Syncope, umlaut, and prosodic structure in early Germanic*

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Abstract

A theory of sound change based on Stratal OT is presented and applied to early Germanic syncope and umlaut.

Section 2 puts forward four phonological and morphological arguments to show that the Germanic weak preterite had a compound-like prosodic structure, inherited from its periphrastic origin. The weak preterite fused into a single prosodic word early in North Germanic and Old English but retained its complex prosody late in continental West Germanic. The relative chronology of fusion, syncope, and umlaut divides early Germanic into five dialect groups.

Section 3 draws on these ideas for a new account of Nordic syncope. The special features of early Nordic syncope are traced to its more restrictive syllable structure. The key move is to reframe the traditional syllable weight conditions on syncope as prosodic constraints that govern its output. This yields a periodization into three successively more general stages of syncope. At the first stage (550-600 A.D.), syncope applies freely on condition that it may not produce a syllable of more than two moras, or in a foot of less than two moras, with word-final consonants counting as weightless. Syncope is then extended to allow three-mora syllables. A second extension occurs around 800, when word-final consonants become capable of bearing weight.

Section 4 outlines the issues and motivates the treatment of phonologization in Stratal OT. It is conceptually the diachronic counterpart of phonological opacity and explained like it by the serial relation between the lexical and postlexical constraint systems. A set of predictions is derived about when and how sound changes interact with existing phonological constraints.

Section 5 applies this understanding of syncope to the long-standing problem of Nordic umlaut. Armed with Stratal OT, we can solve the problem simply by dating it between the first stages of syncope.

1 The weak preterite

The phonological development of the weak preterite in West and North Germanic is baffling in several respects. The most notorious puzzle is the apparently opposite conditioning effect of syllable weight on umlaut in them in West Germanic and North Germanic, as illustrated in (1) by Old High German and Old Icelandic, respectively.

(1)		Germanic	OHG	Old Icel.	
a.	Light root:	**wariðōm*	*w**e**rita*	*v**a**rþa*	'I protected'
b.	Heavy root:	**warmiðōm*	*w**a**rmta*	*v**e**rmþa*	'I warmed'

It is the North Germanic distribution that is immediately surprising. We might expect resistance to umlaut in long vowels, or in rounded vowels, or in vowels separated from the trigger by intervening back consonants or complex clusters. Such conditions which make phonetic sense, and they are well attested in Germanic (Howell and Salmons 1997). But why would *light syllables* not undergo umlaut?

Kock's classic theory (1888) addresses this problem by positing two periods of syncope and two periods of umlaut. The weight restriction applies at the first round of syncope, at which point only deleting vowels trigger umlaut. Umlaut is then "turned off", and subsequently reinstated in a more general form

(2) a. Unstressed *i* is syncopated after a *heavy* syllable, but *triggers umlaut*.
b. Then unstressed *i* is syncopated after a *light* syllable, and *doesn't trigger umlaut*.
c. Remaining *i*'s are *not syncopated*, and *trigger umlaut*.

The two umlaut stages posited in Kock's theory are suspicious for two reasons. First, it allows no historical continuity between them, for they would have to be interrupted by a period where umlaut was blocked. Secondly, the "transderivational" restriction in stage 1 of (2), according to which umlaut is first triggered only by syncopating vowels does not sit well with standard views of sound change (Benediktsson 1982).

I take up these problems and offer a new historical analysis of Nordic umlaut and syncope in section 3 below. There I argue that syncope is not conditioned just by the weight of the preceding syllable, but rather by the prosodic constraints on syllables and feet. Relaxation of these constraints yields a progressive generalization of syncope, motivating a new periodization of early North Germanic, which I show to be independently supported by Runic evidence.

The Old High German data in (1) seem unproblematic by comparison. Medial syncope after heavy syllables must have removed the *-i-* before it could condition umlaut. Heavy-stem preterites like **warmiða* 'warmed', **falliða* 'felled', **kanniða* 'knew', **hōriða* 'heard', **lēriða* 'taught' were syncopated to *warmta, falta, kanta, hōrta, lērta*, while light-stem preterites such as **wariða* 'protected', **waliða* 'chose', **taliða* were not subject to syncope and consequently underwent umlaut to *werita, welita, zelita*.

