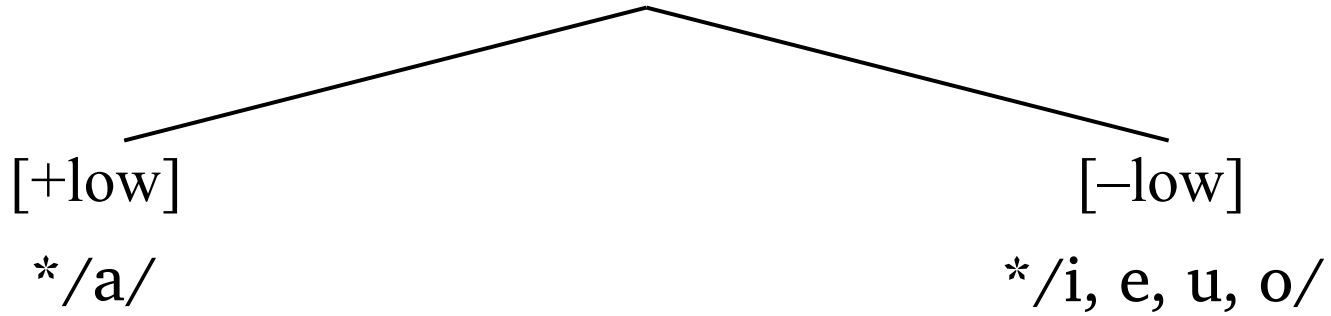
Further, there is evidence that *[i] and *[u] had lowered allophones before *[a], again suggesting that *[a] had a feature that could affect vowel height, in this case [+low].

	i	u
	e	o
[+low]	a	

There is no evidence that *[a] had any other phonologically active features.

West Germanic Feature Hierarchy

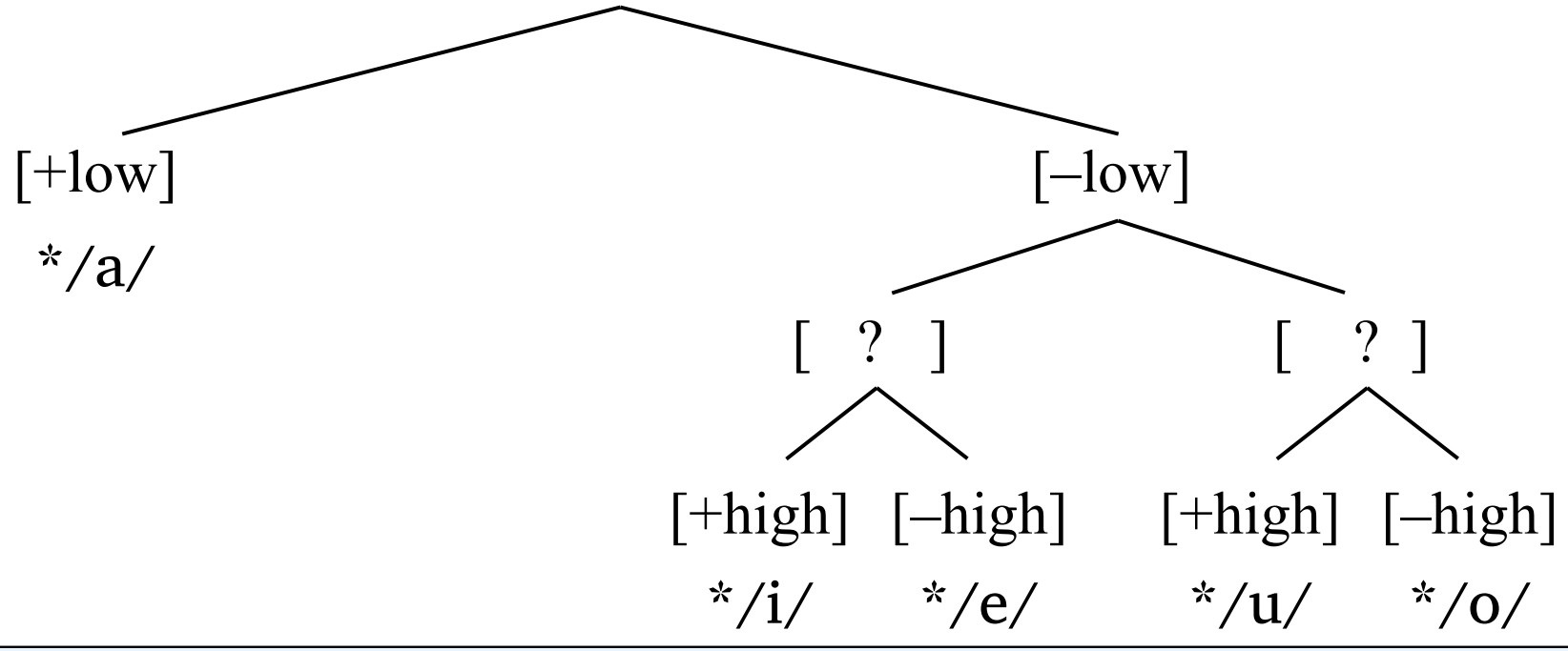
Therefore Antonsen, following Benediktsson 1967, puts [low] at the top of the vowel feature hierarchy, so that */a/ receives no further contrastive features.



West Germanic Feature Hierarchy

I assume that [high] distinguishes between */i/~*/e/ and */u/~*/o/.

