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Contrastive Vowel Features
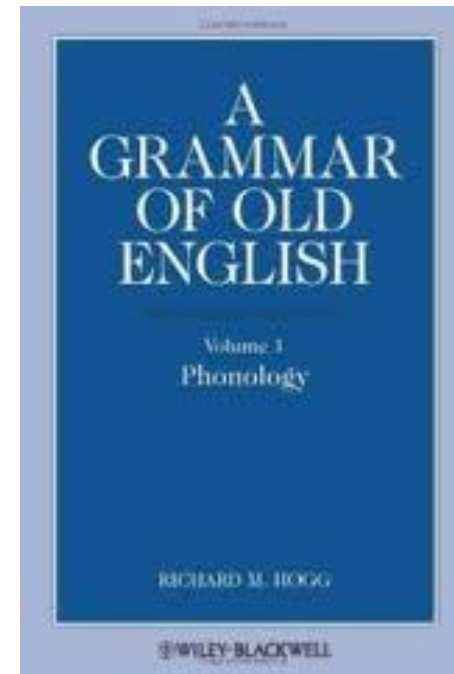# *in West Germanic and Old English*

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Introduction

The insight that phonological change may involve a reorganization of the contrasts of a language goes back to Jakobson (1931), who argued for a structuralist phonemic approach (see Salmons & Honeybone to appear).

Introduction

Richard Hogg (1992) showed that his Neogrammarian predecessors were unable to give a satisfactory account of developments in early Old English because they lacked a contrastive phonemic perspective.

Introduction

I argue that some of these phonemic insights are not expressible in a theory that requires full specification of underlying segments.

They can be recaptured, however, if underlying forms are specified only for contrastive features.

My analysis also suggests a new solution to a phonologization paradox posed by Kiparsky (to appear).

An Unnecessary Detour?

Proto-Germanic   *æː

West Germanic   ?   *aː
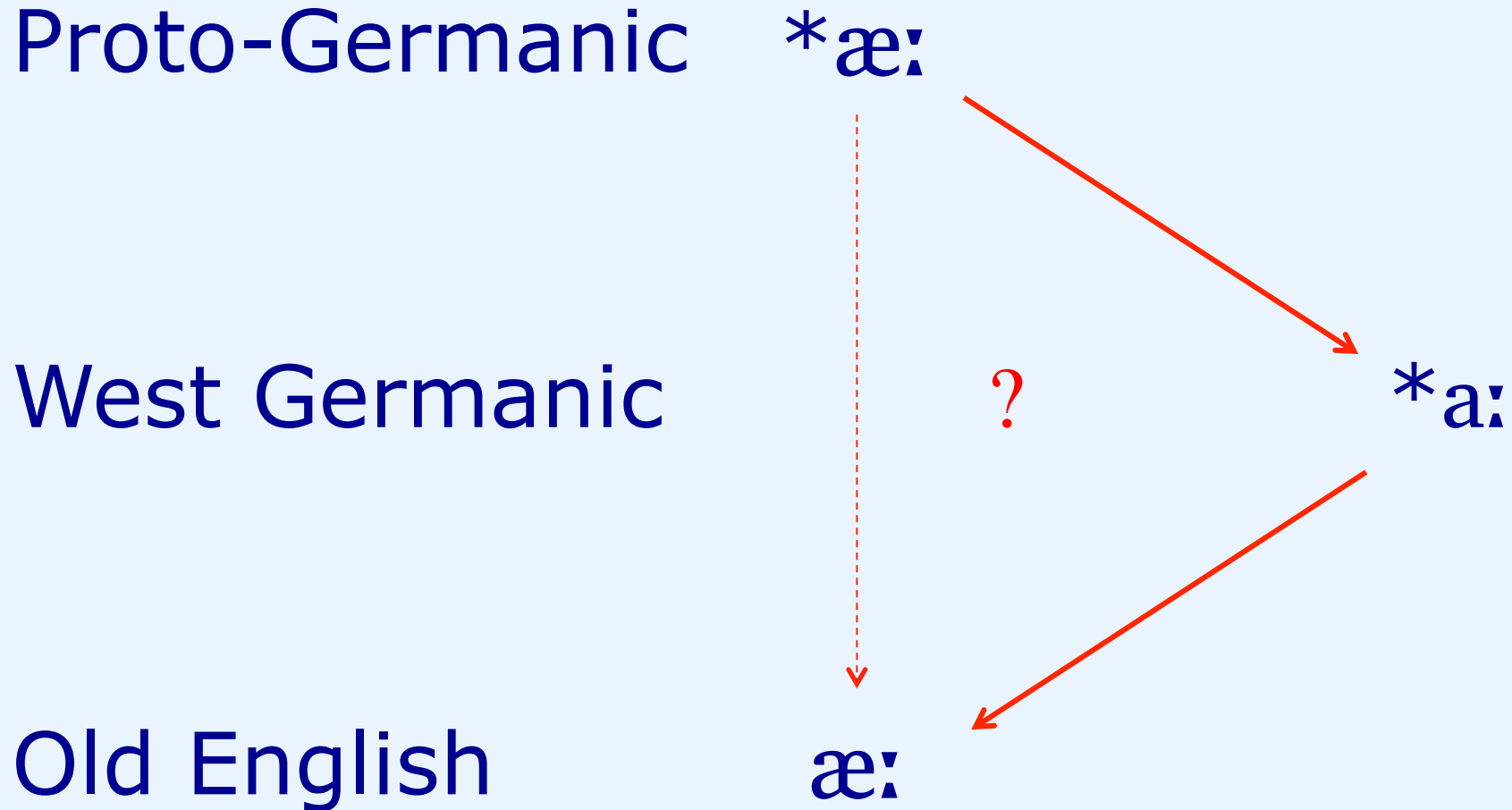
Old English   æː

Did P-G *æː > *aː on its way to OE æː?

The Prehistory of Old English æː

One example concerns the prehistory of early Old English long æː.

Since the corresponding vowel in Proto-Germanic is assumed to have also been *æː, Wright & Wright (1925) had proposed that æː simply persisted into the Old English period.

