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**Contrastive Feature Hierarchies
and Germanic Phonology:**

**Jørgen Rischel's Analysis of
the Scandinavian Runic Reform**

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Introduction

I will look at an analysis of changes in the Scandinavian runic alphabet, or futhark, by Jørgen Rischel (1934–2007).

Rischel's paper, written in 1966, accounts for some puzzling changes in the futhark by employing contrastive feature hierarchies represented as branching trees.

Such hierarchies enjoyed a brief period of prominence in the 1950s and 1960s, but then disappeared from mainstream phonological theory.

However, they were employed in a number of interesting studies of Germanic and other languages whose insights we can still profit from today.

The goal of this talk is to bring attention to this largely forgotten approach to phonological analysis.

Scandinavian Runes: 'Older Futhark'

Before 700 CE, the Scandinavian runic alphabet, the 'older futhark', had symbols for five vowels, which are assumed to correspond to the five vowel phonemes of Northwest Germanic (Diderichsen 1945; Antonsen 1963; Rischel 1966).

/i/ |

𐌺 /u/

/e/ M

𐌾 /o/

𐌿
/a/

Scandinavian Runes: 'Older Futhark'

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/i:/ | /i/ /u/ ᚢ /u:/

/e:/ ᚱ /e/ /o/ ᚦ /o:/

ᚨ
/a/ /a:/

Vowel length was phonemic, so there were in fact ten phonemic vowels, each vowel having a long and short form.

However, vowel length (along with some other prosodic features) was not represented in the futhark, and I will not consider it further here.

Northwest Germanic Vowel System

Most scholars assume also that, already at an early stage, each vowel phoneme had positional allophones caused by fronting, backing, raising, and lowering.

/i/

/u/

/e/

/o/

/a/

Writers differ as to how many allophones there were; here I mainly follow Antonsen (1963) and Rischel (1966).

The significant allophones were as follows:

Northwest Germanic Vowel System

The phonemes /u/ and /o/ developed front rounded allophones [y] and [ø], respectively, before *j* or *i*: this is the origin of *i*-umlaut.

/i/ [y] ← [u] /u/

/e/ [ø] ← [o] /o/

/a/

Northwest Germanic Vowel System

It is believed that /i/ and /e/ developed back unrounded allophones [ɯ] and [ɤ], respectively, before *u* or *w* (back umlaut).

/i/ [i] [y] → [ɯ] [u] /u/

/e/ [e] [ø] → [ɤ] [o] /o/

/a/

These allophones either did not persist or changed to something else, so I will not consider them further here; but see further Schalin 2017.

Northwest Germanic Vowel System

There were morphophonemic alternations between /i/ and /e/ that established a close connection between these vowels.

/i/ [i] [y]
[i̥]
[e̞]
/e/ [e] [ø] [u] /u/
[o] /o/
/a/

In addition, /i/ developed a lowered allophone before /a/, and /e/ developed a raised allophone when a high vowel followed.

As these allophones were mainly transitory, I will not consider them further here.

Northwest Germanic Vowel System

The phoneme /a/ developed three significant allophones: a fronted allophone before /i/ or /j/ that Rischel represents as [æ] (which may have ranged phonetically as far as [ɛ]);

/i/ [i] [y]

[u] /u/

/e/ [e][ø]

[o] /o/

[æ] ← /a/ → [ɑ̃]
[a]

a retracted allophone written [ɑ̃] before /u/ or /w/, which may have been phonetically [ɑ], [ɔ], or [ɔ̃];

and central [a] in neutral contexts. There may also have been a raised [ɐ] or [ə], but I will not consider it here.

Changes in Proto-Scandinavian

As a result of losses and mergers in the unstressed vowels, the allophones shown here eventually became separate phonemes in Proto-Scandinavian.

/i/ /y/ /u/

/e/ /ø/ /o/

/æ/ /ǫ/

/a/

Thus, the number of vowel phonemes increased from five to nine.

About 850–900, a new orthography, the ‘younger futhark’, was developed in response to changes in the phonology.

The Scandinavian Runic Reform

Recall that the older futhark had five vowel runes.

The futhark could perhaps have added four new vowel runes to keep up with phonological changes, but this did not happen.

/i/ | /y/ ᚱ /u/

/e/  /ø/  /o/

/æ/ ᚦ /a/ /å/

Instead, somewhat counter-intuitively, the number of vowel runes were *reduced* from five to three!


The old runes for /e/ and /o/ were discontinued.

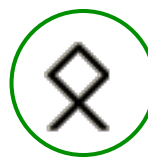
The Scandinavian Runic Reform

Assuming that there were reasons why it would not have been practical to invent four new vowel runes, why were the original five not retained?

/i/ | /y/

𐌆 /u/

/e/  /ø/

 /o/

/æ/

𐌚

/ǫ/

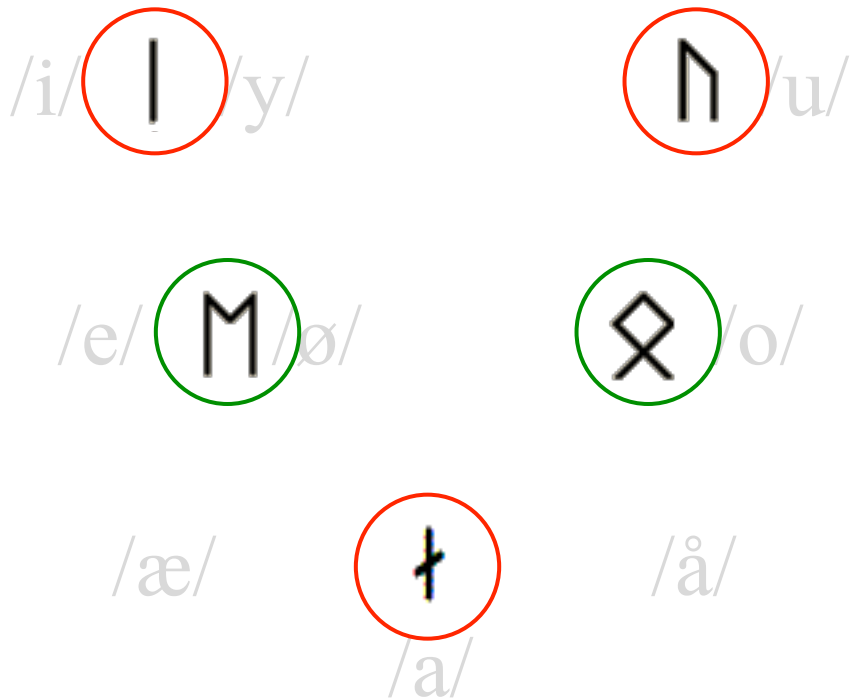
/a/

Rischel (2009 [1966]: 256) suggests there may have been an orthographic reason for dropping the runes for /e/ and /o/.

He observes that the younger futhark “avoids characters which do not have one full-size vertical line”.

The Scandinavian Runic Reform

The old characters for /i/, /u/, and /a/ all have one full-size vertical line, but the runes for /e/ and /o/ do not (the /e/ rune has two full-size vertical lines, the /o/ rune has none).



However, Rischel argues that the more important reasons are phonological.

The Scandinavian Runic Reform

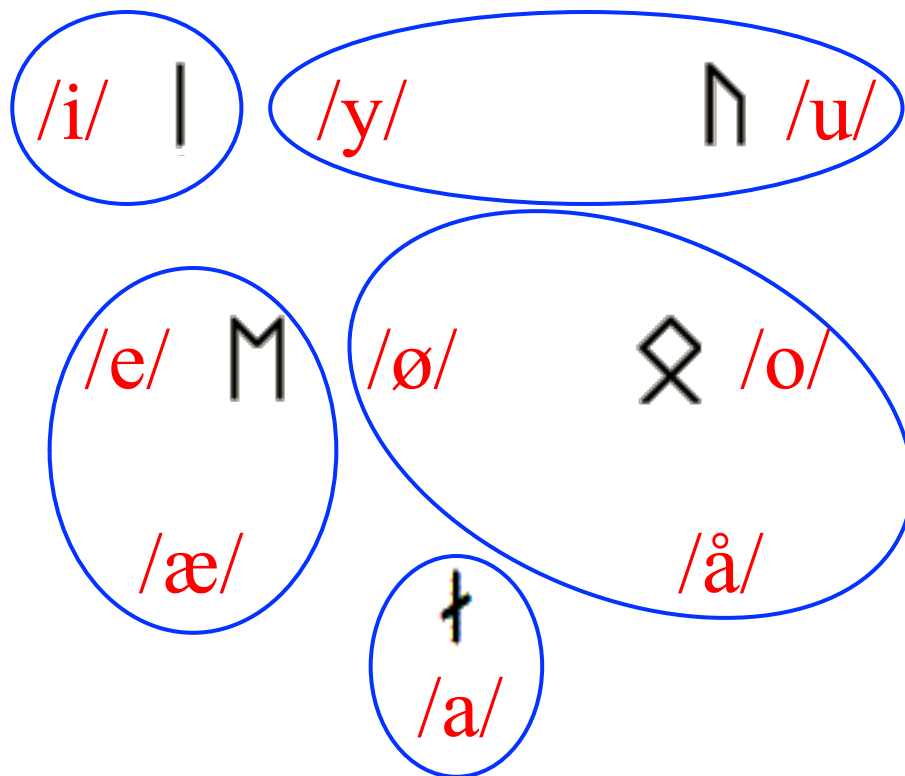
“If the nine vowel phonemes were to be distributed on five runes in such a way that these were still used with roughly the same sound values as before, one would be forced to group the vowel phonemes in a way that would violate the pattern of the language.”