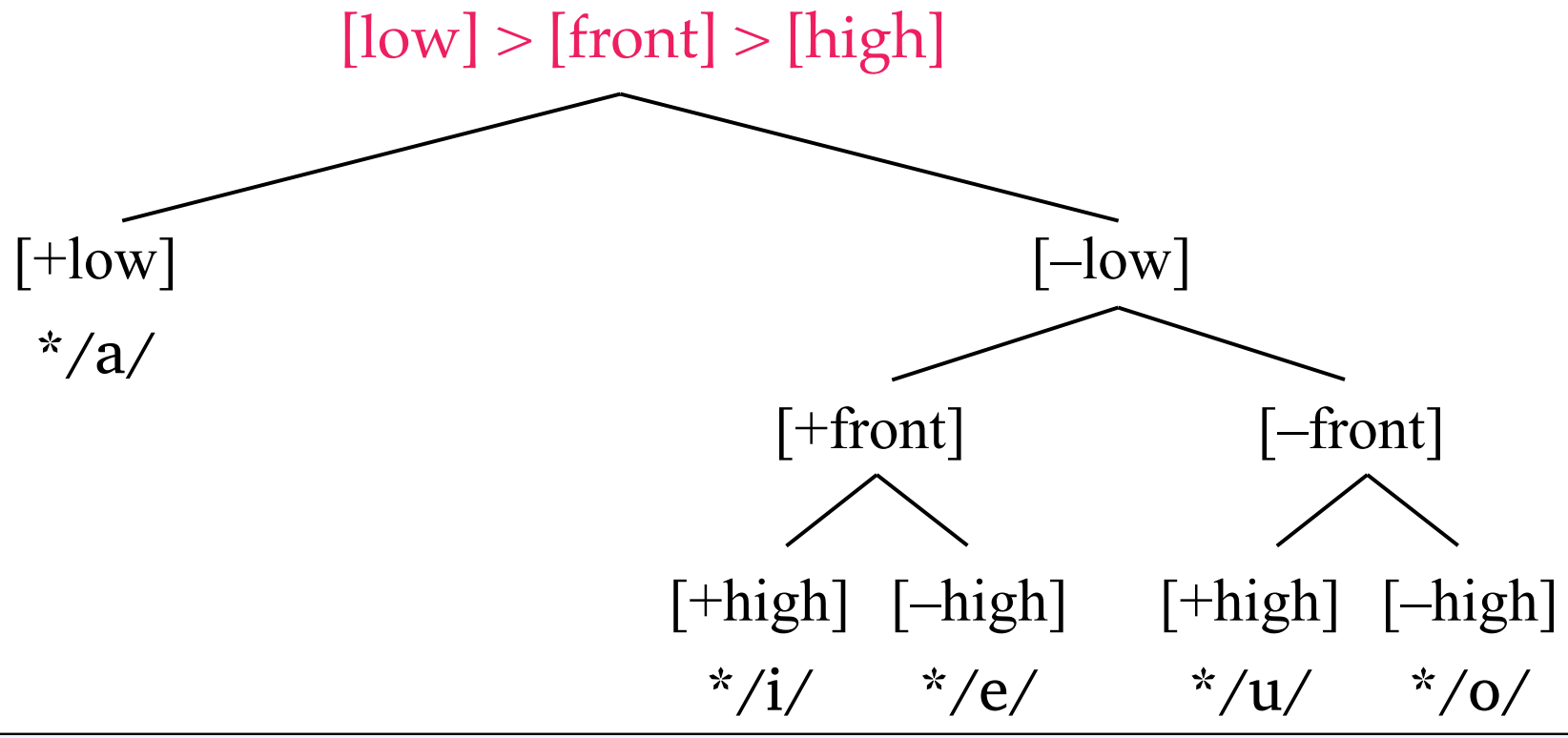
There is now room for only one more feature to distinguish between */i, e/ and */u, o/.



West Germanic Feature Hierarchy

I posit that this feature is front (cf. Lass 1994; Ringe 2006; Purnell & Raimy 2015).

We now have the feature hierarchy [low] > [front] > [high]. The feature [rounded] is not contrastive at this point.



i-umlaut

According to most accounts (V. Kiparsky 1932; Twaddell 1938; Benediktsson 1967; Antonsen 1972; Penzl 1972; but not Voyles 1992), *i*-umlaut began in early Germanic as a phonetic process that created fronted allophones of */a(ː)/, */ o(ː)/, and */u(ː)/ when */i(ː)/ or */j/ followed.

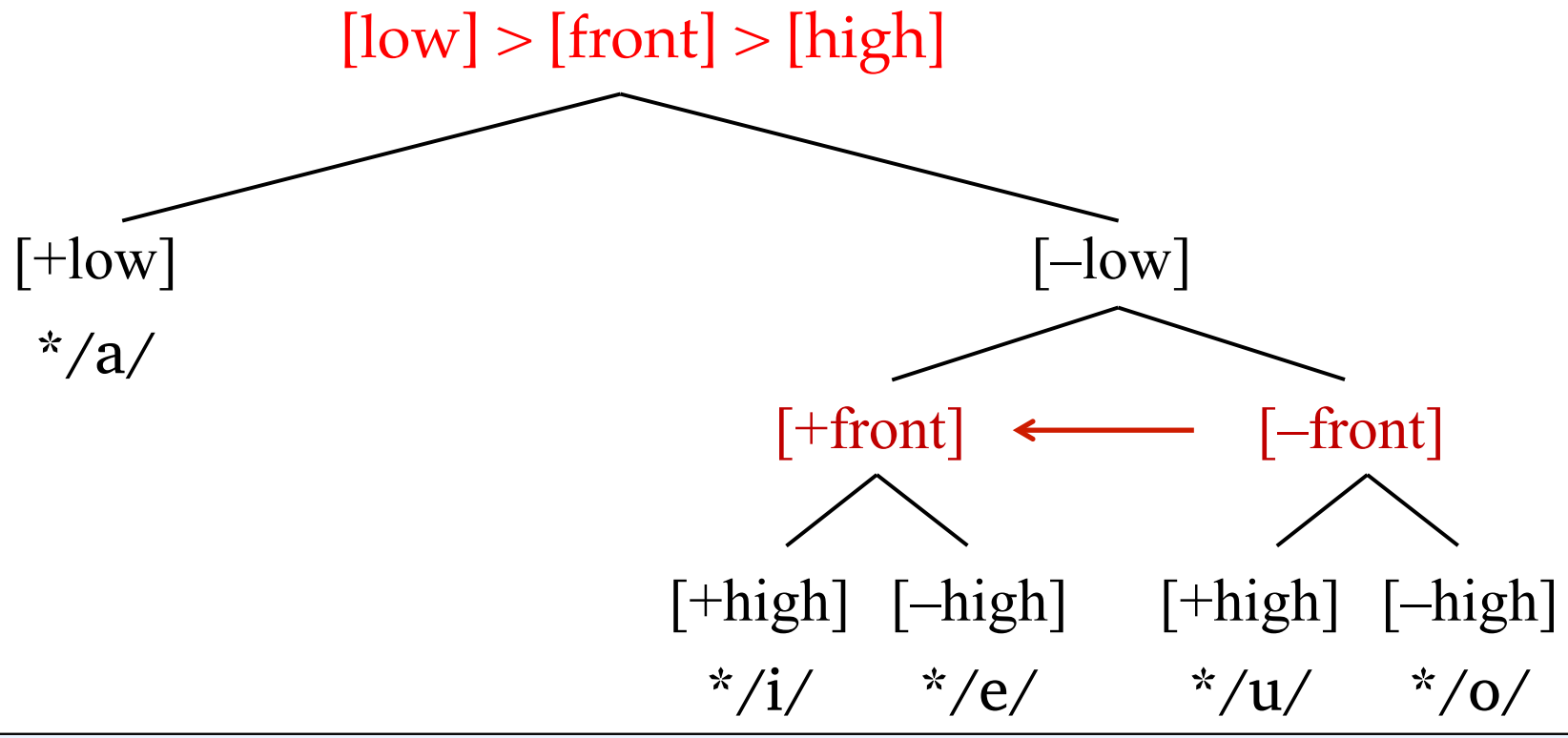
Examples of the latter two are shown below.