This much seems clear. Yet a closer look reveals even worse difficulties than in Nordic. The most obvious problem is that Old High German otherwise *retains* medial vowels in all morphological categories, even after heavy syllables. (3) documents this for medial *-i-* in various word types:

(3) a. *blīd-iro* ‘happier’
b. *leng-isto* ‘longest’
c. *epfil-i* ‘apples’ (Nom.Pl.)
d. *houbit-es* ‘head’ (Gen.Sg.)
e. *lemb-ir-o* ‘lambs’ (Dat.Pl.)
f. *tiuri-da* ‘dearness’
g. *luzzil-ī* ‘littleness’
h. *chindi-lī(n)* ‘child’ (Dimin.)
i, *jung-idi* ‘young one’
i. *predigō(n)* ‘preach’ (Latin loanword)

Already Franck (1909: 82) suspected *besondere Gründe* for the weak preterite’s unique syncopation behavior, but those “special reasons” have to my knowledge never been identified. The current edition of the authoritative handbook of Old High German continues to record the syncope of weak preterites as an unexplained anomaly.[1]

This is not the only seemingly exceptional feature of the OHG weak preterite. Section 2.1 presents three others and gives a unified explanation for all four on the basis of the weak preterite’s unique prosodic structure, due ultimately to its periphrastic origin. The other branches of West Germanic are then integrated into the analysis in sections 2.2-2.4. Section 2.5 formulates the constraints on syllable structure and foot structure which underlie the syncope patterns and the interaction of syncope with umlaut. Section 4 proposes a theory of sound change built on Stratal Optimality Theory, which offers new answers to the questions how sound change is related to phonological structure, and how new phonemes arise. These underlie the novel treatment of Nordic umlaut and syncope advanced in section 3.

The weak preterite proves to be an Ariadne’s thread which leads through the labyrinth of early Germanic phonology to the innovations by which its major dialects hived off. The relative chronology of umlaut, syncope, and prosodic fusion in the weak preterite demarcates five dialect groups, which fit well into the established historical picture. The Nordic branch up to about 550 A.D. had a distinctive syllable structure which enforced a different progression of syncope than in West Germanic, and consequently also a different interaction of syncope with umlaut. I interpret the findings as showing that umlaut originated in the easternmost part of Germanic and spread first along a maritime dialect continuum which extended from Gotland through Denmark and coastal northern Germany to England, before reaching Western Scandinavia and the interior of Germany.

Hand in hand with these theoretical and empirical goals goes a methodological one. We would hope for nothing but regular, natural, and independently motivated sound changes, and analogical changes which can be grounded in the language’s morphological system. In the best of all possible worlds, it would turn out that:

(4) • Umlaut operates under substantially the same conditions in North and West Germanic.

[1] “Synkope von ursprünglichen Mittelvokalen, die in den übrigen westgerman. Sprachen nach langer Stammsilbe sehr verbreitet ist … tritt im Ahd. konsequent nur bei dem *i* im Praet. (Part. Praet.) der langsilbigen schw. V. I auf, z.B. *nerita, ginerit ēr,* aber *h ōrta, gih ōrt ēr*. — Sonstige ursprüngliche Mittelvokale werden im Ahd. … durchaus bewahrt.” (Braune/Reiffenstein 2004: 69). Baesecke 1918: 66, 225 ff. gives a similar assessment and additional data.

- Umlaut is not sensitive to syllable weight.
- There are no discontinous umlaut "stages".
- Umlaut and syncope are regular sound changes in all branches of Germanic.
- Analogical changes eliminate unmotivated complexity.

The treatment of Old High German and Old Norse syncope and umlaut developed here comes close to this ideal.