For example, P-G *æː appears in Old English (West Saxon) as *dǣd* 'deed'; before nasals it retracts to *ō* as in *mōna* 'moon'.

Proto-Germanic	*æː	OE	dǣd	mōna
Old English	æː			

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The Prehistory of Old English æː

Against this view is historical and comparative evidence which appears to show that it was a back vowel, *aː, in West Germanic.

For example, the long low vowel in Latin loanwords such as *strāta* 'street' was borrowed as Germanic *a:.

In other West Germanic languages, this vowel develops as aː, as in Old High German *tāt* 'deed' and *māno* 'moon'.

			OE	dǣd	mōna
Proto-Germanic	*æː				
West Germanic		*aː	OHG	tāt	māno
Old English	æː	aː	Old High German		

The Prehistory of Old English æː

The version of events accepted by most other writers therefore posits, as below, that Proto-Germanic *æː retracted to *aː in West Germanic;

this vowel remained in Old High German, but fronted again to *æː in Old English when not before a nasal.

Proto-Germanic	*æː	
West Germanic	*aː	
Old English	æː aː	

OE	dǣd	mōna
OHG	tāt	māno

Old High German

Hogg's Phonemic Approach

Hogg (1992: 61–3) considers not just the phonetic value of this vowel, but also its phonemic status at each stage of the language. This approach results in a richer picture.

He assumes, as in the traditional account, that /æː/ was a contrastively front vowel in early Proto-Germanic.

Early Proto-Germanic long vowel system

/iː/	/uː/	
/eː/	/oː/	
/æː/ = [æː]	/aː/ = [aː]	9

Hogg's Phonemic Approach

Later, /ɑː/ merged with /oː/, leaving /æː/ as the only low vowel phoneme.

Later Proto-Germanic long vowel system

/iː/	/uː/	
/eː/	/oː/	
/æː/ = [æː]	/ɑː/	

Hogg's Phonemic Approach

Later, /ɑː/ merged with /oː/, leaving /æː/ as the only low vowel phoneme.

Hogg proposes that this vowel was contrastively neutral with respect to the front/back dimension; therefore, it can be represented as /aː/, whatever its precise phonetic character.

Later Proto-Germanic long vowel system

/iː/	/uː/	
/eː/	/oː/	
/aː/		11

Hogg's Phonemic Approach

Since it could act neutrally with respect to backness, it appeared to earlier writers as though it were a back vowel in early West Germanic.

Hogg suggests that this phoneme may have nevertheless been phonetically front throughout in the dialects that developed into Old English.

West Germanic long vowel system

/iː/		/uː/	West Germanic /aː/
/eː/		/oː/	OE OHG
	/aː/		/aː/ = [æː] /aː/ = [aː]

Hogg's Phonemic Approach

At a later period, a contrasting low back vowel developed in Old English from the monophthongization of older */ai/ which merged with retracted /aː/ before nasals.

This new phoneme created a backness contrast which led to a reanalysis of the original low vowel to a contrastively front vowel /æː/.

Early Old English long vowel system

/iː/	/uː/	
/eː/	/oː/	
/æː/ = [æː]	/ɑː/	13

Hogg's Phonemic Approach

Hence, the alleged shift of Proto-Germanic *æː to West Germanic *aː and then back to æː in Old English and Old Frisian emerges as an artefact of a non-phonemic theory.

Thus, a phonemic perspective allows for a simpler sequence of development: the phonetic value of */æː/ may have remained relatively unchanged from Proto-Germanic to Old English, though its contrastive status may have changed.

	Phonemic	Phonetic
Proto-Germanic	*/æː/	*[æː]
West Germanic	*/aː/	*[æː]
Old English	/æː/	[æː]

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Hogg's Phonemic Approach

Hogg (1992: 77f.) suggests that short */a/ developed in parallel with the long low vowel. Proto-Germanic had only four short vowels.

Like the long low vowel, */a/ was neutral with respect to the front/back dimension, though it appears to have had a more back pronunciation than /aː/.

Proto-Germanic short vowel system

/i/   /u/

/e/

        /a/

Hogg's Phonemic Approach

At some point /u/ lowered before non-high vowels, eventually creating a new phoneme */o/.

After this, West Germanic had five short vowels to match the five long vowels we saw earlier.

West Germanic

Short vowel system		Long vowel system	
/i/	/u/	/iː/	/uː/
/e/	/o/	/eː/	/oː/
	/a/		/aː/

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Hogg's Phonemic Approach

In parallel with the long low vowel, in early Old English */a/ became a contrastively [–back] vowel, */æ/.

This change, known as the first fronting (or Anglo-Frisian brightening), could have occurred even without the develop-ment of a new [+back] phoneme */a/, simply by extending the scope of the [±back] contrast to include the low vowel.

Early Old English short vowel system

/i/	/u/	
/e/	/o/	
/æ/ = [æ]		17

Hogg's Phonemic Approach

Following Hogg (1992: 14), I will assume that there did develop a new phoneme */ɑ/, though the contrast between it and */æ/ was at best marginal, and may have varied by dialect.

Having set out the main aspects of Hogg's phonemic analysis of the development of the low vowels, let's now turn to see how it can be incorporated into a generative grammar.

Early Old English

Short vowel system		Long vowel system	
/i/	/u/	/iː/	/uː/
/e/	/o/	/eː/	/oː/
/æ/	/ɑ/	/æː/	/ɑː/

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Incorporating Hogg's Insight into a Generative Analysis

A Featural Analysis

In terms of distinctive features, Hogg's discussion suggests that the West Germanic low vowels */aː/ and */a/ should not be specified as being either [+back] or [–back].

This kind of contrastive underspecification cannot be expressed in a theory that requires full specification of features.