Jørgen Rischel (2009 [1966]: 262)

The Scandinavian Runic Reform

Rischel imagines what such a system might have looked like, if the existing runes were reassigned based on phonetic closeness:



The **i** rune could stand for **/i/**;

u for **/u/** and **/y/**;

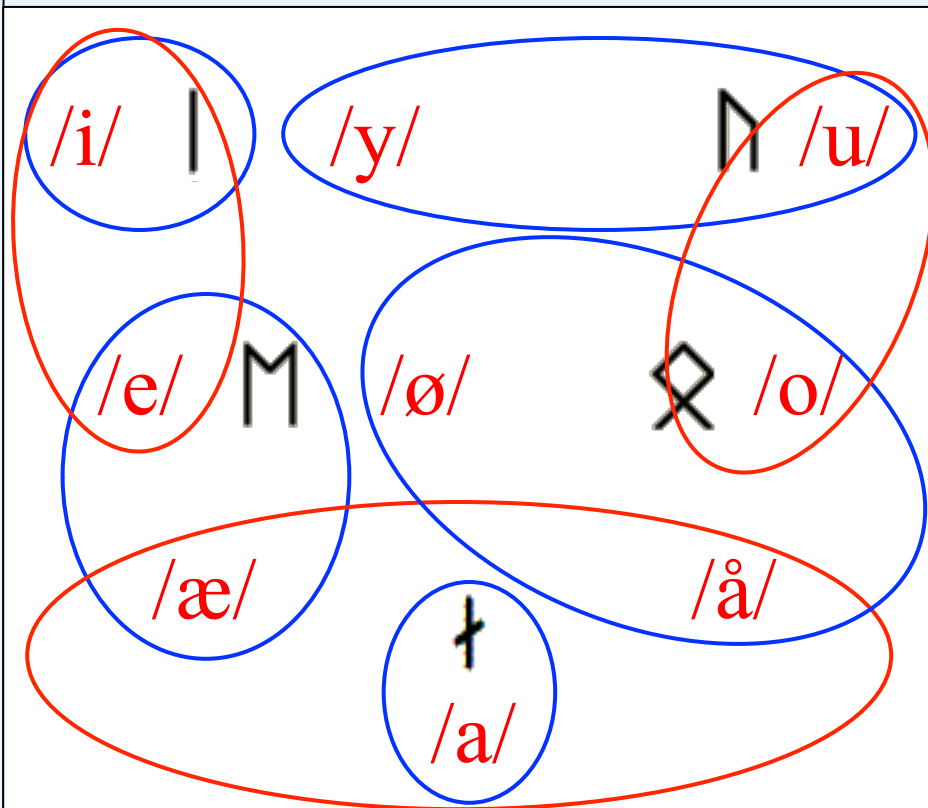
e for **/e/** and **/æ/**;

o for **/o/**, **/ø/**, and **/å/**;

and **a** for **/a/**.

The Scandinavian Runic Reform

These groupings “would entail a vehement break with spelling tradition and would be absurd from a morphophonemic point of view.” Specifically:



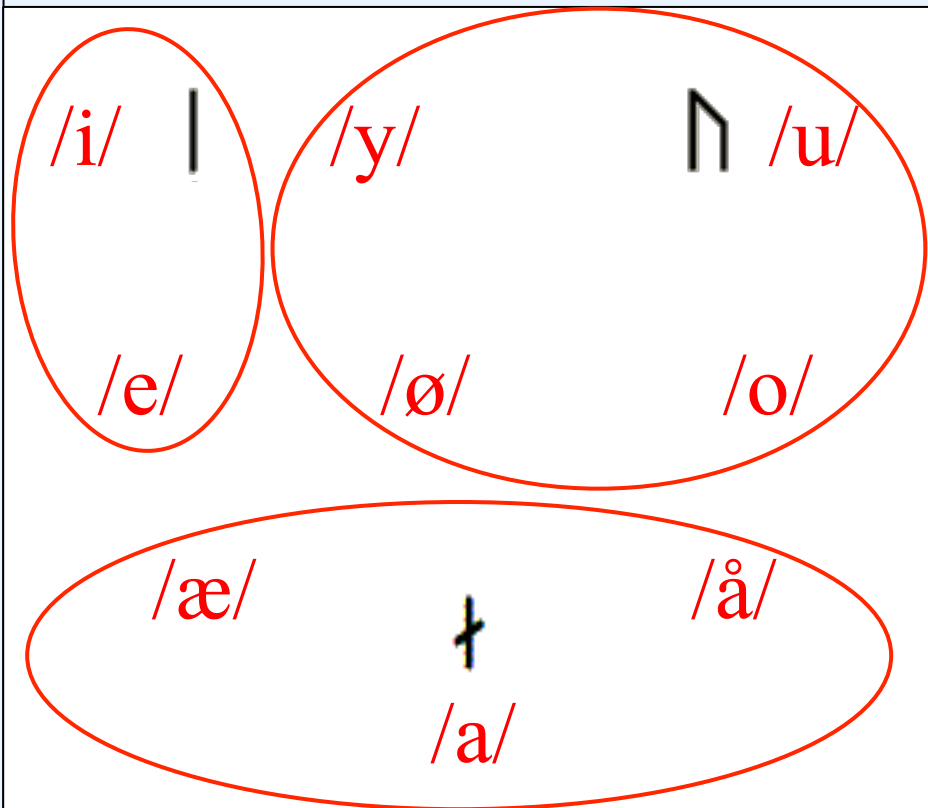
The phonemes /a/, /æ/, /å/ are closely related by alternation and etymology;

/i/ and /e/ are related by alternations;

finally, unstressed vowels are reduced to three: /i/ from /i/ and /e/; /u/ from /u/ and /o/; and /a/.

The Scandinavian Runic Reform

We arrive, then, at three logical groupings for both the stressed and unstressed vowels: /i, e/; /u, y, o, ø/; and /a, æ, å/.



Each group is represented by one rune: **i**, **u**, and **a**.

How can these groups be characterized phonologically?

The Scandinavian Runic Reform

Building on proposals by Diderichsen (1945) and Antonsen (1963), Rischel (1966) employs a feature tree to illustrate how the three younger fuþark vowel runes map onto the nine vowel phonemes.

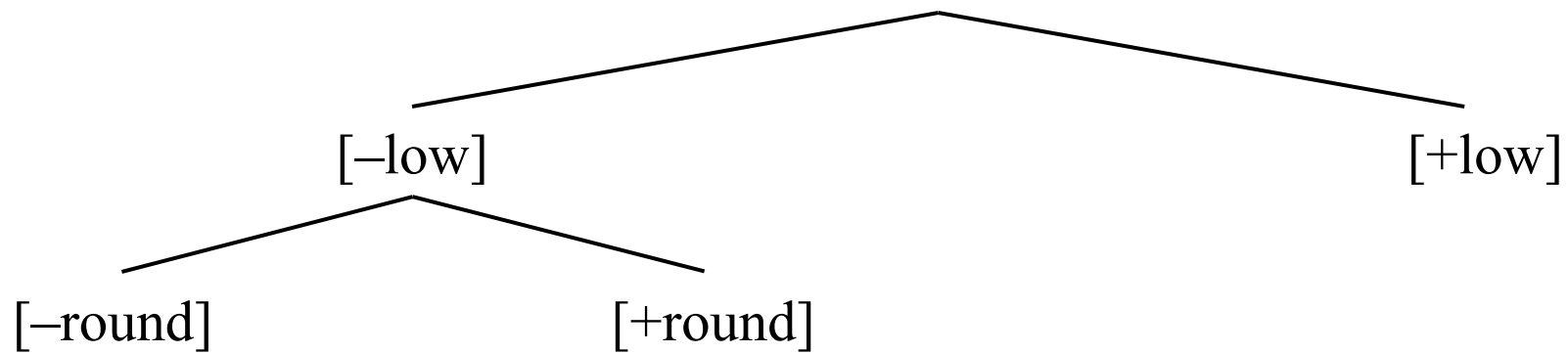
The key insight is that, in the newer orthography, some vowel features are *underspecified*; as Antonsen (1963: 201) put it, “only the crassest oppositions” were represented.

The following tree is slightly modified from Rischel (2009 [1966]: 265).