2 West Germanic

2.1 Old High German

2.1.1 The proposal

It is clear that *-i-* in West Germanic heavy-stem preterites like **warmiða* 'warmed' must have undergone syncope before it could condition umlaut. The only conceivable alternative account for the West Germanic outcome would be to reverse Kock's North Germanic scenario by positing early umlaut in light syllables only, followed by syncope after heavy syllables. Such a solution has no independent support, and does not explain the morphological restriction of syncope to weak preterites. Moreover, a restriction of umlaut to light syllables (as opposed to a restriction to short vowels) would be hard to justify phonetically. The putative complementarity with the syncope environment after heavy syllables is not only suspicious. In fact, a restriction of umlaut to light syllables would simply not be viable for OHG, for the following reason. Medial *-i-* is exceptionally retained after heavy syllables in certain forms, such as early Franconian *sendida* 'sent', *hengita* 'hanged'. If umlaut at first applied to light syllable only, then such forms should have back vowels at this stage. Contrary to this prediction, these non-syncopated preterites are invariably umlauted. The generalization is that retained *-i-* always triggers umlaut *(sendida)* and syncopated *-i-* never triggers umlaut *(santa)*, setting aside occasional later cases of paradigmatic leveling. The only reasonable conclusion from these data is that syncope preceded umlaut.

This leaves the problem why syncope applied *only* in weak preterites, and not in other morphological categories under the same phonological conditions. The answer lies in the origin of the weak preterite ending.

The endings of the Germanic weak preterite are generally thought to be derived from a past tense form of the light verb **dō-/*dē-* 'do' added to a deverbal noun base.[2] The weak preterite system is also assumed to have absorbed reflexes of Indo-European participles in **-to-*, and perhaps of nominals in other dental suffixes, which gave rise to a distinct subclass of weak preterites. The trajectory from the verb 'do' to the past tense inflectional suffix *-d-* (OHG *-t-*) most likely included an intermediate stage where it was loosely attached as a clitic (Lahiri 2000).[3] The segmental

[2] What exactly the base was, and which past tense of 'do' the endings came from, are extremely controversial questions; see von Friesen 1925, Sverdrup 1929, Tops 1974, 1978, Lühr 1984, Bammesberger 1986, and Hill 2004.

[3] Perhaps the best-known example of this type of process is the change of Latin *cant ā re habe ō* to French *chanterai* 'I will sing'. Lahiri 2000 presents a Bengali parallel with an interesting additional twist. In this language, the auxiliary *ač^h* 'to be' has been recruited to supply the endings of both the progressive and the perfect; in the former the grammaticalization has gone to completion and the erstwhile auxiliary is now just a suffix, while in the latter it has only reached the clitic stage.

phonology of Stage 1 is shown in its (conjectural) Proto-Germanic form, but I shall argue that the prosodic structure of Stage 1 persisted much longer, in fact into historical OHG times. (The symbol ω stands for Prosodic Word.)

(5) Stage 1: [[tal-i]$_\omega$[ðeðōm]$_\omega$]$_\omega$ light verb
Stage 2: [[tal-i]$_\omega$-d-a]$_\omega$ clitic
Stage 3: [zel-i-t-a]$_\omega$ suffix

The periphrastic construction of Stage 1 had arisen to fill a well-known gap in Indo-European morphology. The suffixed perfect, like the Germanic strong preterite descended from it, was confined to monosyllabic roots. Longer verbs, if they had perfects at all, formed them with an auxiliary or a light verb appended to a denominal verb form. The restriction of the suffix to monosyllabic roots was characteristic of a large class of Indo-European primary endings. It is manifested either as a gap in the paradigm, or as suppletive allomorphy, or, in inflection, as periphrasis. For the perfect, the complementarity of root suffixation and stem periphrasis is retained in Sanskrit. Disyllabic stems like *cint-ay-* 'think' make their perfects with 'be' or 'do', e.g. *cint-ay-ām āṣ-a* (or *cint-ay-āṃ ca-kār-a*) 'he (has) thought'. The Germanic weak preterite in (5) shows the same pattern, although the periphrastic form of stage 1 has a different denominal ending and a different auxiliary.

The stages in the evolution of (5) constitute a typical grammaticalization trajectory. Prosodic and morphological structure normally go hand in hand, but in ongoing grammaticalization processes prosody may lag behind. When they are mismatched, it is prosodic rather than morphological structure that is relevant for phonological processes (Inkelas & Zec 1990). There are many Germanic parallels for this distinction between morphological and prosodic structure, and for the phonological relevance of the latter. Words in *-līh* '-like' (OIcel. *-lig*, OE *-līc*), such as OHG *kraftlīh* 'powerful', are a familiar case in point. At a prehistoric stage, these suffixes were nouns with the lexical meaning 'form', 'body', morphologically joined to the stem in a *bahuvrīhi* compound (such as *redneck*), but the morphological compounding had become opaque before Old High German began to be written down.