Gloss	'evil N.S.'	'foot N.P.'
Early Germanic	*uβil	*foːt + i
i-umlaut	*yfil	*føːt + i

The Origins of *i*-umlaut

Given our analysis of the West Germanic vowel system, the result of fronting */u, o/ in the contrastive phonology would be to simply make them identical to */i, e/.

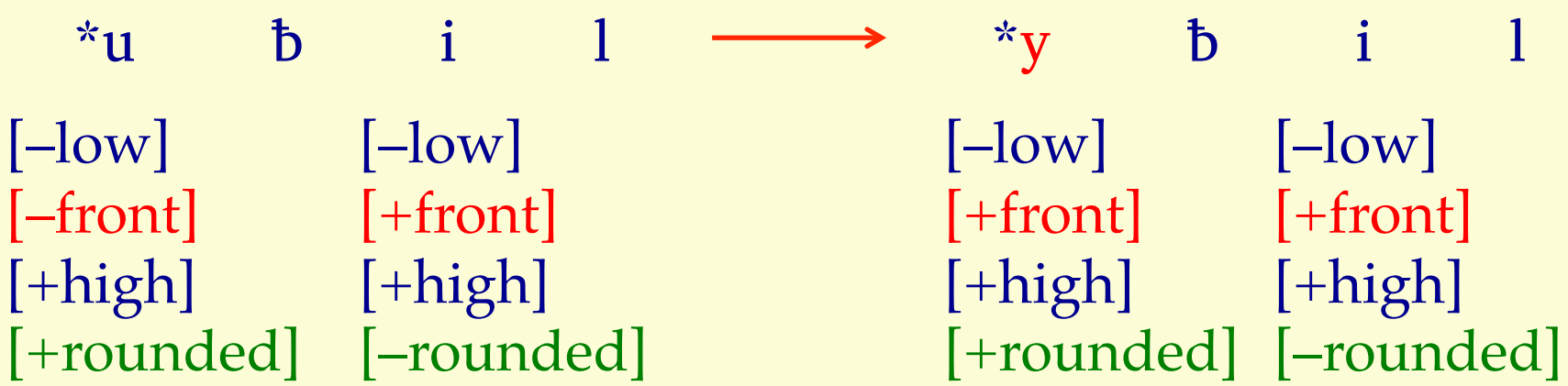
i-umlaut crucially preserves the rounded nature of the fronted vowels.



i-umlaut

Therefore, the enhancement feature [rounded] must be in play at the point that */u, o/ are fronted.

This conclusion is consistent with the assumption of many commentators, beginning with V. Kiparsky (1932) and Twaddell (1938), that *i*-umlaut began as a late phonetic (or postlexical) rule.



i-umlaut Becomes Opaque

At some point the contexts of *i*-umlaut became obscure.

In Old English, for example, unstressed /i/ lowered after a light syllable, as in *yfel*, and deleted after a heavy syllable, as in *føːt*.

These processes had the effect of making *i*-umlaut *opaque*.

Gloss	'evil'	'foot N.P.'
Underlying	/ufil/	/foːt + i/
i-umlaut	yfil	føːt + i
i-lowering/deletion	yfel	føːt Ø

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 /ufil/ to /yfel/.

I assume that *i*-umlaut may have persisted as a synchronic rule in forms with alternations, like *foːt* ~ *føːt* 'foot ~ feet'.

Gloss	'evil'	'foot N.P.'
Underlying	/yfel/	/foːt + i/
i-umlaut	—	føːt + i
i-lowering/deletion	—	føːt Ø

Phonologization Paradox

Scholars have pointed out a number of problems with this scenario (see Liberman 1991; Fertig 1996; Janda 1999, P. Kiparsky 2015).

One of these is the Phonologization Paradox: As long as *i*-umlaut remains a phonetic post-enhancement process, it is not clear how it could survive the loss of its triggering contexts.

Before loss of *i*-umlaut trigger

Lexical Phonology

Underlying /ufil/

Postlexical Phonology

i-umlaut yfil

i-lowering yfel

Phonologization Paradox

Before loss of *i*-umlaut trigger

Lexical Contrastive Phonology

[low], [front], [high]

Underlying /ufil/

Postlexical Post-enhancement

Add [rounded]

i-umlaut yfil

i-lowering yfel

In the old grammar, the underlying form is */ufil/.

In the Lexical Phonology, only contrastive features are computed, i.e., [low, [front], and [high].

In the Postlexical Phonology, enhancement features are added, notably [rounded].

i-umlaut applies, and then the triggering *i* is lowered to *e*.

Phonologization Paradox

After loss of *i*-umlaut trigger

Lexical Contrastive Phonology

[low], [front], [high]

Underlying /ufel/

Postlexical Post-enhancement

Add [rounded]

i-umlaut -----

i-lowering -----

Suppose learners can no longer recover the */i/, and acquire underlying */ufel/, not */ufil/.

In the Postlexical component, *i*-umlaut cannot apply, and we expect the form to surface as **ufel*, which is not correct.

Phonologization Paradox

Before loss of *i*-umlaut trigger

Lexical Contrastive Phonology

Contrastive features?

Underlying /ufil/

i-umlaut yfil

Postlexical Post-enhancement

Enhancement features?

i-lowering yfel

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

i-lowering continues to apply in the postlexical component.

Phonologization Paradox

After loss of *i*-umlaut trigger

Lexical Contrastive Phonology

Contrastive features?

Underlying /yfel/

i-umlaut -----

Postlexical Post-enhancement

Enhancement features?

i-lowering -----

Then when *i* is lost, the lexical allophone [y] is reanalyzed as a phoneme /y/.

But this account requires that the feature [rounded] be available in the lexical phonology, contrary to our original assumption.

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 are more perceptually salient than their triggers (Jakobson, Fant & Halle 1952), which were becoming progressively weaker as time went on.