Younger Futhark Feature Hierarchy

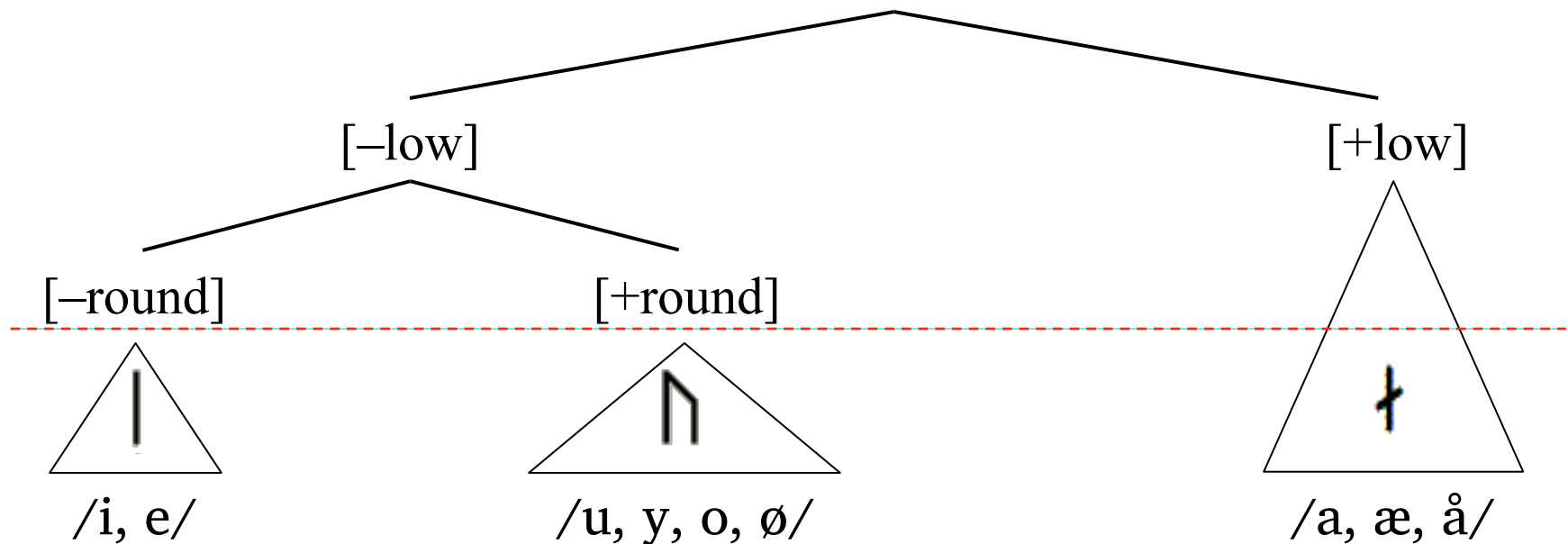
The first division of the vowel system is into [-low] and [+low] vowels.

The [-low] vowels are divided by [\pm round].



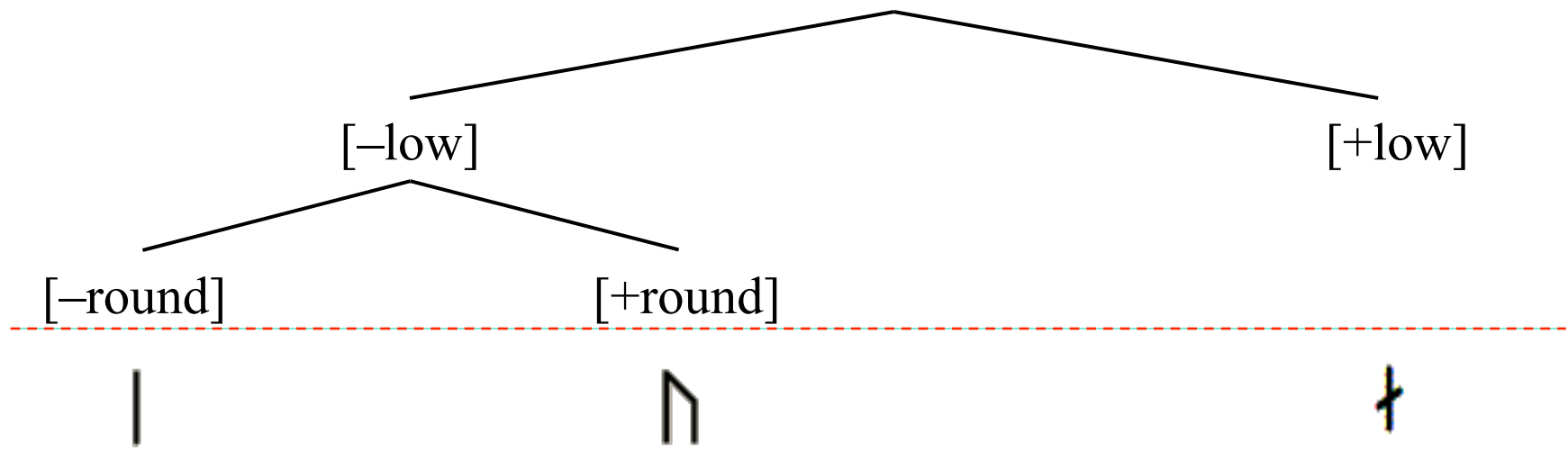
Younger Futhark Feature Hierarchy

These are the only features represented in the younger futhark: one rune represents the feature combination [-low, -round], another represents [-low, +round], and a third is [+low].



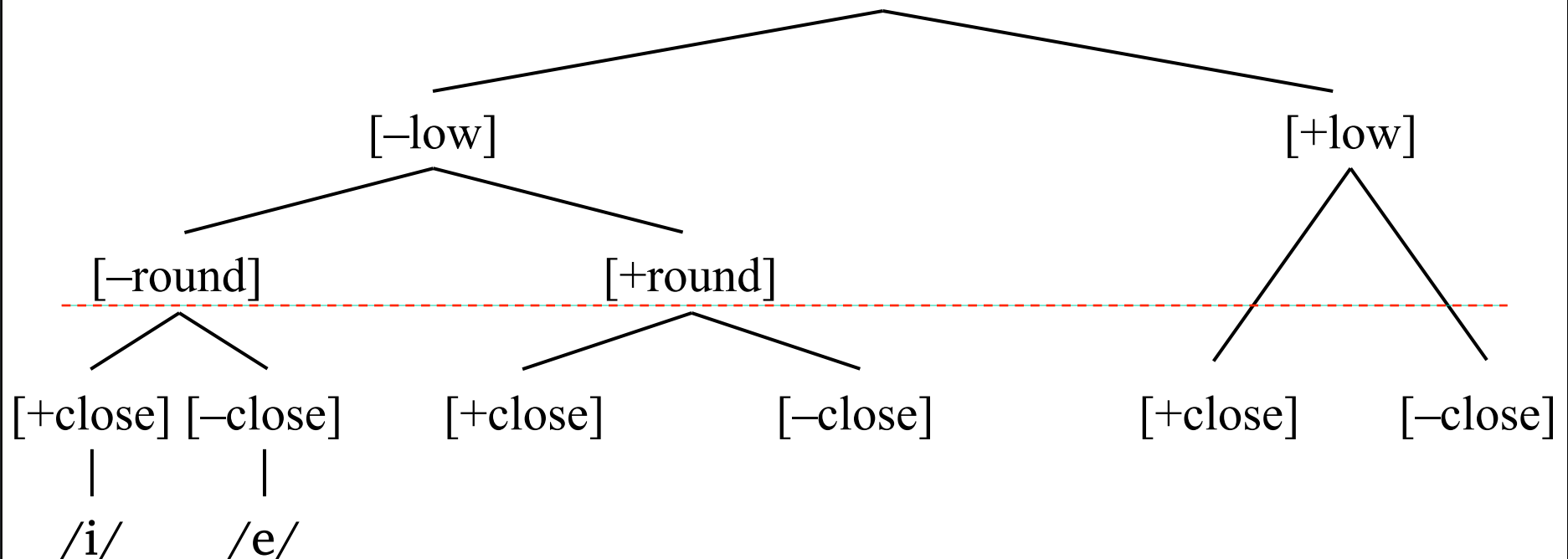
Younger Futhark Feature Hierarchy

Rischel completes the vowel feature hierarchy, extending it to features not represented by the younger futhark.



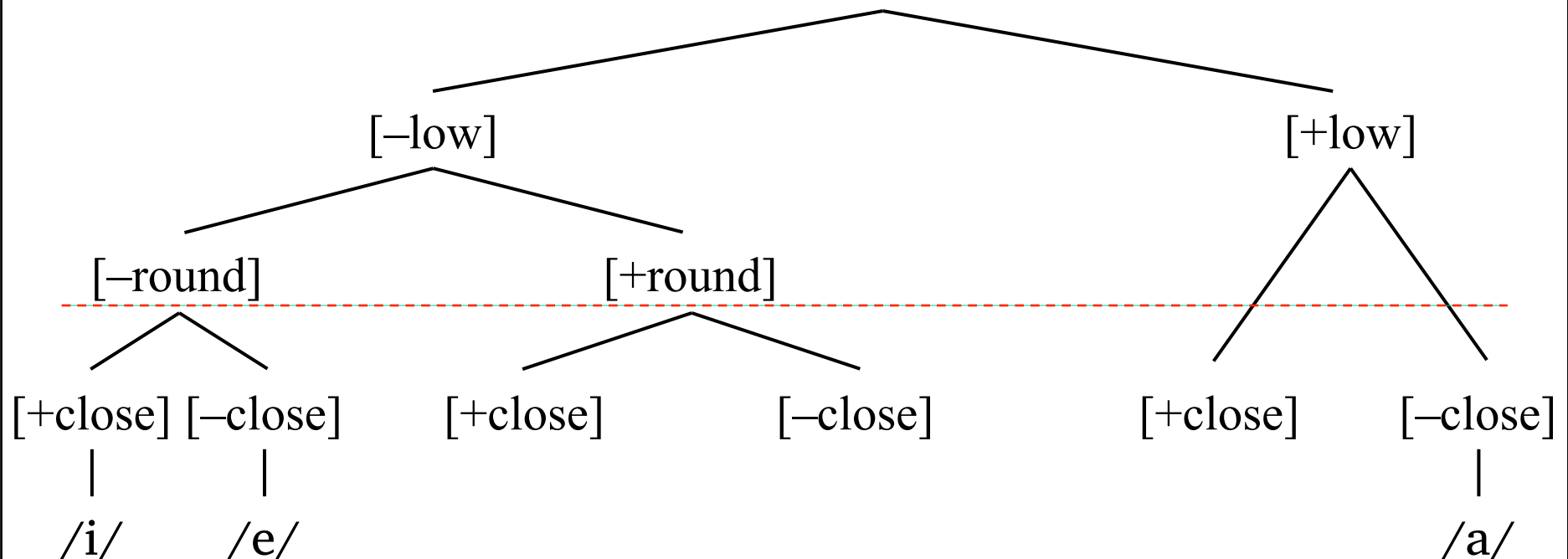
Proto-Scandinavian Feature Hierarchy

The next contrastive feature is [\pm close]. There are no further contrasts in the [-round] branch, which terminates with [+close] /i/ and [-close] /e/.



