CONTRASTIVE FEATURE HIERARCHIES AND GERMANIC PHONOLOGY: JØRGEN RISCHEL'S ANALYSIS OF THE SCANDINAVIAN RUNIC REFORM

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Abstract: I look at an analysis of changes in the Scandinavian runic alphabet, or futhark, by Jørgen Rischel. Rischel's article, written in 1966, accounts for some puzzling changes in the futhark by employing contrastive feature hierarchies represented as branching trees. Feature hierarchies can be traced back to the work of Roman Jakobson and his colleagues. They 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 paper is to bring attention to this largely forgotten approach to phonological analysis, and to spell out the principles that underlie it. I will show that the theory we arrive at is essentially that proposed by Dresher (2009).

Keywords: Scandinavian, Germanic, runes, contrast, phonological systems, feature hierarchies, branching trees.
Languages: Scandinavian, Proto-Scandinavian, Northwest Germanic, Old English, West Germanic, Proto-Germanic, Russian, futhark.

CONTRASTIVE FEATURE HIERARCHIES were once common in phonological analyses. I have been attempting to trace their history in phonological theory in general, and in Germanic phonology in particular (Dresher 2015, 2016a, 2016b, 2017). This paper reviews a particularly interesting example in this genre, an analysis of changes in the Scandinavian runic alphabet, or *futhark*, by Jørgen Rischel (1934–2007).

In section 1, I briefly review the older Scandinavian system of runes representing vowels, and the changes in the Proto-Scandinavian vowel system that led to this system becoming out of step with the phonological inventory. Sections 2 and 3 review Rischel's analyses of the changes in the runes for vowels and obstruents, respectively. In section 4, I consider Rischel's insightful comments on 'branching diagrams' (contrastive feature hierarchies), and the criteria he proposes for ordering features. Section 5 is a brief discussion of the origins and history of branching tree diagrams in phonology, and section 6 presents a theory of contrastive specification that is consistent with Rischel's analysis. Section 7 is a brief conclusion.

1. SCANDINAVIAN RUNES: THE "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), as shown in **Figure 1**. 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.

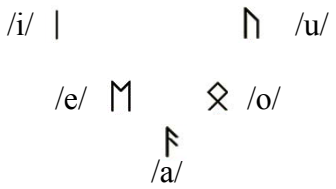

Figure 1. *Northwest Germanic vowel phonemes and runes*

Most scholars assume also that, already at an early stage, each vowel phoneme had positional allophones caused by fronting, backing, raising, and lowering. Writers differ as to how many allophones there were; here I mainly follow Antonsen (1963) and Rischel (1966). The significant allophones were as follows:

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

It is believed that /i/ and /e/ developed back unrounded allophones [ɯ] and [ɤ], respectively, before u or w (back umlaut). These allophones either did not persist or changed to something else, so I will not consider them further here; but see further Schalin (2017).

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

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]); a retracted allophone written [å] before /u/ or /w/, which may have been phonetically [ɑ], [ɒ], or [ɔ]; and central [a] in neutral contexts. There may also have been a raised [ɐ] or [ə], but I will not consider it here.

As a result of losses and mergers in the unstressed vowels, some of these allophones eventually became separate phonemes in Proto-Scandinavian, as shown in **Figure 2**. Thus, the number of vowel phonemes increased from five to nine.

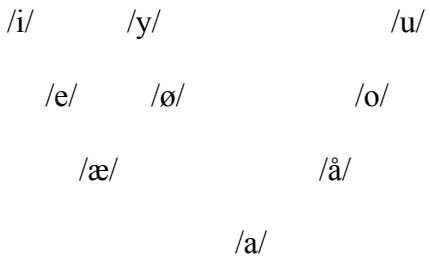

Figure 2. *Proto-Scandinavian vowel phonemes*

2. THE SCANDINAVIAN RUNIC REFORM: VOWELS. 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. Instead, somewhat counterintuitively, the number of vowel runes were *reduced* from five to three! The old runes for /e/ and /o/ were discontinued (and, due to sound changes, the old rune for /a/ was restricted to nasalized *a* and was replaced by the old rune for /j/). 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?

Rischel (2009 [1966]:256) suggests that 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 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, and the /o/ rune has none).

However, Rischel (2009 [1966]:262) argues that the more important reasons are phonological: "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." 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/; the *u* rune could be assigned to /u/ and /y/; the *e* rune could represent /e/ and /æ/; the *o* rune could stand for /o/, /ø/, and /å/; and the *a* rune would continue to designate /a/.

Rischel argues that 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, but these would be divided among three different runes; /i/ and /e/ are related by alternations, but these would belong to different runes; and finally, unstressed vowels are reduced to three: /i/ from /i/ and /e/; /u/ from /u/ and /o/; and /a/. 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 a single rune, as shown in **Figure 3**.