Phonologization Paradox

The second question is:

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

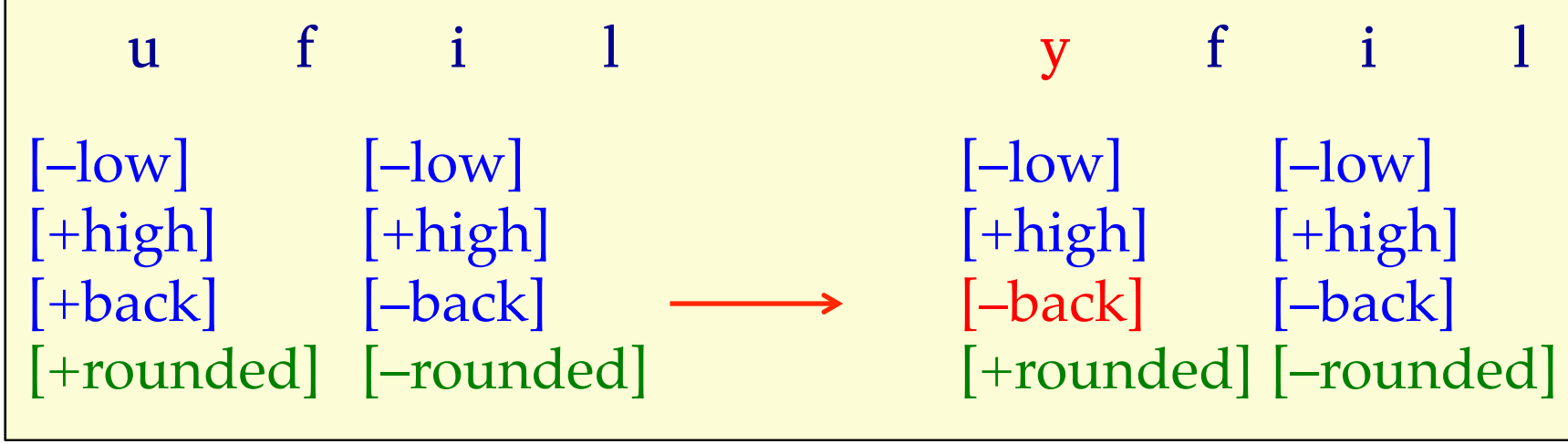
To this question contrastive hierarchy theory can contribute a new solution based on the notion of contrast shift, which goes back to proposals of Jakobson (1931).

The notion that contrast shift is a type of grammar change has proved to be fruitful in the study of a variety of languages (for references, see Dresher, Harvey & Oxford 2014 and Dresher 2015).

Salience and Contrast Shift

Let us revisit the early stage of *i*-umlaut as a postlexical and post-enhancement rule.

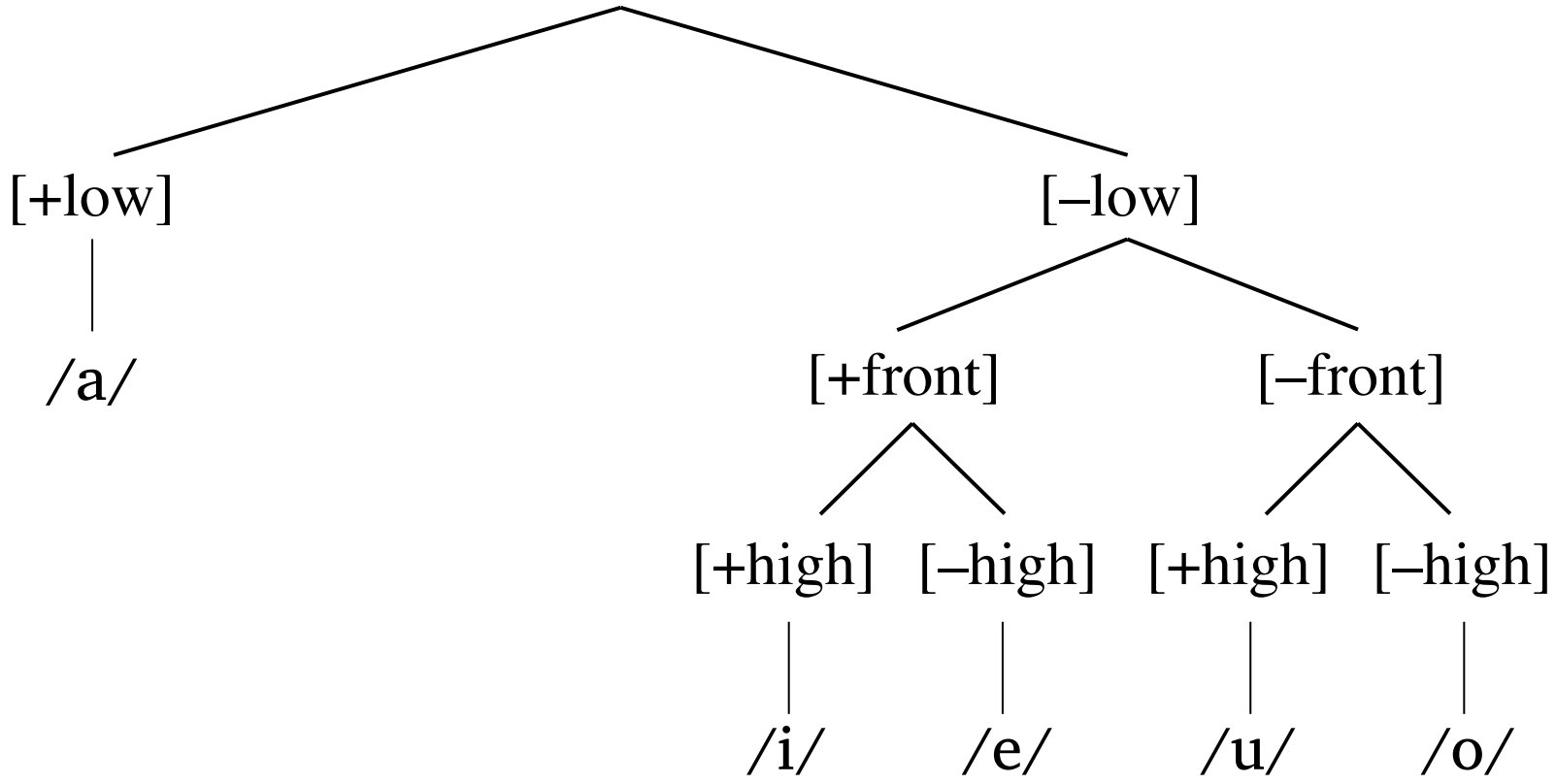
Expanding on P. Kiparsky (2015), let's suppose that the perceptual salience of the front rounded allophones could have led learners to hypothesize that [rounded] is a contrastive feature.