West Germanic vowel system

/i(ː)/	/u(ː)/	
/e(ː)/	/o(ː)/	
/a(ː)/		

A Featural Analysis

To translate Hogg's insight into an explicit theory, we can borrow an idea from Jakobson and his collaborators (Jakobson, Fant & Halle 1952, Jakobson & Halle 1956), namely:

Contrast via Feature Ordering

Assign contrastive features by ordering the features into a contrastive hierarchy (Dresher 2009), successively dividing the inventory until every phoneme has been distinguished.

On the assumption that only active features are contrastive (the Contrastivist Hypothesis, Hall 2007), phonological activity can serve as a heuristic to ordering the features.

That is, assume that active features are contrastive, and find, if possible, a feature ordering that fits the observed patterns of activity.

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A West Germanic Feature Hierarchy

One way of ordering the features so that the low vowels have no specification for the front/back dimension has been proposed by Purnell & Raimy (to appear).

With a few minor revisions, I adapt their analysis to arrive at the feature hierarchy shown below.
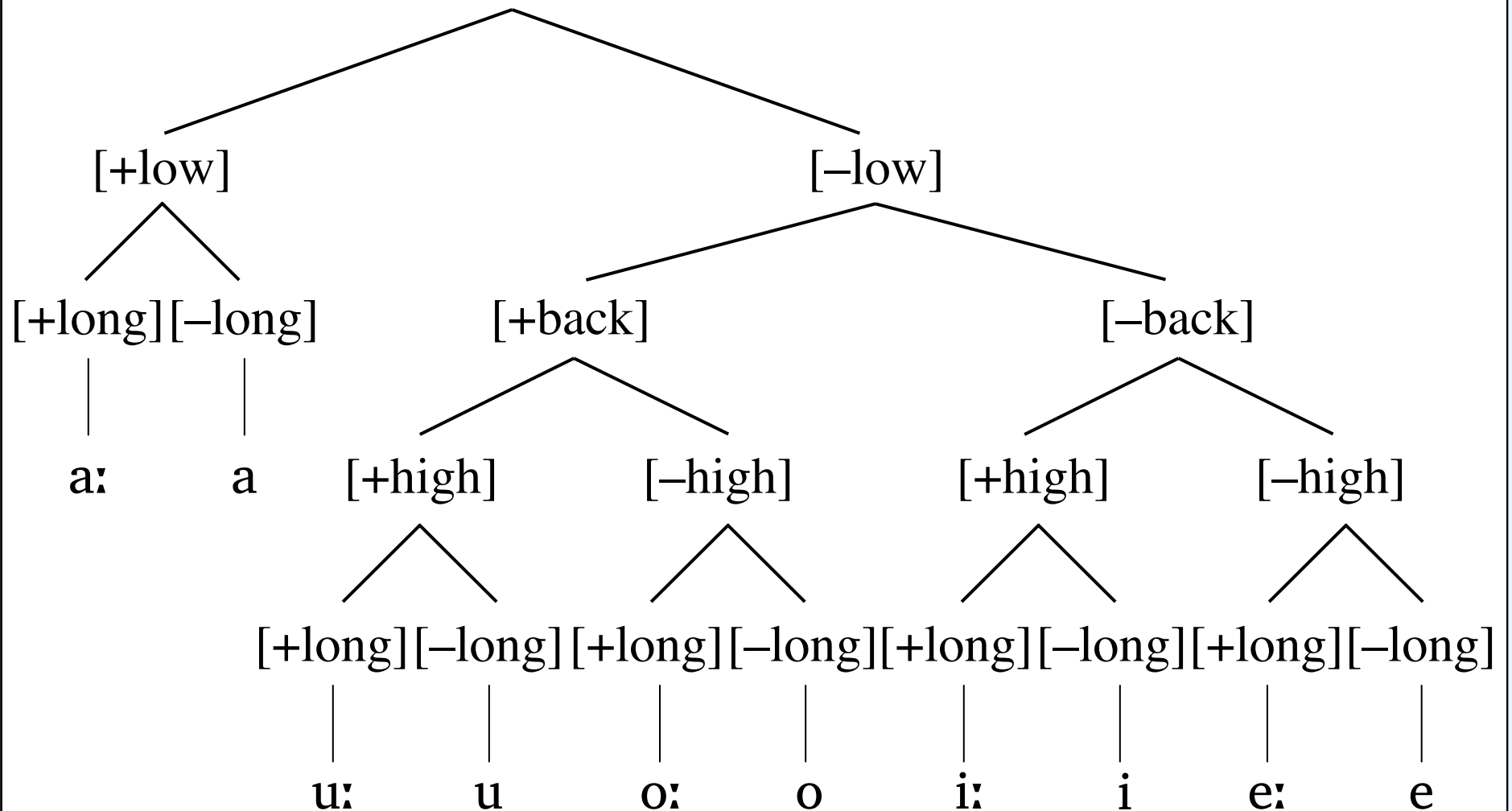
West Germanic

Vowel system	Feature hierarchy
/i(ː)/ /u(ː)/	[low]
/e(ː)/ /o(ː)/	[back]
	[high]
/a(ː)/	[long]

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A West Germanic Feature Hierarchy

[low] > [back] > [high] > [long]

A West Germanic Feature Hierarchy

Once the low vowels are distinguished by [low], there is place for only one tonality feature in the non-low vowels, either [back] or [round].

In support of the choice of [back], it is noteworthy that Lass (1994) observes that rounding is non-distinctive in West Germanic.

West Germanic

Vowel system	Feature hierarchy

/i(:)/	/u(:)/	[low]
/e(:)/	/o(:)/	[back]
		[high]
/a(:)/		[long]

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A West Germanic Feature Hierarchy

I have seen no evidence that a feature [round] is active in West Germanic (cf. the accounts of Prokosch 1939 and Voyles 1992).