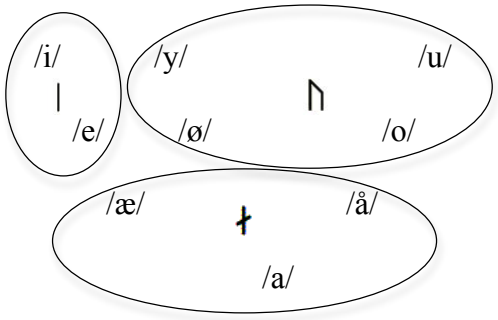

Figure 3. *Proto-Scandinavian vowel phonemes and runes*

Rischel next considers how these groups can be characterized phonologically. Building on proposals by Diderichsen (1945) and Antonsen (1963), Rischel (1966) employs a feature tree to illustrate how the three younger futhark 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 tree in **Figure 4** is slightly modified from Rischel (2009 [1966]:265). The first division of the vowel system is into [–low] and [+low] vowels. The [–low] vowels are divided by [±round]. 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].

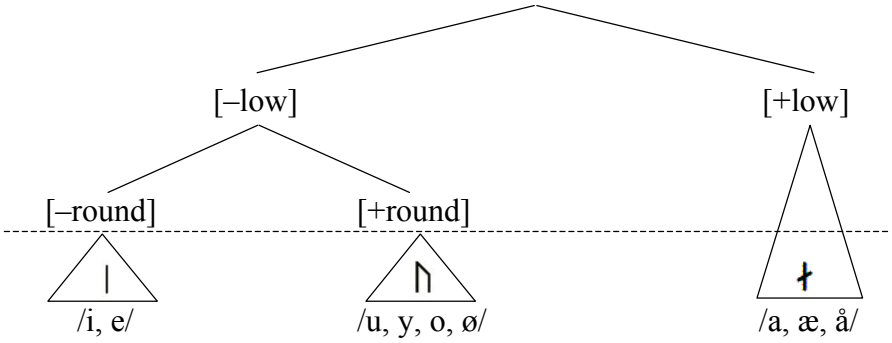

Figure 4. *Younger futhark vowel feature hierarchy*

Rischel completes the Proto-Scandinavian vowel feature hierarchy as in **Figure 5**, extending it to features not represented by the younger futhark. The next contrastive feature after [±round] is [±close]. There are no further contrasts in the [–round] branch, which terminates with [+close] /i/ and [–close] /e/. In the [+low] branch, there is only one vowel that is [–close], namely /a/. The remaining branches of the tree are divided by [±back]. This completes the feature hierarchy for the Proto-Scandinavian vowels; the features are ordered [low] > [round] > [close] > [back].

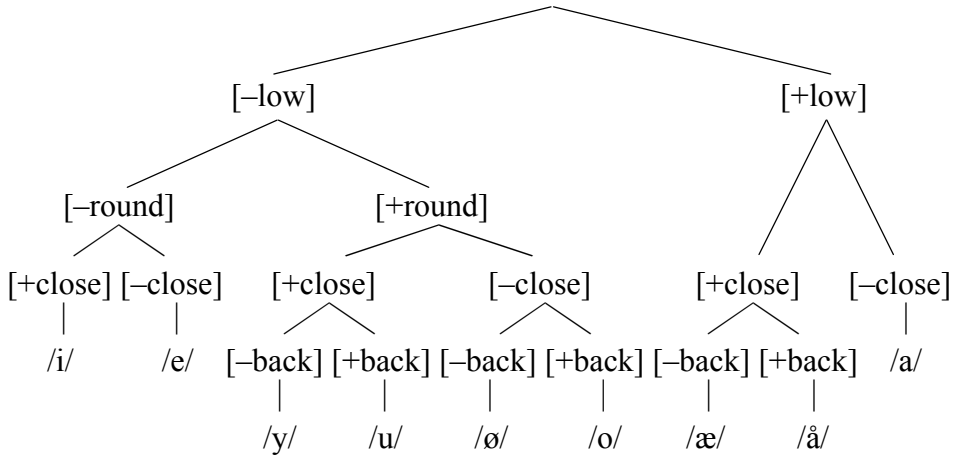

Figure 5. *Proto-Scandinavian: all contrastive vowel features*

3. THE SCANDINAVIAN RUNIC REFORM: OBSTRUENTS. Rischel (1966) uses another 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 and stop ~ fricative. Fortis consonants, probably voiceless, were in contrast with lenis, probably voiced, consonants; hence fortis [þ] was a member of a different phoneme from lenis [ð]. Stops, for example [t], were in contrast with fricatives, like [þ]. 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. 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 major place features > [fortis/lenis] >

[stop/fricative], as illustrated in **Figure 6**. As with the vowels, each obstruent phoneme is represented by a separate rune in the older futhark.