West Germanic Feature Hierarchy 1

Recall that this had not been the case in West Germanic until that point, for which we posited the feature hierarchy

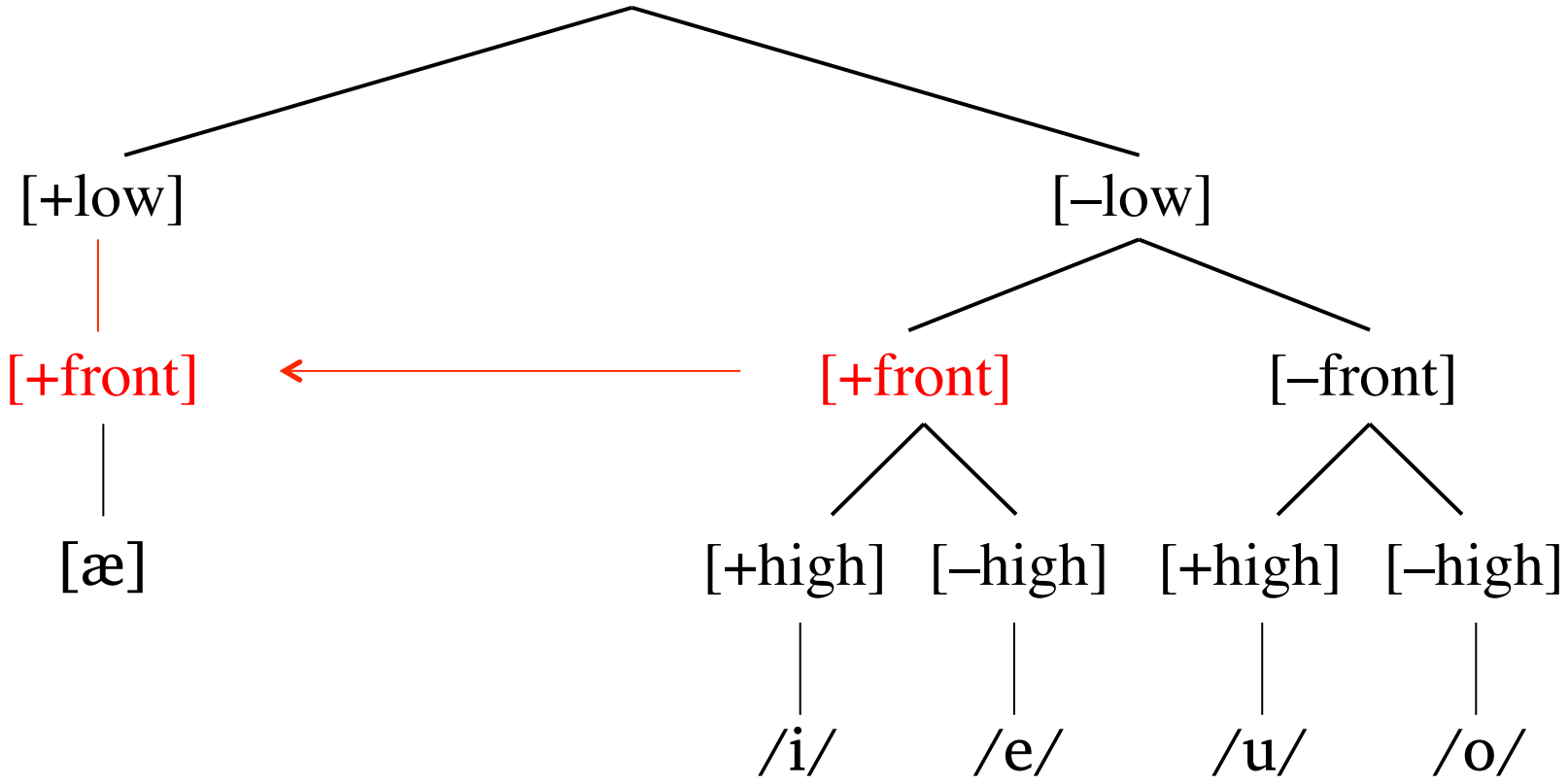
[low] > [back] > [high]



West Germanic Feature Hierarchy 1

Notice, by the way, that the *i*-umlaut of */a/ can occur in the contrastive phonology at this stage.

Adding [+front] to */a/ creates a new allophone that is [+low, +front], made up only of contrastive features.



Contrast Shift in West Germanic

Returning to the non-low vowels, another feature hierarchy can be constructed that includes [rounded] as a contrastive feature.

This hierarchy requires demoting [low] to allow [rounded] to be contrastive over the back vowels.

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

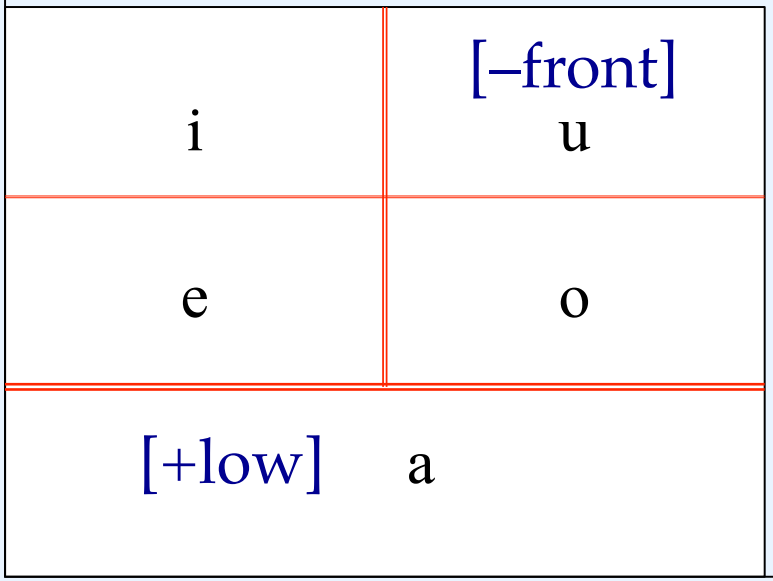
Contrast Shift in West Germanic

Schematically, the contrasts in the vowel system are redrawn from the diagram on the left to the one on the right.

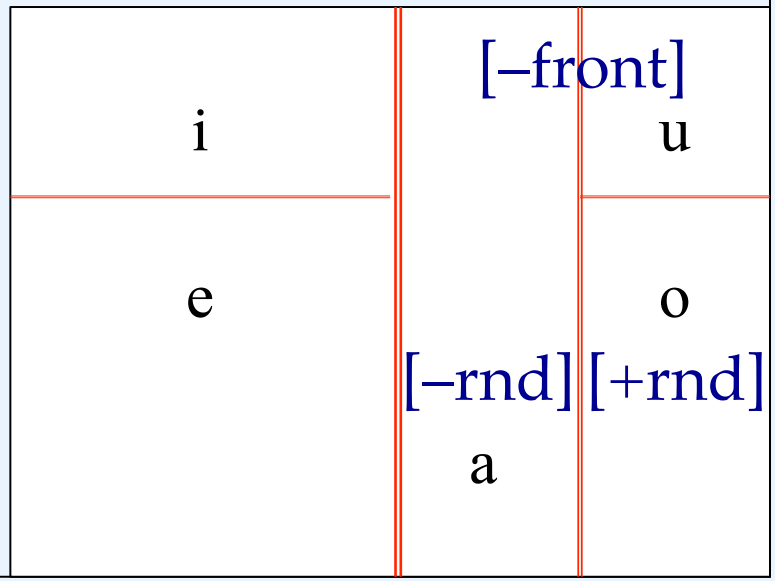
The main difference is in the [–front] vowels, where the [low] contrast has been replaced by a [rounded] contrast.