The types of processes mentioned by Hogg (1992) include lowering of high vowels, and raising of */e/ to */i/ before */i/ and in some dialects before */u/.
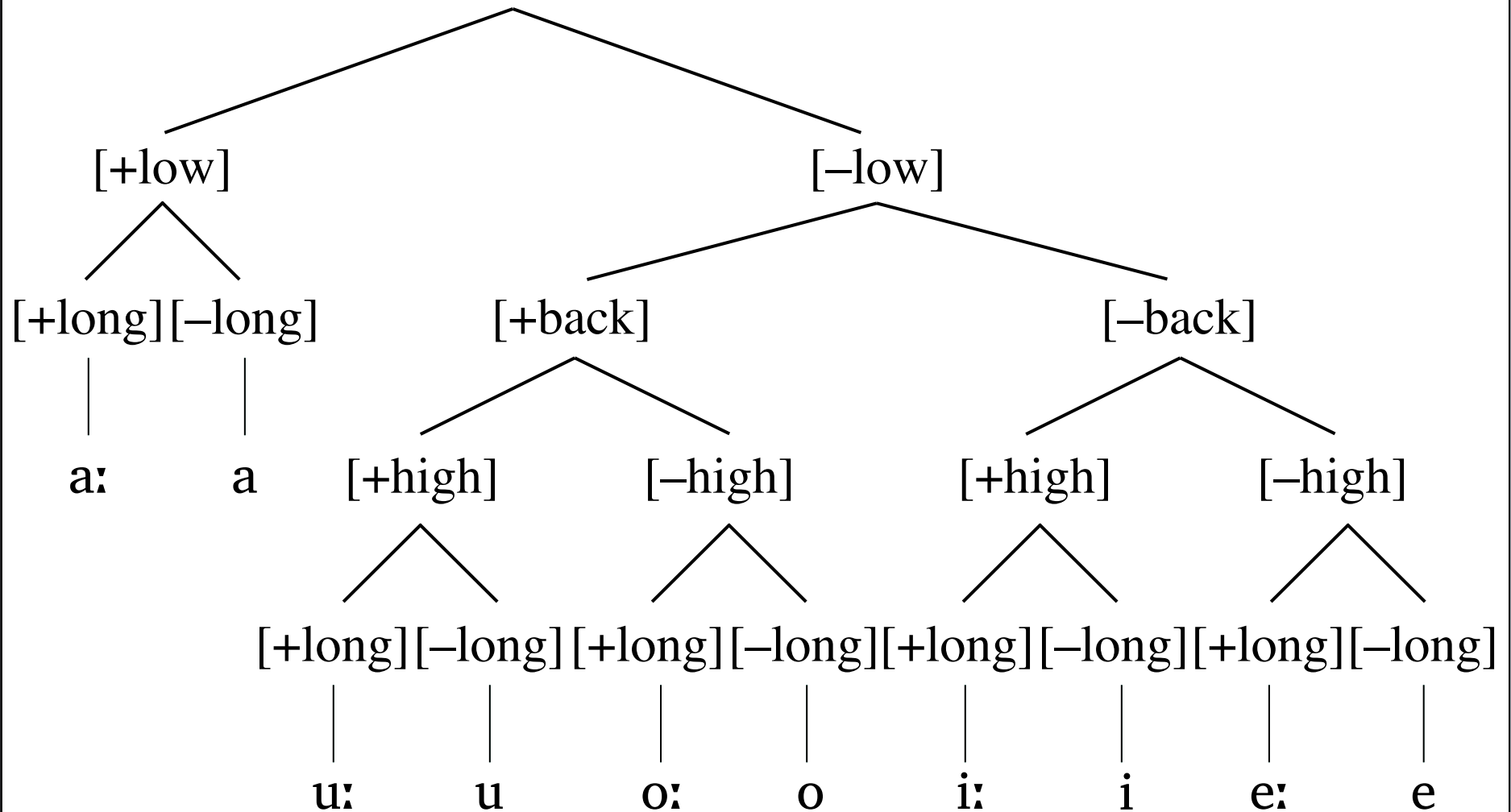
West Germanic

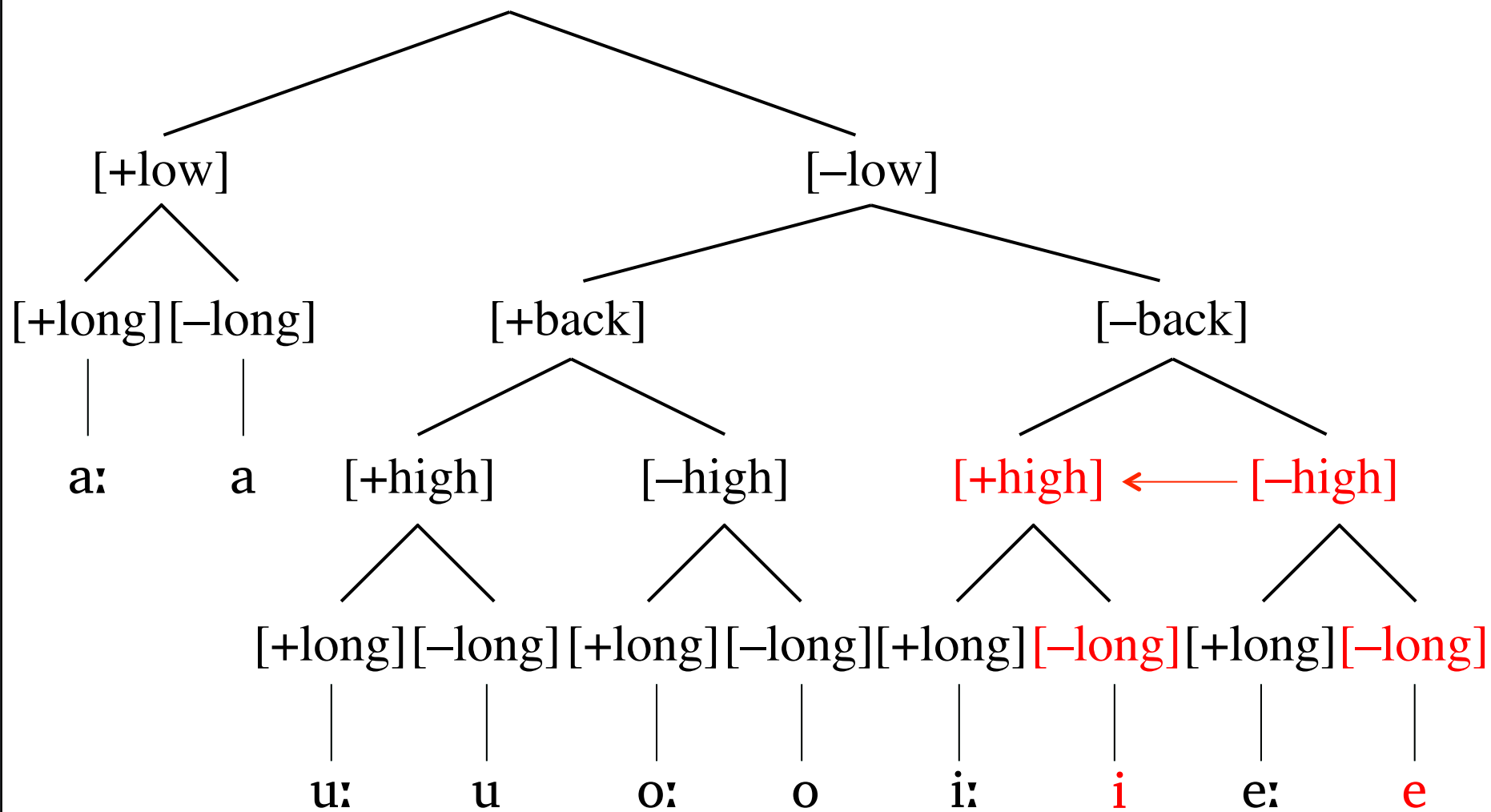| Vowel system		Feature hierarchy
/i(:)/	/u(:)/	[low]
/e(:)/	/o(:)/	[back]
		[high]
/a(:)/		[long]