Proto-Scandinavian Feature Hierarchy

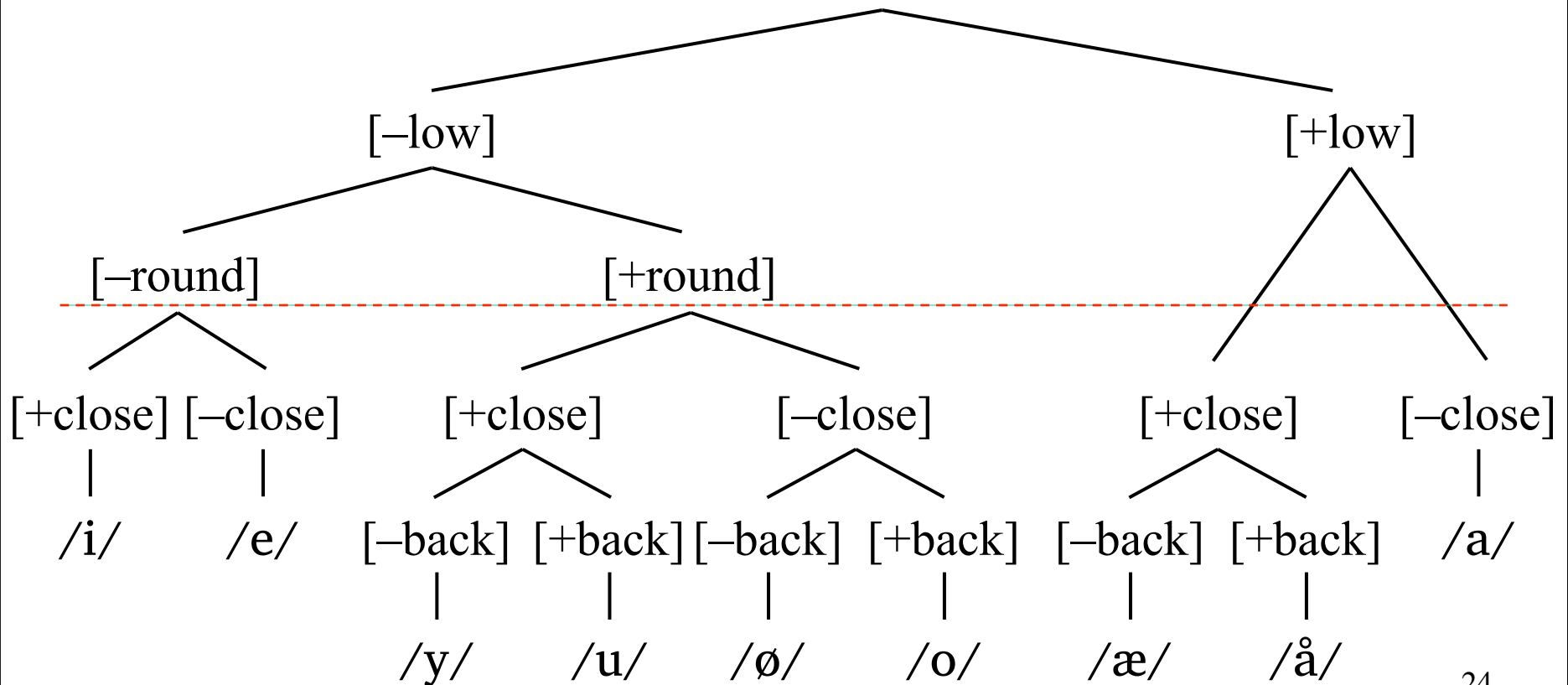
In the [+low] branch, there is only one vowel that is [-close], namely /a/.



Proto-Scandinavian Vowel Features

The remaining branches of the tree are divided by [\pm back]. This completes the feature hierarchy for Proto-Scandinavian vowels:

[low] > [round] > [close] > [back]



Obstruent Feature Hierarchies

Rischel (1966) uses a similar feature hierarchy tree to account for changes in the obstruents of Proto-Scandinavian and their corresponding runes.

He writes (2009 [1966]: 266) that in Early Proto-Scandinavian there were two important contrasts in the obstruent system:

Fortis ~ Lenis:

Fortis consonants, probably voiceless, were in contrast with lenis, probably voiced, consonants; hence fortis [p] was a member of a different phoneme from lenis [ð].

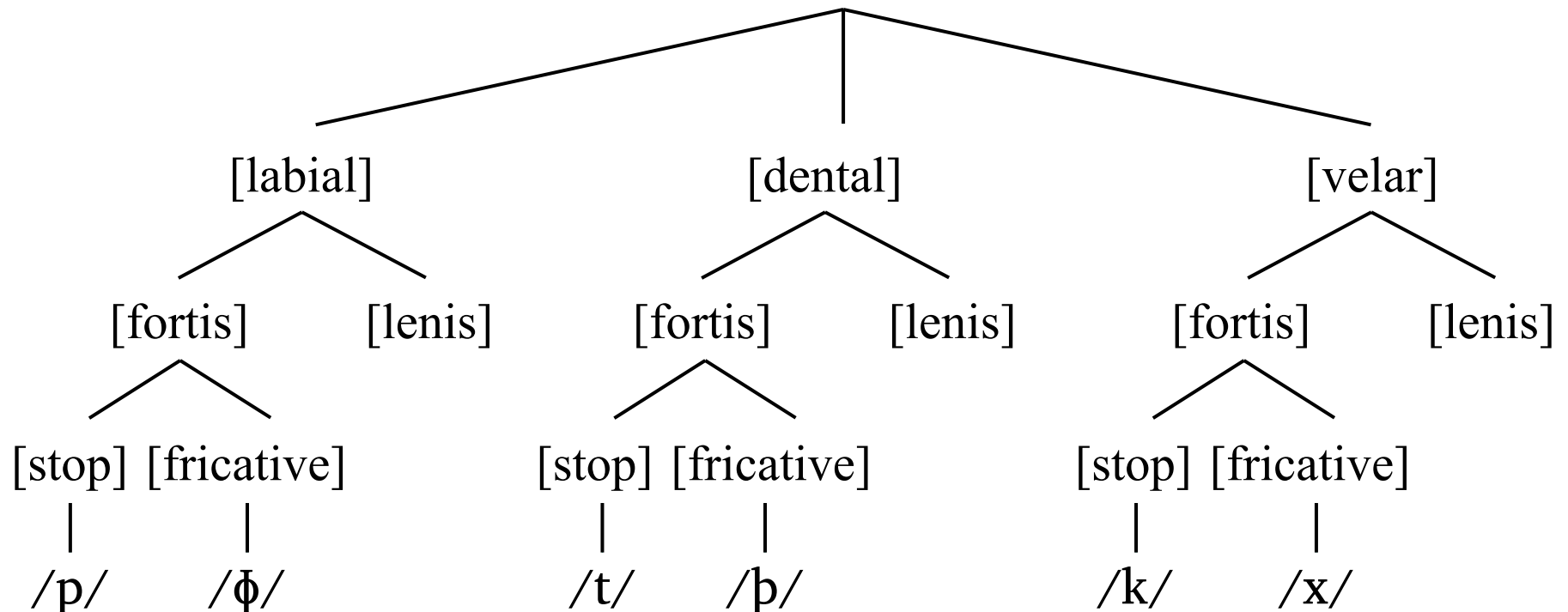
Stop ~ Fricative:

Stops, for example [t], were in contrast with fricatives [p].

Early P-S Obstruent Features

Rischel proposes that “the fortis-lenis distinction seems to have had the higher rank in early Proto-Scandinavian.”