In tree form the new hierarchy looks as follows:

Earlier Hierarchy

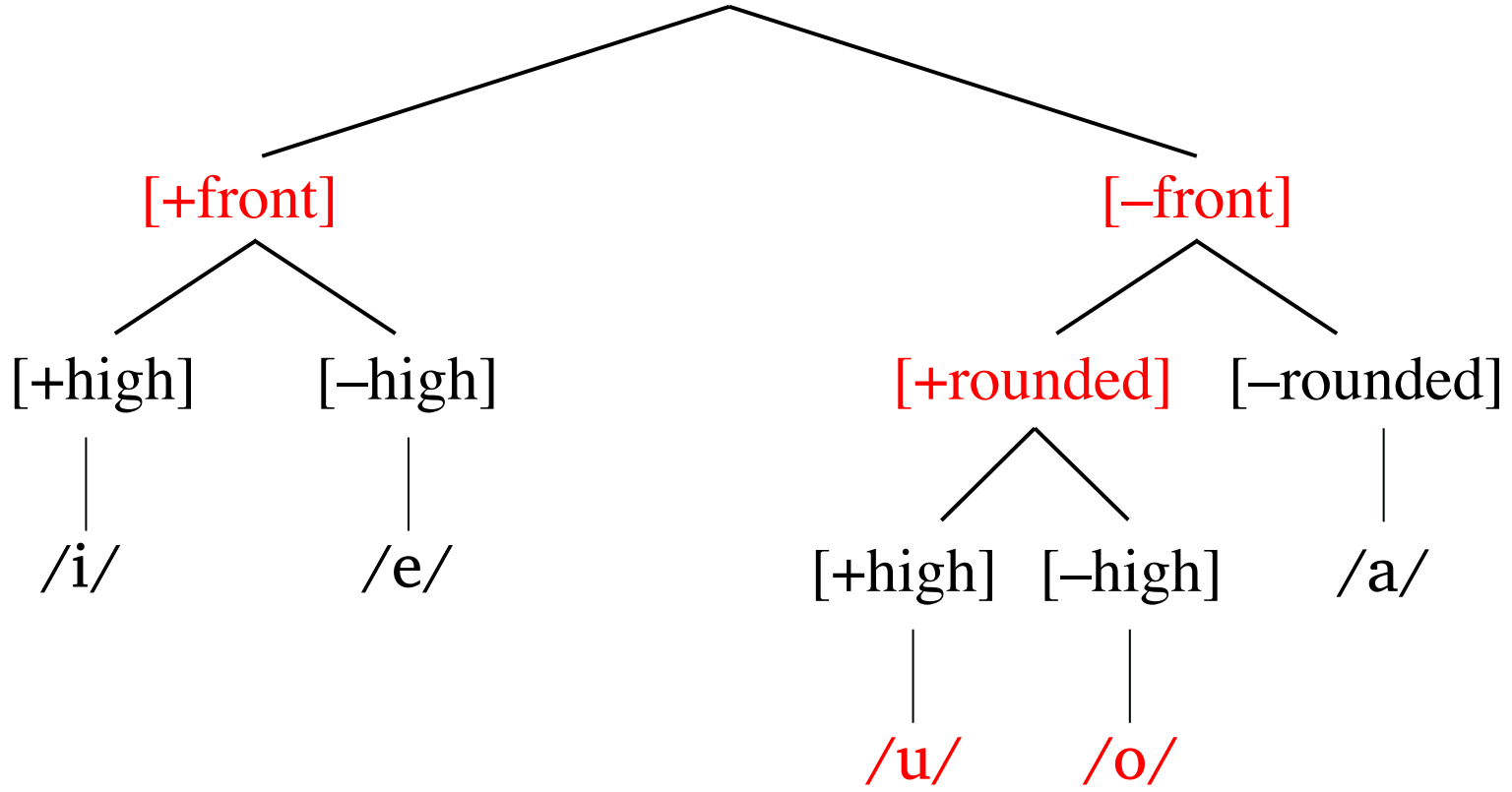


Later Hierarchy



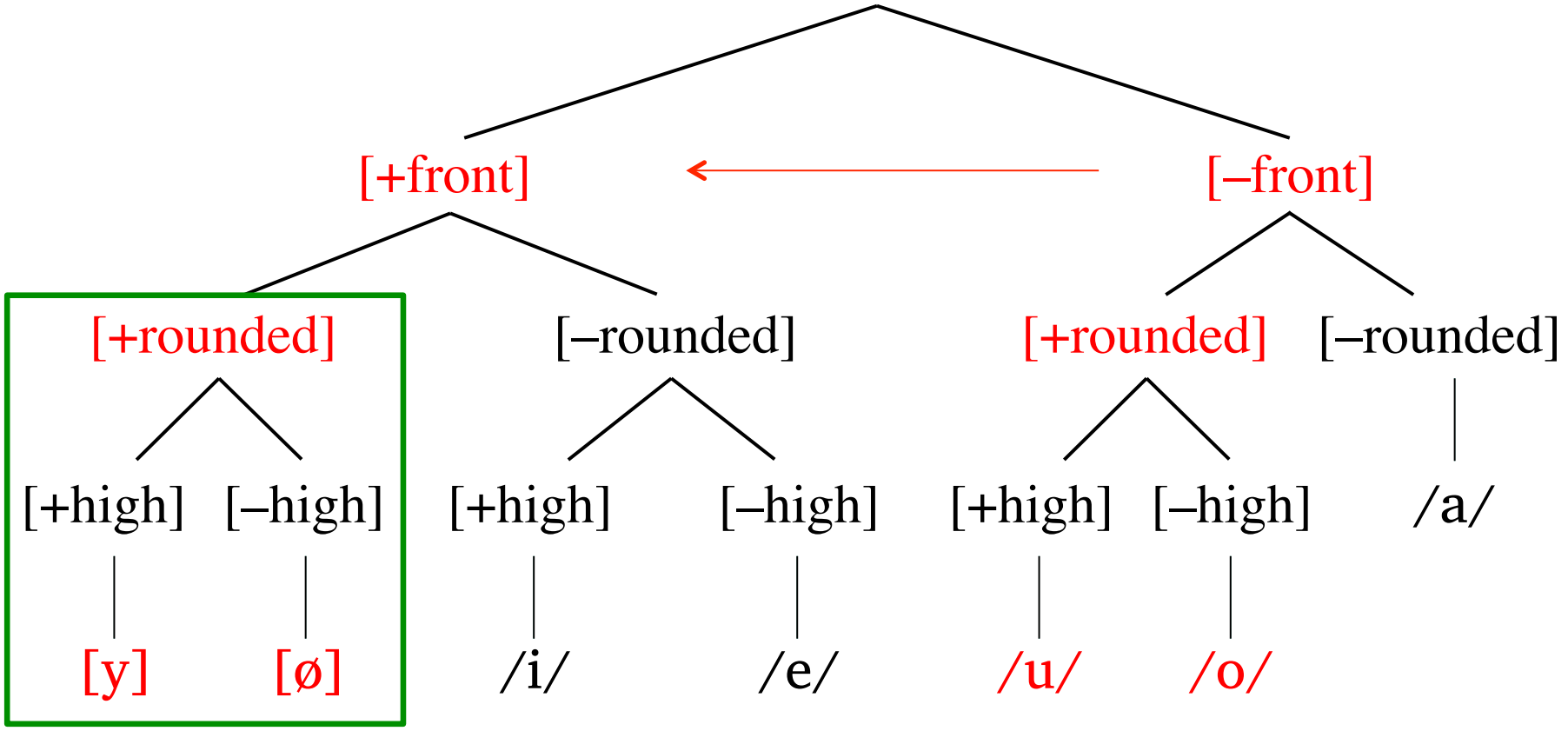
West Germanic Feature Hierarchy 2

[front] > [rounded] > [high] > [low]



West Germanic Feature Hierarchy 2

Now changing the [–front, +round] vowels to [+front] results in new front rounded vowels, which begin as allophones.



Deep Allophones