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A West Germanic Feature Hierarchy

These processes refer to the features shown here:

A West Germanic Feature Hierarchy

Raising of /e/ to /i/: [–high] becomes [+high]

A West Germanic Feature Hierarchy

These contrastive specifications account for phonological generalizations about West Germanic: in particular, the absence of [back] on /aː/ and /a/, and the inactivity of [round].

These properties of the vowel system would be missed by a theory that requires every phoneme to be specified for every distinctive feature that might apply.

Vowel system   Feature hierarchy

/i(ː)/	/u(ː)/	[low]
/e(ː)/	/o(ː)/	[back]
/a(ː)/		[high]
		[long]

West Germanic to Old English

As West Germanic evolved into Old English, the grammar changed not just in the rules and underlying representations, but also in the system of contrastive specifications.

Even phonemes that do not appear to change overtly may come to have different contrastive features.

Vowel system

Feature hierarchy

/i(ː)/	/u(ː)/
/e(ː)/	/o(ː)/
/a(ː)/	

[low]

[back]

[high]

[long]

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Old English Vowel System

In Old English a new contrast developed between front /æ(ː)/ and back /ɑ(ː)/.

The feature hierarchy proposed for West Germanic can accommodate this expansion of the vowel system by simply extending the [back] contrast to the [+low] branch.
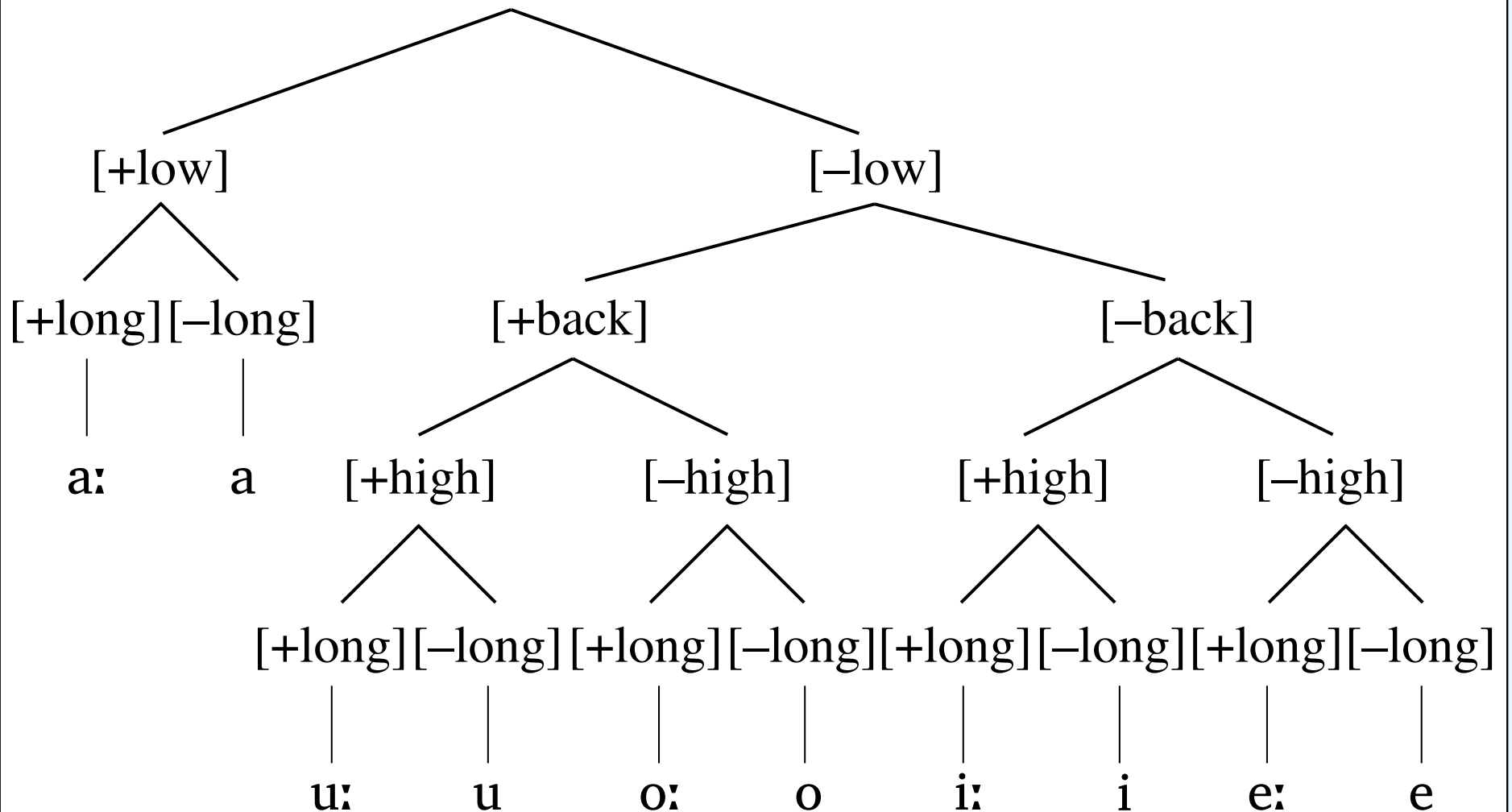
Old English