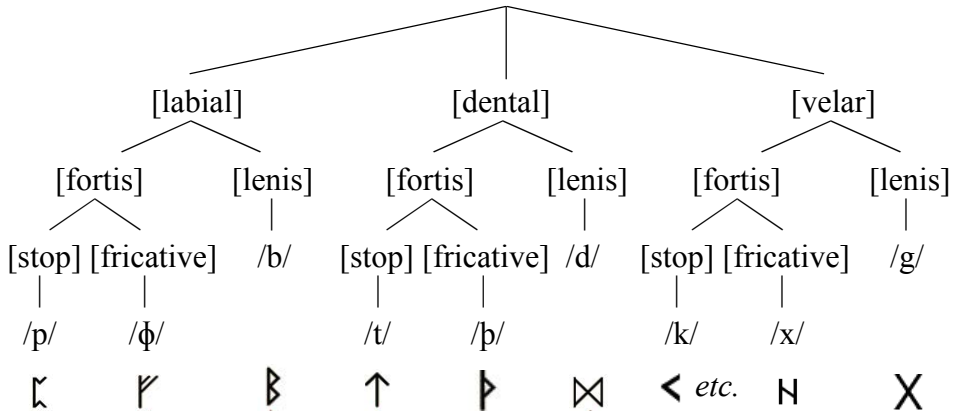

Figure 6. *Early Proto-Scandinavian obstruent features*

Rischel (1966) shows how a series of changes in the Proto-Scandinavian obstruent system led to a reorganization of the system of contrasts. Fortis and lenis consonants that had been in contrast, such as fortis [þ] and lenis [ð], came to be in complementary distribution and members of a single fricative phoneme, /þ/. 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]. The result, according to Rischel, was a contrast shift whereby [fortis/lenis] changed places with [stop/fricative], so that the feature hierarchy was major place features > [stop/fricative] > [fortis/lenis]. Now the stop ~ fricative contrast is the higher one, and the fortis ~ lenis contrast holds only in the [stop] obstruents, as shown in **Figure 7**.

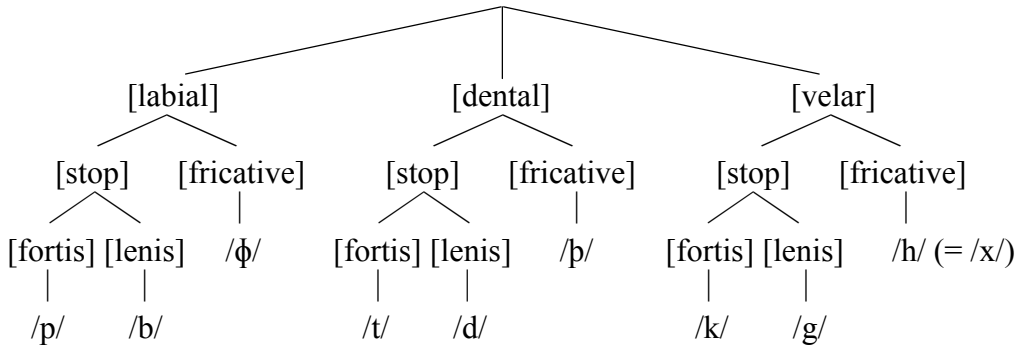

Figure 7. *Later Proto-Scandinavian obstruent features*

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. Again, Rischel proposes that the younger futhark represents only the higher-ranked place and stop ~ fricative distinctions; it omits the fortis ~ lenis distinctions, as shown in **Figure 8**.

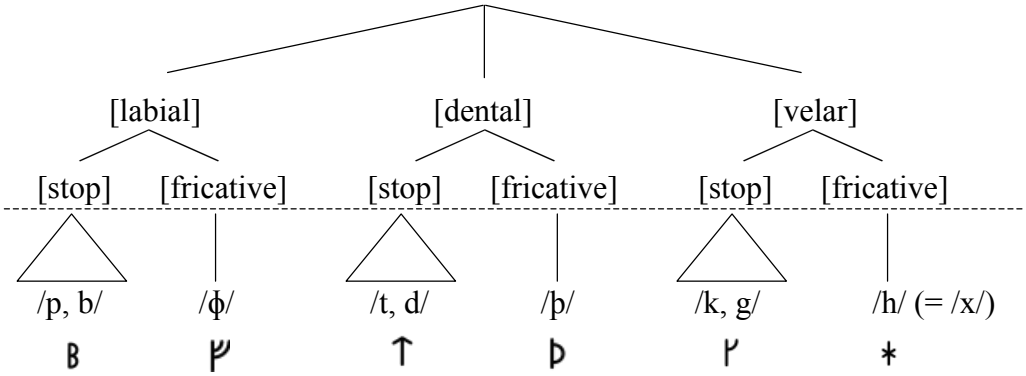

Figure 8. *Younger futhark obstruent feature hierarchy*

4. 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." If features are put into a hierarchy, we need to have criteria that tell us what the feature hierarchy is for a given inventory. Rischel considers a number of possible criteria, listed in (1).