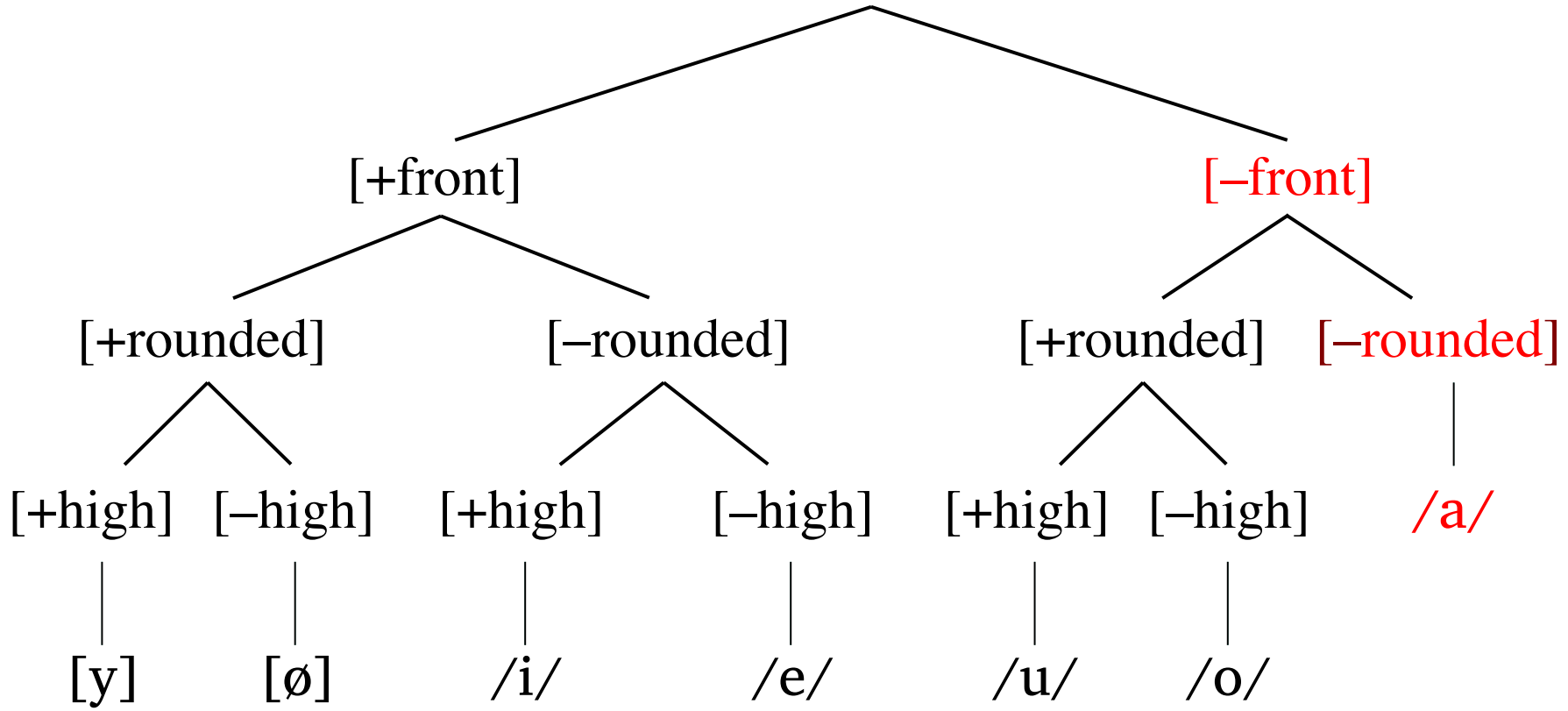
Although they are allophones, they can arise in the lexical phonology because they consist only of contrastive features.

They are thus what Moulton (2003) calls 'deep allophones', referring to the Old English voiced fricatives which also arise in the lexical phonology.

Deep allophones are possible because contrastive features are not all necessarily unpredictable in a hierarchical approach.