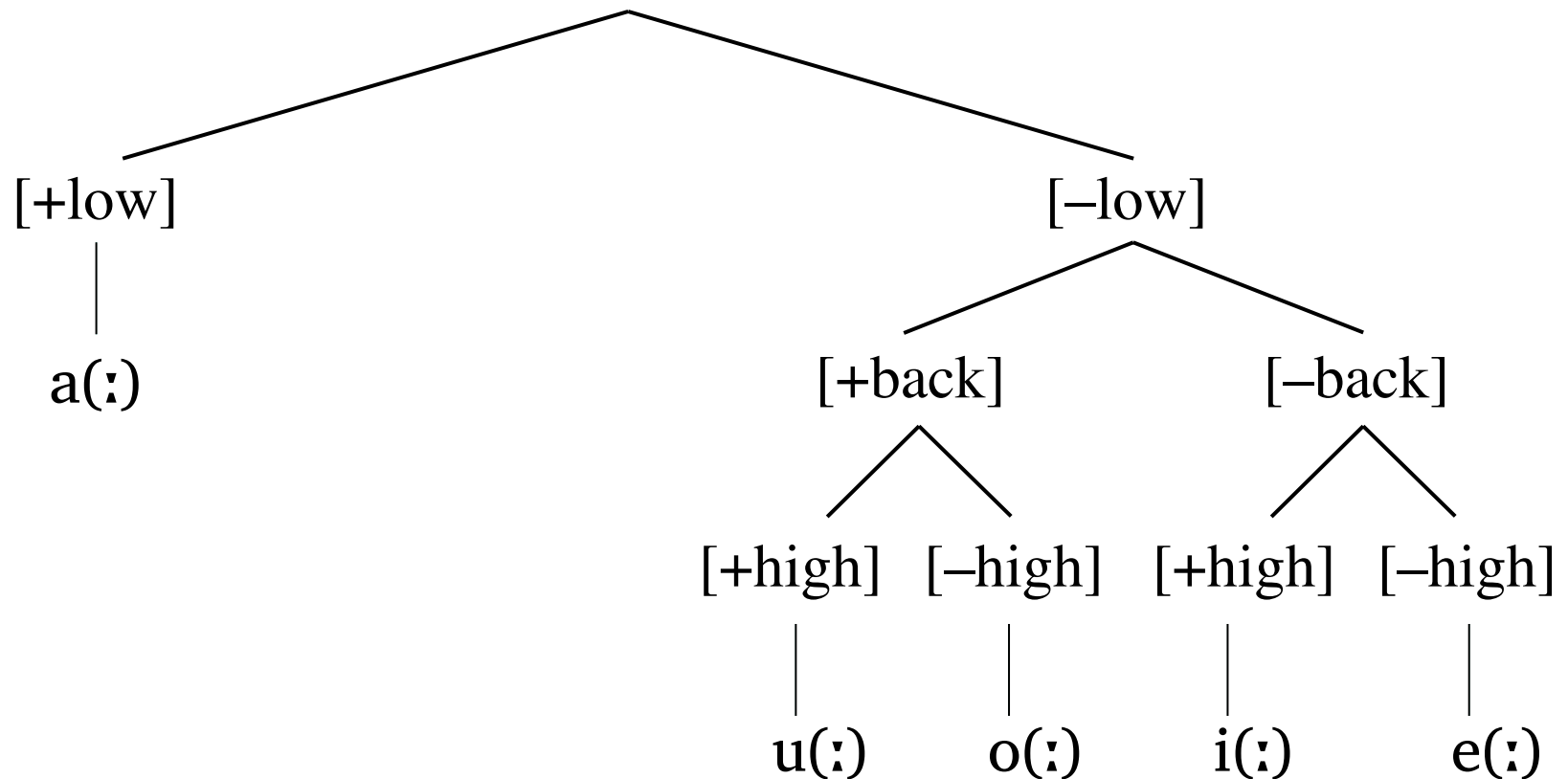| Vowel system		Feature hierarchy
/i(ː)/	/u(ː)/	[low]
/e(ː)/	/o(ː)/	[back]
		[high]
/æ(ː)/	/ɑ(ː)/	[long]

A West Germanic Feature Hierarchy

Recall the West Germanic feature hierarchy. To simplify the diagram, let us omit the length contrast for now.