For purposes of morphology and syntax they were single words, but the phonology treated them as two prosodic words. This prosodic status is diagnosed by phonological processes that are restricted to the word domain, such as syncope, stress, and umlaut. The phonological pattern is that pattern

(6) Old High German *-i* stems (original distribution)[4]

Light monosyll.	*wini* 'friend', *quiti* 'saying', *turi* 'door'	(*-i* retained)
Heavy or polysyll.	*gast* 'guest', *anst* 'favor', *durft* 'need', *zahar* 'tear'	(*-i* deleted)
Light monosyll.	*situ* 'custom', *fridu* 'peace', *fihu* 'cattle'	(*-u* retained)
Heavy or polysyll.	*hand* 'hand' (later joined the *-i* stems)	(*-u* deleted)

[4]There was considerable analogical transfer among declensional paradigms. Ultimately, most light *-i* stems adopted the declension of heavy stems, and nearly all heavy *-u* stems joined the *-i* stems.

Each stem of a compound word counts as a phonological word. The second member does not trigger umlaut on the first, it bears stress, and final -V of the first member is regularly deleted after a heavy syllable and in polysyllables, and retained in light stems.

(7) a. -V lost in heavy and polysyllabic first members: *gast-hūs* 'inn', *anst-geba* 'favor-giver', *erd-rīchi* 'kingdom of earth', *himil-rīchi* 'kingdom of earth', *aphil-boum* 'apple-tree'

b. -V retained in light first members: *beta-hūs* 'prayer-house', *heri-zogo* 'duke', *taga-lōn* 'daily wage', *turi-wart* 'gatekeeper',

The same pattern is seen in formations with with *-līh* (Gröger 1910).

(8) a. -V lost in heavy and polysyllabic first members, *-līh* does not trigger umlaut: *gast-līh* 'hospitable', *gi-walt-līh* 'powerful, violent', *kraft-līh* 'powerful'

b. -V retained in light first members, *-līh* does not trigger umlaut: *trugi-līh* 'treacherous', *trugi-heit* 'treachery', *scama-līh* 'shameful'[5]

The same pattern is seen in before functionally suffix-like elements historically derived from compounds, such as *-haft, -heit, -lōs,* and *-sam*. Syncope, stress, and umlaut treat the two parts a separate phonological words.

In Middle High German, elements like *-lich* were degraded into word-based suffixes (Stage 2) and began to trigger umlaut if the requisite phonological conditions were met. In modern German, they are regular stem-based suffixes. Their morphological function remained unchanged throughout this period. For example, *-lich* remained an adjective-forming suffix, although its prosodic status was degraded twice.

The weak preterite's trajectory in (5) can be understood along the same lines. The verb at Stage 1 is a prosodic compound, that is, it is made up of two prosodic words, separated by a compound boundary, and linked by a compound stress pattern. From a syntactic/semantic point of view, though, the second part became equivalent to a tense suffix already at this stage.

I will now present evidence that *weak verbs in continental West Germanic underwent syncope and umlaut before the light verb had fused with the stem into a single prosodic word.* In fact, in the most conservative variety of Old High German, the prosodic compound structure of Stage 1 in (5) was still intact when syncope and umlaut took effect, and arguably even persisted into the language of the earliest texts.[6] The proposition is not quite as shocking as it may seem at first blush because we are talking about *prosodic* rather than *morphological* compound status (like that of the *-līh* adjectives). Four arguments for it follow, all involving Old High German innovations that must have taken place at Stage 1.

[5]Complex compounds require closer study, but they seem to indicate that deletion is cyclic. In [un [[scama] [līh]]] 'unshameful' , the *-a* of *scama-* escapes deletion because it is a CVCV prosodic word at the relevant stage of the derivation. This also explains contrasts between prefixed and simple stems, such as *gi-bet-hūs* (from *gibet* 'prayer') vs. *beta-hūs*.