West Germanic Feature Hierarchy 2

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

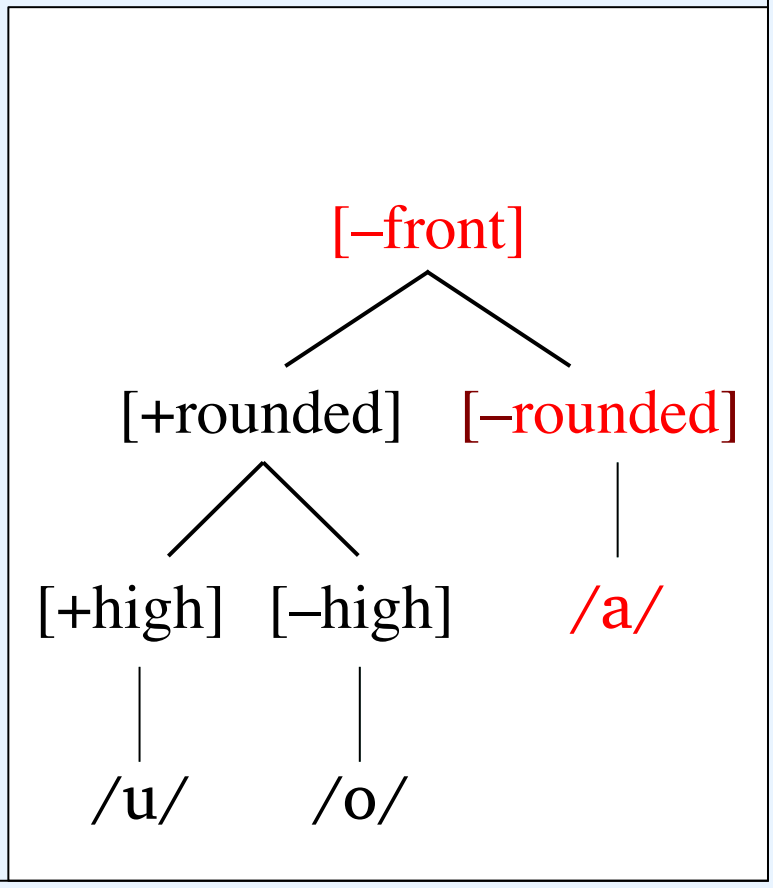


West Germanic Feature Hierarchy 2

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

As far as I can tell, however, it does not need one.

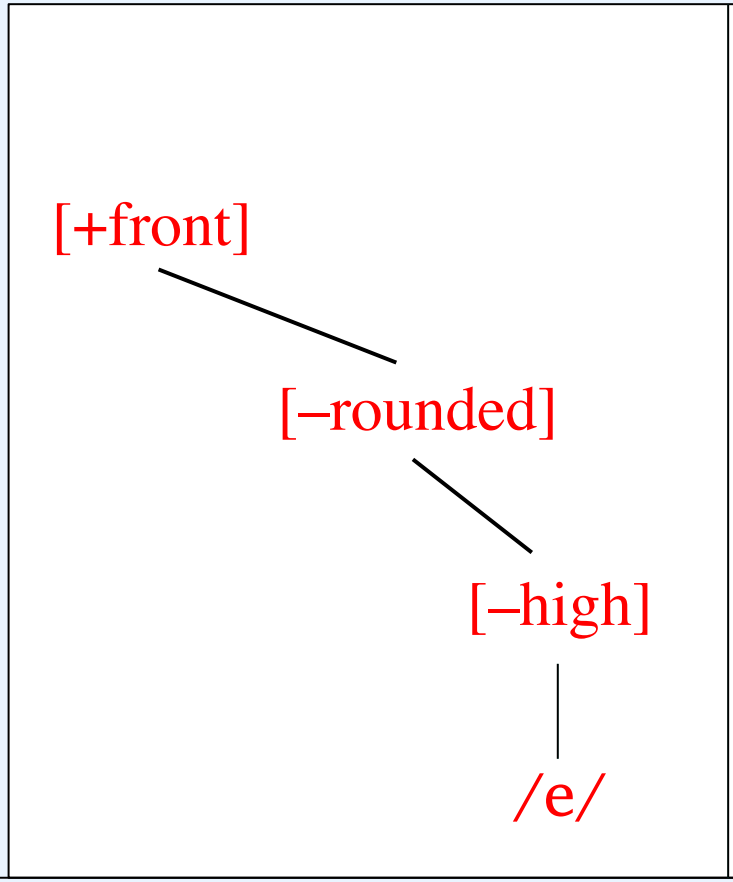
Unlike earlier periods of the language, there is no evidence that /a/ causes lowering of other segments, for example.

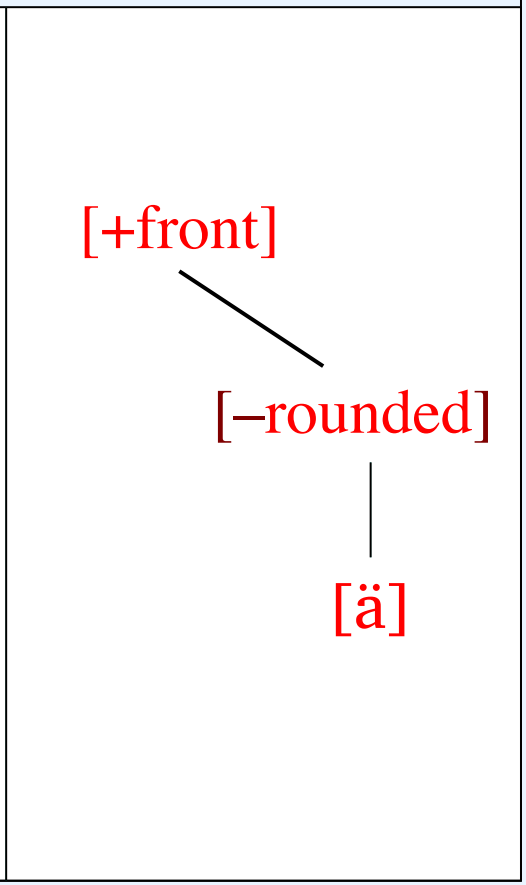


West Germanic Feature Hierarchy 2

Adding [+front] to /a/ at this stage results in a new allophone with the contrastive features [+front, –rounded], but no contrastive height feature.

Depending on how this vowel is implemented phonetically, it may or may not be distinct from /e/.





Conclusions

The evidence of early Germanic vowel systems is that [low] was highest in the hierarchy of vowel features, and [back] but not [rounded] was contrastive.

The rise of front rounded allophones *[y, ø] created by *i*-umlaut and the weakening of their triggering contexts brought about a contrast shift, whereby [rounded] became contrastive and [low] was demoted.

Conclusions

Thus, a crucial step in the phonologization of the front rounded allophones as new phonemes is the promotion of the enhancement feature [rounded] into the contrastive phonology while the allophones are still positional variants of */u/ and */o/.

The *i*-umlaut of */a/ does not depend on [rounded]; on this approach, it follows that it could occur in the contrastive phonology before and after the contrast shift, with different results.

THANK YOU!

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BERKELEY GERMANIC LINGUISTICS ROUNDTABLE

University of California, Berkeley April 1–2, 2016