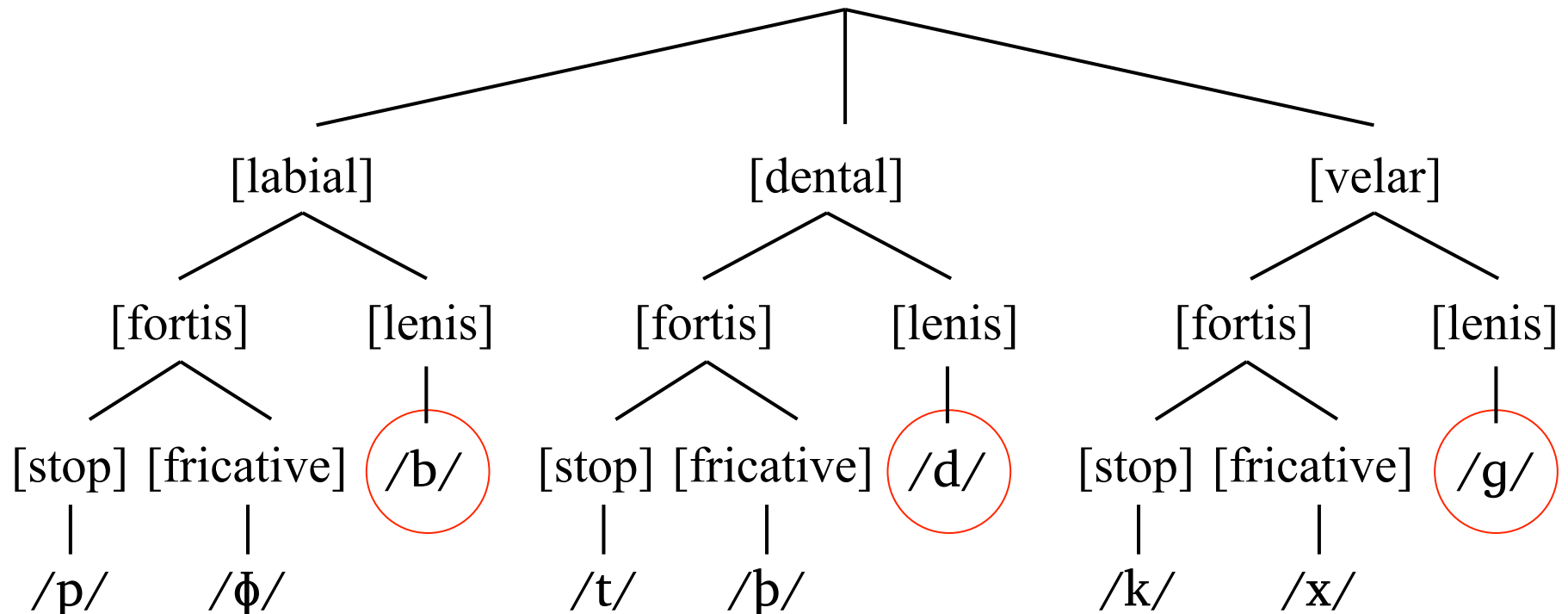
The stop-fricative opposition existed only within the fortis obstruents.



Early P-S Obstruent Features

There was no such contrast in the lenis consonants, which could be realized as stops or fricatives depending on context. Thus, the ordering of the features was:

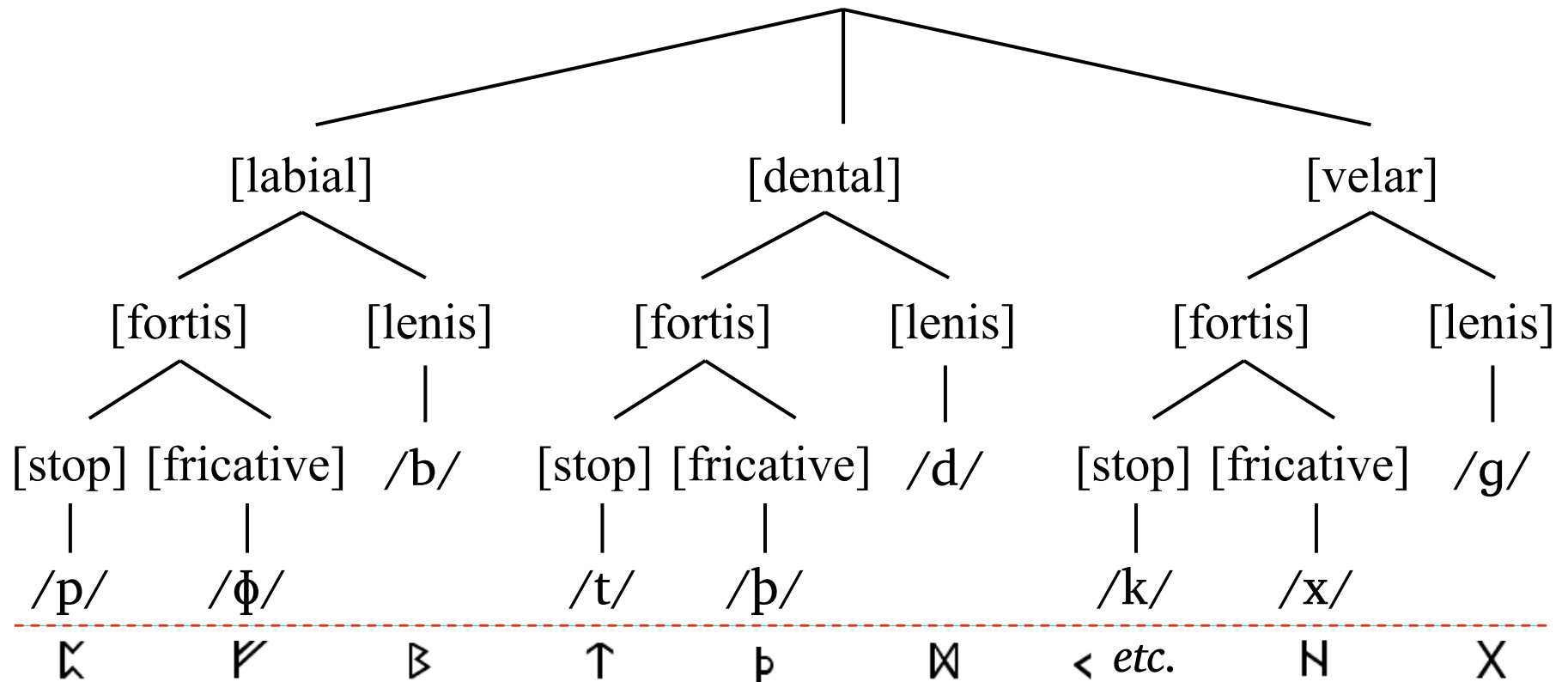
PLACE > [fortis / lenis] > [stop / fricative]



Early P-S Obstruent Features

As with the vowels, each obstruent phoneme is represented by a separate rune in the older futhark.

PLACE > [fortis / lenis] > [stop / fricative]



Changes in the P-S Feature Hierarchy

Rischel (1966) shows how a series of changes in the Proto-Scandinavian obstruent system led to a reorganization of the system of contrasts:

Fortis ~ Lenis:

Fortis and lenis consonants that had been in contrast, such as fortis [p] and lenis [ð], came to be in complementary distribution and members of a single fricative phoneme, /p/.

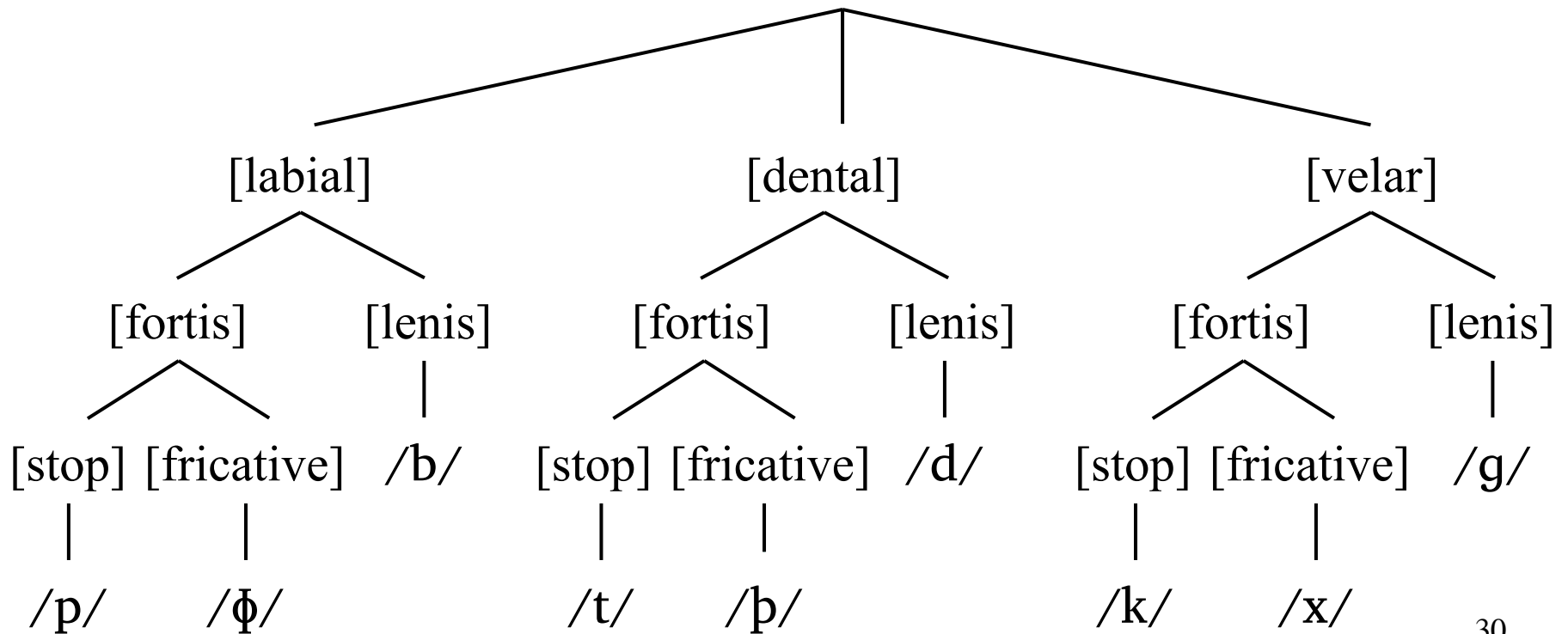
Stop ~ Fricative:

At the same time, the stop ~ fricative contrast was extended to the lenis consonants; for example, stop [d] became a separate phoneme from fricative [ð].