(1) *Criteria for ordering features (Rischel 2009 [1966]:264–265)*
   a. Coverage
      A distinction that affects a greater part of the system must be hierarchically superordinate to one that affects a lesser part.
   b. 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.

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

5. ORIGINS AND HISTORY OF THE BRANCHING TREES. Where did the branching feature trees come from? I have proposed (Dresher 2007, 2009, 2015, 2016a, 2017) 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. The branching tree is alluded to by Jakobson et al. (1952). They propose that listeners identify phonemes by distinguishing them from every other phoneme in the system. These distinctions are effected by making a series of binary choices that correspond to the oppositions that are linguistically relevant in the language. By "linguistic relevance (expressed in binary terms)" (Jakobson et al. 1952:11) 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 et al. 1953, Jakobson & Halle 1956, and Halle 1959, *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). 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, given in (2); he argues that phonological features *must* be ordered into a hierarchy, because this is the only way to ensure that segments meet the Distinctness Condition.

(2) *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.

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 (1968).

In addition to Rischel's analysis of early Scandinavian, contrastive feature hierarchies were employed by the Icelandic linguist Hreinn Benediktsson (1967) in an article on the Proto-Germanic vowel system. His article appears in the first volume of *To honor Roman Jakobson*, and employs a Jakobsonian approach to distinctive features.

Elmer Antonsen, an American linguist and runologist, also used a contrastive feature hierarchy in his 1972 analysis of the Proto-Germanic vowel system. Antonsen (1972) posits the feature hierarchy [low] > [rounded] > [high] for the Proto-Germanic short vowel system (**Figure 9**), which has four vowel phonemes. It is very similar to Rischel's hierarchy for North Germanic, which is more complex because it covers nine vowels.

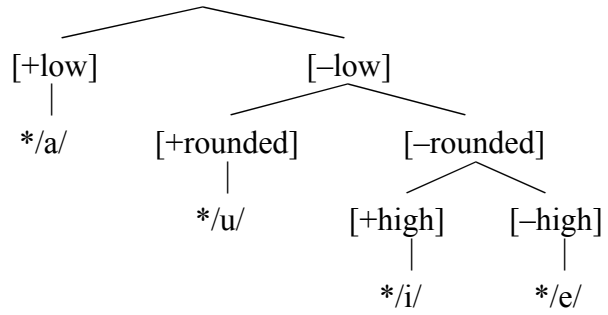

Figure 9. *Proto-Germanic feature hierarchy for short vowels (Antonsen 1972)*

Despite their status as a kind of orthodoxy in the 1960s, after the publication of *The sound pattern of English* (Chomsky & Halle 1968) contrastive feature hierarchies virtually disappeared from phonological theory for the rest of the twentieth century, for reasons documented by 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 and colleagues (Dresher et al. 1994; Dyck 1995; Zhang 1996; Dresher 1998, 2009; Hall 2007, 2011; Mackenzie 2011, 2013; Ko 2012; Spahr 2014; Oxford 2015; Krekoski 2017; among others).

6. A THEORY OF CONTRASTIVE SPECIFICATION. The latter have been trying to fill out the theory that underlies analyses such as Rischel's account of the Scandinavian runes. One basic tenet has been formulated by Hall (2007:20) as the Contrastivist Hypothesis (3).

(3) *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.

That is, the Contrastivist Hypothesis posits that only contrastive features can be *phonologically active*, where activity is defined as in (4) (adapted from Clements (2001:77).

(4) *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.

The second major tenet of the theory is that contrastive features are computed *hierarchically by ordered features* that can be expressed as a branching tree. Branching trees are generated by *the Successive Division Algorithm*, given informally in (5) (Dresher 1998, 2003, 2009).

(5) *The Successive Division Algorithm*
Assign contrastive features by successively dividing the inventory until every phoneme has been distinguished.

It follows from the above that the most important criterion for ordering features into a hierarchy is phonological activity: if only contrastive features can be active, then features should be ordered in such a way that the active features are all contrastive.[1] I believe that this the main criterion that Rischel (1966) actually 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.

7. 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 Dresher (2016b, 2017) on West Germanic and Old English, and by Schalin (2017) on Scandinavian.

[1] Thus, minimization of feature specifications is *not* the main motivation for underspecification in this approach, unlike some other underspecification theories discussed by Sullivan (1998); see Dresher (2015) for discussion.

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