A West Germanic Feature Hierarchy

Recall the West Germanic feature hierarchy. To simplify the diagram, let us omit the length contrast for now.

```
                          ╱╲
                 [+low]        [−low]
                   │              ╱╲
                  a(ː)    [+back]      [−back]
                            ╱╲            ╱╲
                    [+high] [−high]  [+high] [−high]
                       │      │         │       │
                      u(ː)   o(ː)      i(ː)    e(ː)
```

Early Old English Feature Hierarchy

Extending the [back] contrast to the [+low] vowels yields:
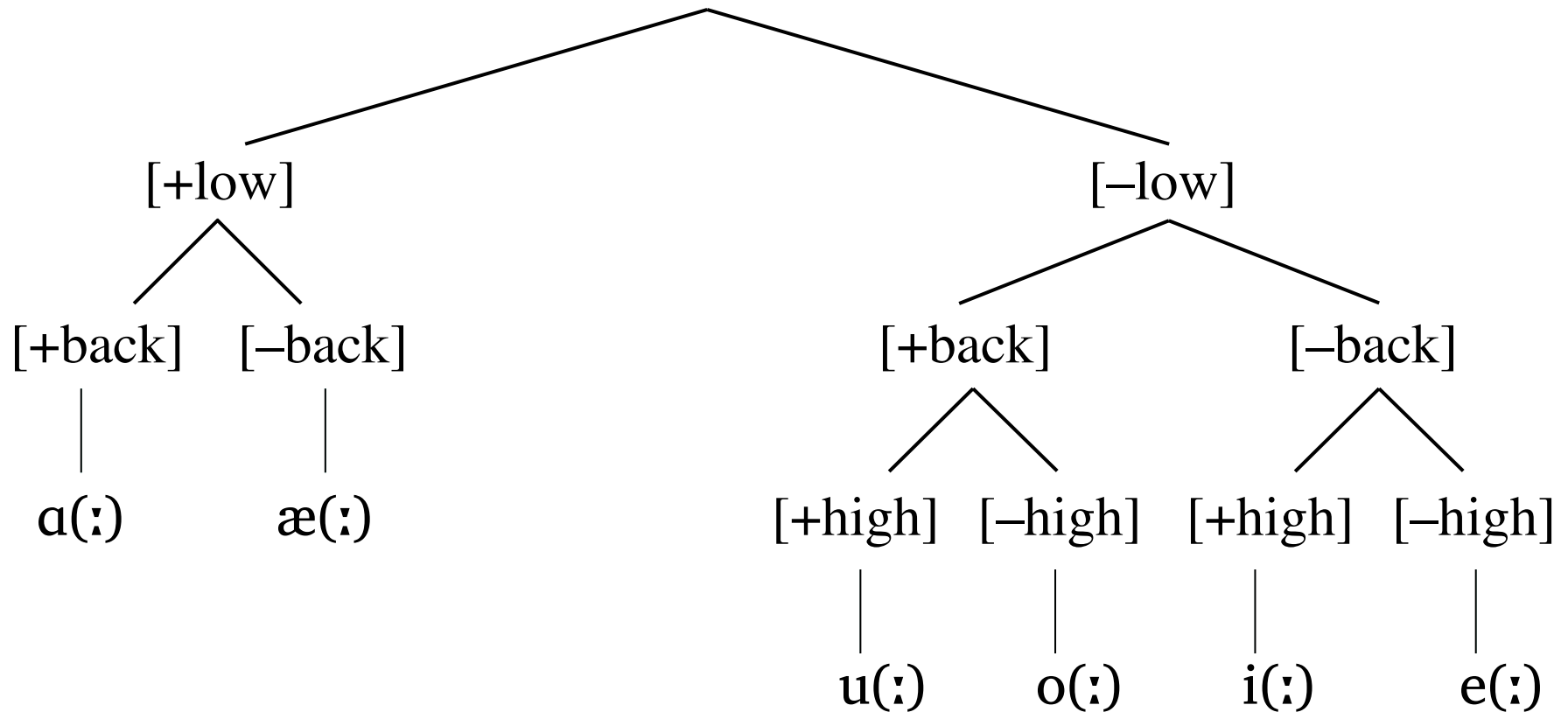
Contrast Shift:
A New Perspective on the Phonologization of *i*-umlaut

The notion that contrast shift is a type of grammar change has proved to be fruitful in the study of a variety of languages.

Examples include: Zhang (1996) and Dresher and Zhang (2005) on Manchu; Barrie (2003) on Cantonese; Rohany Rahbar (2008) on Persian; Dresher (2009: 215–225) on East Slavic; Compton & Dresher (2011) on Inuit; Gardner (2012), Roeder & Gardner (2012), and Purnell & Raimy (2013) on North American English vowel shifts; and large-scale studies by Harvey (2012) on Ob-Ugric (Khanty and Mansi), Ko (2010, 2011, 2012) on Korean, Mongolic, and Tungusic, and Oxford (2012a, b) on Algonquian.

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i-umlaut

And there is evidence, that at some point the contrastive organization of the Old English vowel system shifted.

The key evidence involves *i*-umlaut, whereby a back vowel followed by *i* or *j* is fronted:

Gloss	'evil'	'foot N.P.'
Pre-OE	*ufil	*foːt+i

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i-umlaut

*u(:) becomes *y(:)*, as in 'evil', and *o(:) becomes *ø(:)*, as in 'feet'.

i-umlaut of low vowels and diphthongs is more complicated, and I will skip that here.

Gloss	'evil'	'foot N.P.'
Pre-OE	*ufil	*foːt+i
i-umlaut	yfil	føːt+i

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i-umlaut

Notice that *i*-umlaut results in front round vowels: in the example below, the front feature comes from the /i/, and the round feature must come from the /u/.

We have assumed, however, that [round] is not a contrastive feature of the earliest stage of Old English. Recall:

u	f	i	l		y	f	i	l
[–low]	[–low]				[–low]	[–low]		
[+high]	[+high]				[+high]	[+high]		
[+back]	[–back]		⟶		[–back]	[–back]		
[+round]					[+round]			

Early Old English Feature Hierarchy

Changing non-low [+back] to [–back] in this structure results in *[i(:)] and *[e(:)], not [y(:)] and [ø(:)]. To get front rounded vowels, the non-low [+back] vowels must also be [+round].

i-umlaut: Post-enhancement

Therefore, following many commentators, beginning with V. Kiparsky (1932) and Twaddell (1938), I assume that *i*-umlaut began as a late phonetic, that is, postlexical, rule.