Early P-S Obstruent Features

The result, according to Rischel, was a contrast shift whereby [fortis / lenis] changed places with [stop / fricative]:

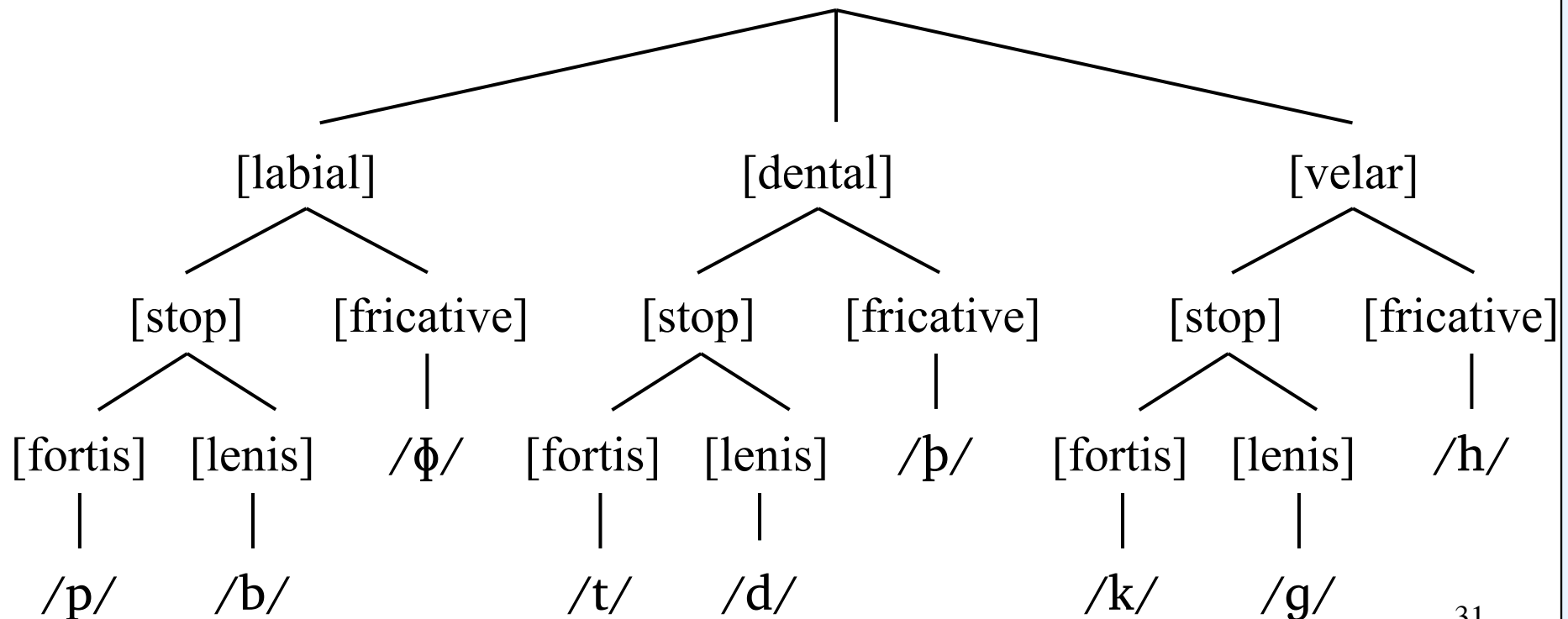
PLACE > [fortis / lenis] > [stop / fricative]



Later P-S Obstruent Features

Now the stop ~ fricative contrast is the higher one, and the fortis ~ lenis contrast holds only in the [stop] obstruents.

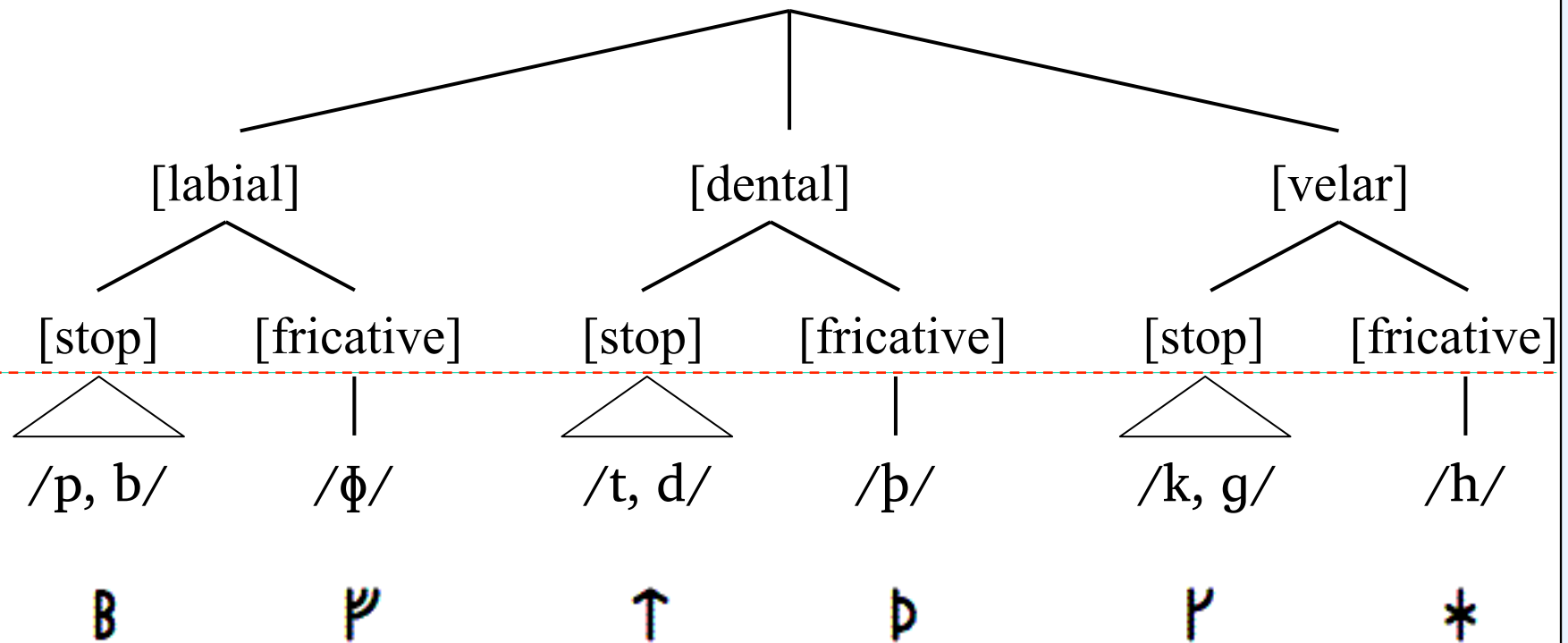
PLACE > [stop / fricative] > [fortis / lenis]



Later P-S Obstruent Features

Rischel shows how the younger futhark changed: as with the vowels, the number of runes was *reduced*, in this case from nine to six, although there remain nine phonemic obstruents.

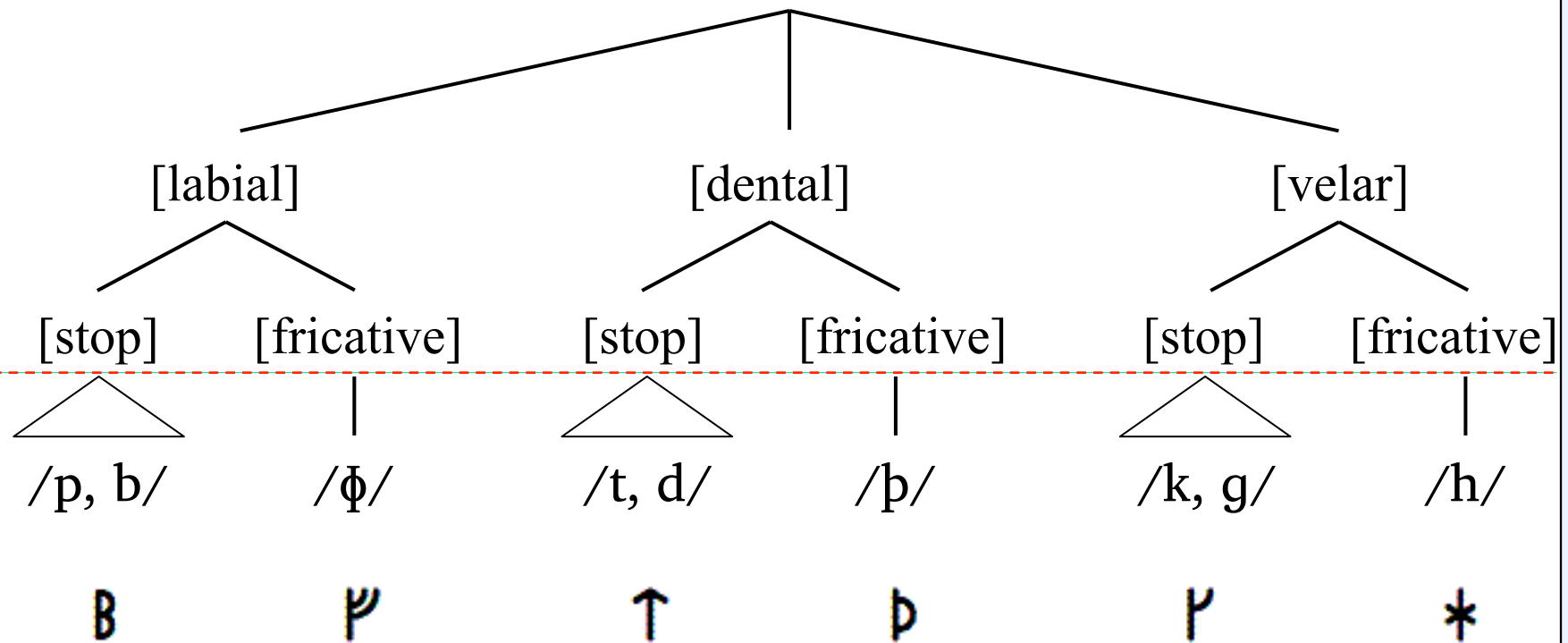
PLACE > [stop / fricative] > [fortis / lenis]



Later P-S Obstruent Features

Again, Rischel proposes that the younger futhark represents only the higher-ranked place and stop ~ fricative distinctions; it omits the fortis ~ lenis distinctions.

PLACE > [stop / fricative] > [fortis / lenis]



Rischel on the 'Branching Diagrams'

Where did Rischel get the idea for representing underspecified features as trees? He writes (2009 [1966]: 263–264):

“Recent analyses of phoneme systems into distinctive features generally appear in the form of branching diagrams, in which the distinctive oppositions among the phonemes...form a hierarchy.”

“The idea of hierarchy implies that some items are considered prior to, or more basic than, others.”

But how do we know what the feature hierarchy is for any given inventory?

Criteria for Ordering Features

Rischel considers a number of possible criteria:

Coverage:

A distinction that affects a greater part of the system must be hierarchically superordinate to one that affects a lesser part.

Subsystems:

If a subsystem utilizes only some of the distinctions utilized by the entire system, then, everything else being equal, these distinctions must be the basic ones.

Criteria for Ordering Features

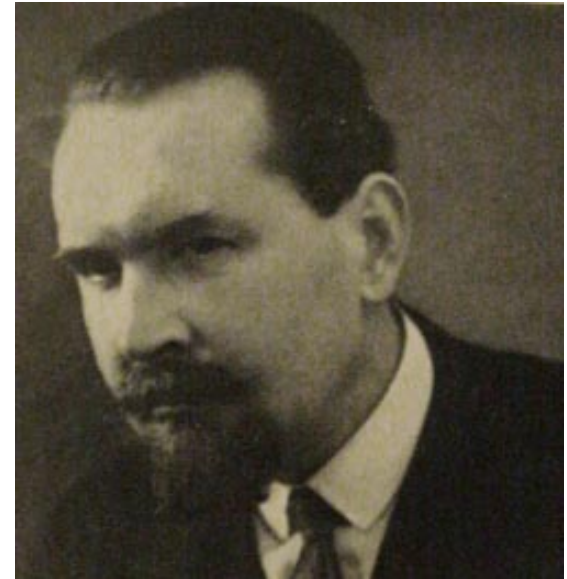
Rischel adds that these criteria may not always be applicable, and may not be the most important ones. He concludes:

Conclusion (Rischel 2009 [1966]: 271):

“We have as yet no well-developed theory about rank-ordering of distinctive features; all we can do is to consider the problem from various aspects and to weigh the various criteria as best we can.”

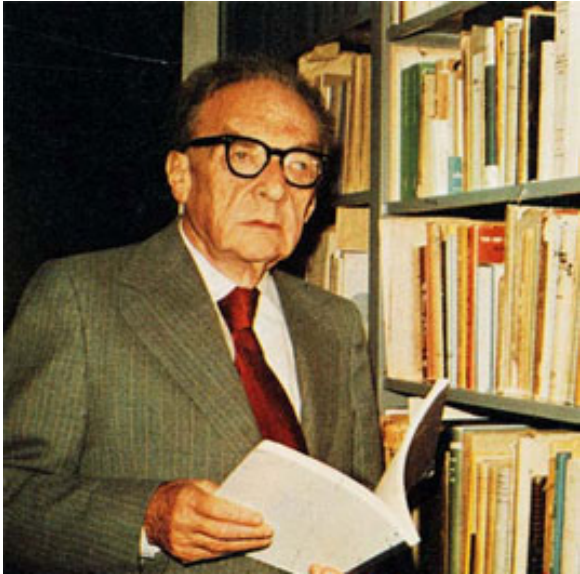
Origins of the Branching Tree

Where did the branching feature trees come from?



I have proposed (Dresher 2007, 2009, 2015, 2016a) that one can trace their origins to early writings of the Prague School phonologists, Roman Jakobson and N. S. Trubetzkoy, although branching diagrams do not actually appear there.

Origins of the Branching Tree



The branching tree appears overtly in Jakobson, Fant & Halle 1952. They propose that listeners identify phonemes by distinguishing them from every other phoneme in the system.

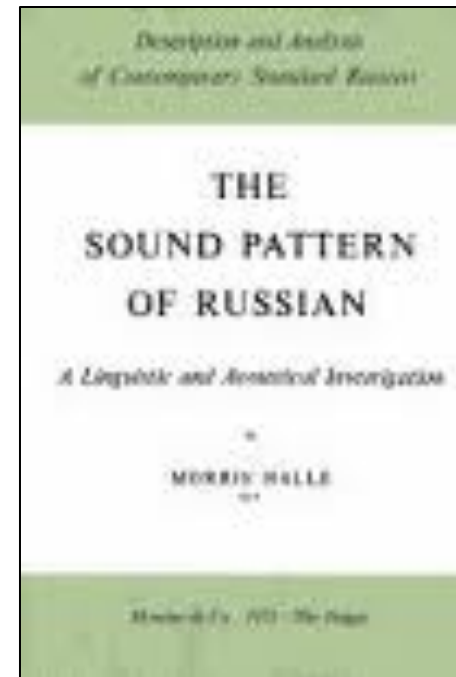
Origins of the Branching Tree

These distinctions are effected by making a series of binary choices that correspond to the oppositions active in the language.

By ‘oppositions active in the language’ they mean that not all phonetic properties of a phoneme are equally important to the phonology, but only the contrastive ones.

Other notable publications that featured branching trees include Cherry, Halle & Jakobson 1953, Jakobson & Halle 1956, and Halle 1959, *The sound pattern of Russian*.

The Sound Pattern of Russian



The latter has a prominent branching tree diagram that shows the contrastive feature specifications of every Russian phoneme (Halle 1959: 46):