In other words, it applies after the [–low, +back] features of /u/ have been enhanced by [+round] (Stevens, Keyser & Kawasaki 1986; Hall 2011).

u	f	i	l		y	f	i	l
[–low]	[–low]				[–low]	[–low]		
[+high]	[+high]				[+high]	[+high]		
[+back]	[–back]		⟶		[–back]	[–back]		
[+round]					[+round]			

i-umlaut Becomes Opaque

Already in early Old English, the /i/ trigger of *i*-umlaut was either lowered after a light syllable or deleted after a heavy syllable, making *i*-umlaut opaque on the surface.

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

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 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

Kiparsky (to appear) points out a problem with this scenario: as long as *i*-umlaut remains postlexical, there is no way it can 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

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Phonologization Paradox

Thus, in the example below, once /ufil/ is restructured to /ufel/, there is no reason for *i*-umlaut to continue to apply; the expectation is that [yfel] would revert to [ufel].

Before loss of *i*-umlaut trigger		After loss of *i*-umlaut trigger	
Lexical Phonology		*Lexical Phonology*	
Underlying	/ufil/	Underlying	/ufel/
Postlexical Phonology		*Postlexical Phonology*	
i-umlaut	yfil	*i*-umlaut	—
i-lowering	yfel		*ufel

Phonologization Paradox

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.

Then, the subsequent loss of the triggering *i* or *j* will not affect the results of *i*-umlaut, which can then be lexicalized.

Before loss of *i*-umlaut trigger 1		Before loss of *i*-umlaut trigger 2	
Lexical Phonology		*Lexical Phonology*	
Underlying	/ufil/	Underlying	/ufil/
		i-umlaut	yfil
Postlexical Phonology		*Postlexical Phonology*	
i-umlaut	yfil	*i*-lowering	yfel
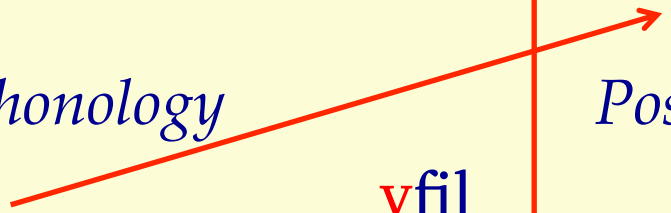
Salience and Contrast

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

Kiparsky (to appear) suggests that it is because the new front rounded allophones are more perceptually *salient* than their triggers (Jakobson, Fant & Halle 1952).

That salient phones can become quasi-phonemic without being distinctive "severs the structuralist link between contrastiveness (unpredictable distribution), a structural notion, and distinctiveness, a perceptual notion."

Undermining the Phoneme?

"The upshot is that while delinking contrastiveness and distinctiveness in a sense preserves the phoneme as a theoretical construct, it does so only by negating the founding intuition behind it."

The contrastive analysis presented earlier, together with the notion that contrast shift is a type of grammar change, allows us to keep the more appealing aspects of Kiparsky's analysis, while still maintaining the Contrastivist Hypothesis and the phoneme as a contrastive unit.

Salience and Contrast Shift

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

Adapting Kiparsky's formulation, I propose that the perceptual salience of the front rounded allophones could have led learners to hypothesize that [round] is a contrastive feature.

u	f	i	l		y	f	i	l
[–low]	[–low]				[–low]	[–low]		
[+high]	[+high]				[+high]	[+high]		
[+back]	[–back]		$\longrightarrow$		[–back]	[–back]		
[+round]					[+round]			

Early Old English Feature Hierarchy 1

[low] > [back] > [high] > [long]

Recall that this had not been the case in West Germanic and early Old English until that point.

Contrast Shift in Old English Vowels

But another feature hierarchy can be constructed that includes [round] as a contrastive feature.

This hierarchy requires demoting [low] to allow [round] to be contrastive over the non-low back vowels, as in the next tree:

Earlier hierarchy			Later hierarchy		
/i(:)/	/u(:)/	[low]	/i(:)/	/u(:)/	[back]
		[back]			[round]
/e(:)/	/o(:)/	[high]	/e(:)/	/o(:)/	[high]
		[long]			[low]
/æ(:)/	/ɑ(:)/		/æ(:)/	/ɑ(:)/	[long]

Old English Feature Hierarchy 2

[back] > [round] > [high] > [low] > [long]

Old English Feature Hierarchy 2

Now changing the [+back, +round] vowels to [–back] 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.

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Old English Vowel Activity

The arrows schematically show the major types of vowel activity in Old English, abstracting away from vowel length: fronting (*i*-umlaut), backing, lowering of high vowels, and raising and rounding of low vowels.

		[–back]		[+back]	
		[–round]	[+round]	[–round]	[+round]
[+high]		i	y		u
[–high]	[–low]	e	ø		o
	[+low]	æ		ɑ	

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Old English Vowel Activity

In the proposed feature hierarchy, all the active features are contrastive.

	[–back]		[+back]	
	[–round]	[+round]	[–round]	[+round]
[+high]	i	y		u
[–high] [–low]	e	ø		o
[–high] [+low]	æ		ɑ	

Conclusion

Conclusion

To conclude, I have proposed that phonology operates on contrastive features assigned by hierarchies that can vary across dialects and over time.

Evidence for this approach comes from the fact that contrastive specifications can capture observed patterns of phonological activity.

Equally significant, like the dog that didn't bark, is the activity that we do not find, as predicted from the absence of features that are non-contrastive in the proposed analyses.

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Conclusion

Specifically, I have shown how we can incorporate Hogg's proposal for understanding the evolution of the low vowels from Proto-Germanic through West Germanic and into Old English.

We can also retain and elaborate on the core of Kiparsky's account of the phonologization of *i*-umlaut, while adhering to the view that the phoneme is a contrastive unit.

Finally, this approach gives us a way to implement the Jakobsonian structuralist program for diachronic linguistics in a generative framework.

THANK YOU!

Thanks to Tom Purnell and Eric Raimy, whose analysis inspired the one proposed here, and Patrick Honeybone and Joe Salmons for bringing their work to my attention.

I am grateful to members of the project on *Markedness and the Contrastive Hierarchy in Phonology* at the University of Toronto (Dresher and Rice 2007):

http://homes.chass.utoronto.ca/~contrast/

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