The Sound Pattern of Russian

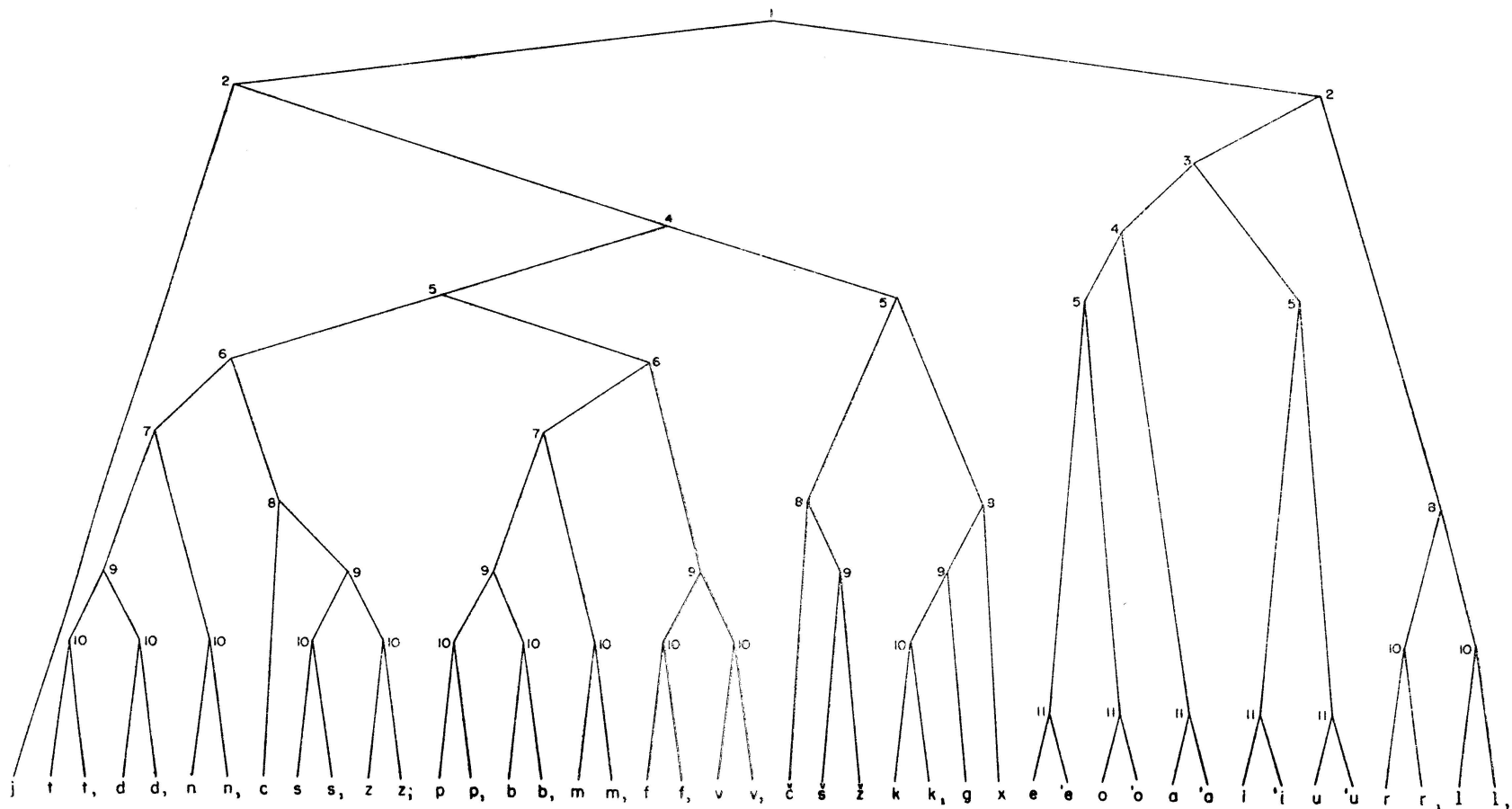


Fig. I-1. Branching diagram representing the morphonemes of Russian. The numbers with which each node is labelled refer to the different features, as follows: 1. vocalic vs. nonvocalic; 2. consonantal vs. nonconsonantal; 3. diffuse vs. nondiffuse; 4. compact vs. noncompact; 5. low tonality vs. high tonality; 6. strident vs. mellow; 7. nasal vs. nonnasal; 8. continuant vs. interrupted; 9. voiced vs. voiceless; 10. sharped vs. plain; 11. accented vs. unaccented. Left branches represent minus values, and right branches, plus values for the particular feature.

The Distinctness Condition

This book is also notable in that it contains a novel argument for specifying features by branching trees.

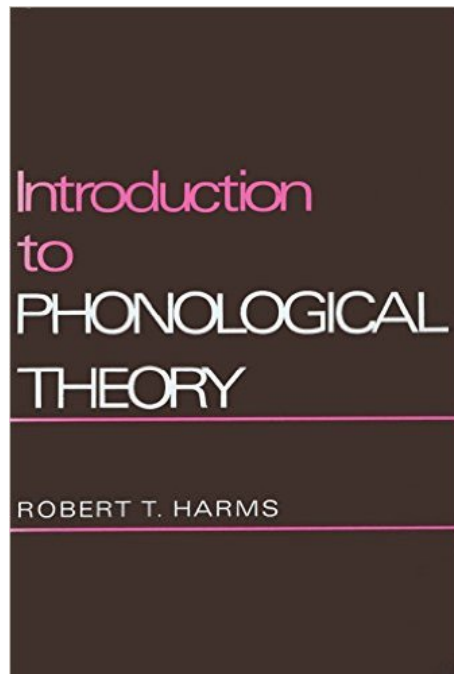
Halle proposes that segments are properly distinct only if they meet the Distinctness Condition:

The Distinctness Condition

Segment-type {A} will be said to be different from segment-type {B}, if and only if at least one feature which is phonemic in both, has a different value in {A} than in {B}; i.e., plus in the former and minus in the latter, or vice versa.

Halle argues that phonological features *must* be ordered into a hierarchy, because this is the only way to ensure that segments meet the Distinctness Condition.

The Golden Age of Branching Trees



This approach was imported into early versions of the theory of Generative Phonology; it is featured prominently in the first Generative Phonology textbook by Robert T. Harms in 1968.

Other Feature Analyses of Germanic



In addition to Rischel's analysis of early Scandinavian, contrastive feature hierarchies were employed in a 1967 article on 'The Proto-Germanic vowel system' by the Icelandic linguist Hreinn Benediktsson.

His article appears in the first volume of *To Honor Roman Jakobson*, and employs a very Jakobsonian approach to distinctive features.

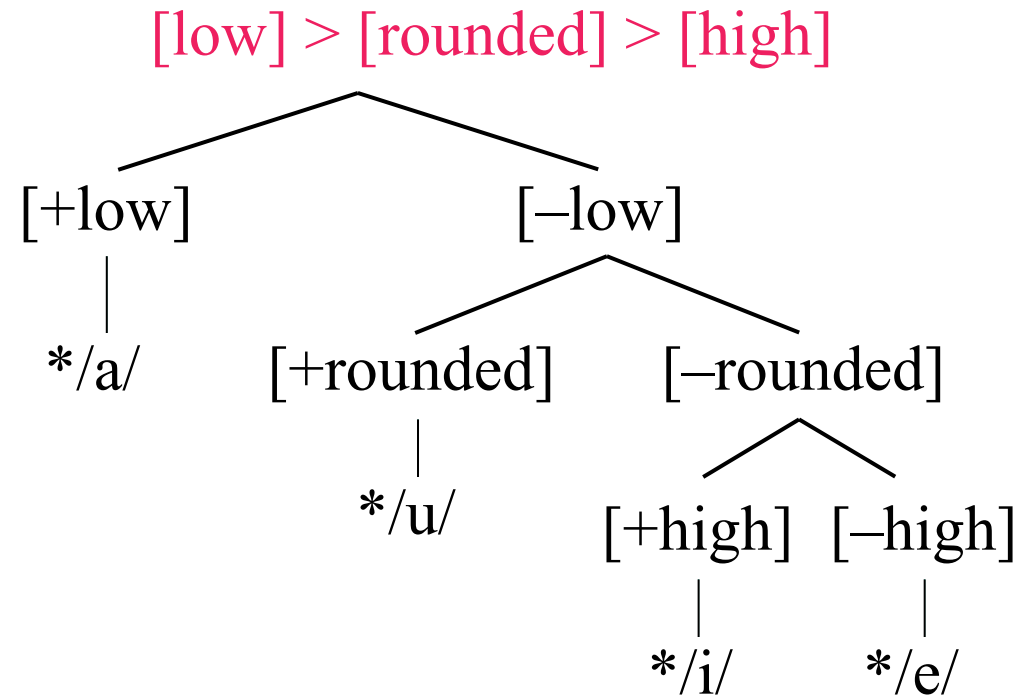
Other Feature Analyses of Germanic

Elmer Antonsen, an American linguist and runologist, also used a contrastive feature hierarchy in his 1972 analysis of the Proto-Germanic vowel system.



Proto-Germanic Feature Hierarchy

Antonsen posits the feature hierarchy [low] > [rounded] > [high] for the Proto-Germanic short vowel system, which has 4 vowel phonemes.



It is very similar to Rischel's hierarchy for North Germanic, which is more complex because it covers 9 vowels.

Recall Rischel's Hierarchy:
[low] > [round] > [close] > [back]

Fall and Rise of Branching Trees

Despite their status as a kind of orthodoxy in the 1960s, contrastive feature hierarchies virtually disappeared from phonological theory for the rest of the twentieth century, for reasons I have tried to document (Dresher 2009, 2015, 2016a).

Contrastive feature trees made sporadic appearances (Cairns 1988; Boersma 1998) before they were more systematically revived by G. N. Clements (2001, 2009) and, independently, by phonologists at the University of Toronto (Dresher, Piggott & Rice 1994; Dyck 1995; Zhang 1996; Dresher 1998, 2009; Hall 2007, 2011; etc.).

A Theory of Contrastive Specification

We have been trying to fill out the theory that underlies Rischel's analysis of the Scandinavian runes.

- One 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 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.

Contrast and Phonological Activity

With respect to criteria for ordering features into a hierarchy, in addition to those proposed by Rischel (1966), we consider as most fundamental that features should be ordered so as to reflect the **phonological activity** in a language, where 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

I believe that this the main criterion that Rischel (1966) used in determining the feature hierarchy for early and later Scandinavian.

Thus, his hierarchies are based on the phonological patterning, that is activity, of the language, supplemented by orthographic evidence from the futhark.

Phonological Activity

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Conclusion

I will conclude by reiterating Rischel's 2009 [1966]: 271) comment that "We have as yet no well-developed theory about rank-ordering of distinctive features".

Though research into contrastive feature hierarchy theory was abandoned shortly after Rischel wrote those words, fifty years later we again hope to make progress on this question.

Recent work on Germanic vowel systems along these lines includes papers by Purnell & Raimy (2015) and Drescher (2016b) on West Germanic and Old English, and by Schalin (2017) on Scandinavian.

Acknowledgement

I am grateful to Johan Schalin for bringing
Rischel's article to my attention.

THANK YOU!



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