[6]This is the main difference between my treatment of Old High German and Lahiri's. Stage 1 in (5), for me crucially the site of Old High German umlaut and syncope, plays no role in Lahiri's (2000) analysis of the Germanic phonological and morphological developments, which she assigns to Stage 3; in fact, she leaves out of consideration the special peculiarities of the conservative OHG dialects that form the core of my argument.

2.1.2 Argument 1

The first argument for my proposal is locating syncope at Stage 1 solves at a stroke the problem why it only applies to weak preterites. For in Old High German, as elsewhere in West Germanic, *word-final* vowels were regularly lost except in CV̆CV words; that is, they were lost after a heavy syllable or after two or more syllables.

This word-final syncope (strictly speaking 'apocope') process is also responsible for the loss of the weak preterites' linking *-i-*.

(9) Heavy: [[dōm-i]$_\omega$ [ðeðōm]$_\omega$]$_\omega$ > *tuom-ta* 'judged'
Polysyllabic: [[mahal-i]$_\omega$ [ðeðōm]$_\omega$]$_\omega$ > *mahal-ta* 'magnified'
Light: [[tal-i]$_\omega$ [ðeðōm]$_\omega$]$_\omega$ > *zel-i-ta* 'told'

Cases like (3) are no longer a problem, because they have, and always had, *medial -i-*, which was syncopated at a much later stage, if at all.

We know that word-final vowels were deleted *before* they could trigger umlaut, because the back vowel is retained without umlaut in heavy-syllable *-i* stems like *gast* 'guest', *gast-hūs* 'inn', *hūt* 'hide', *anst* 'favor'; contrast the light-syllable *meri* 'sea' from **mari*. This straightway explains the lack of umlaut *('Rückumlaut')* in weak preterites with a deleted *-i-*, such as (9a) *tuomta*.

This analysis predicts that regular word-final -V deletion applied just to preterites, not to past participles, because these were not historically built on the verb 'do', but rather continue the Indo-European participles in **-to-* and had always been single morphological and prosodic words. That seems at first sight to be a problem, for participles mostly have the seme phonology as preterits, e.g. *gi-sazt-*. This actually proves to be a strong point rather than liability of our analysis. Past participles had a close paradigmatic relationship to preterites. In particular, the weak preterite and participle stems were identical in class 2 *(salbōt-)*, in class 3 *(habēt-)*, and in light stems of class 1 *(nerit-)*. After syncope, heavy stems of class 1 would have been an exception to this pattern. For example, the participle stem **hōrit- (*gi-hōrit-ēr, -to, -ta…)* would have differed from the preterite stem *hōrt-*. So the participle copied the preterite's distribution of medial *-i-*, with **hōrit-* losing its *-i-* by analogy to *hōrt-*. The evidence for this is that medial *-i-* is sometimes retained in heavy-stem participles even in dialects that consistently delete it in preterites; these are residual forms which betray the original *lautgesetzlich* distribution. For example, while Otfried drops medial *-i-* regularly after heavy syllables in past tense forms, he sometimes retains it in participles (Braune-Reiffenstein §365 A.2, Krüer 1914: 179). Tatian drops medial *-i-* in participles *only* when the corresponding past tense verb does, but then not always (Franck 1909: 247).[7] This implicational relationship becomes understandable if the loss of *-i-* in participles is not the direct outcome of sound change but analogically modeled on the preterite, as my analysis of weak preterite syncope requires.

2.1.3 Argument 2

Argument 1, as presented so far, just shows that syncope took place before Stage 3, that is to say when the first part was still a phonological word. We will now show both syncope and umlaut

[7] E.g. PP. *gi-sezzitu* (fem.) ∼ *gi-saztiu* (Acc.Pl.), but Pret. only *sazta*, from *sezzen* 'put', and PP. *gi-fullitê* ∼ *gi-fultê* (Nom.Pl.) but Pret. only *gi-fulta*, from *fullen* 'fill'.

took place no later than Stage 1, that is to say, when the second part was still a full phonological word, rather than a clitic. To show this it is sufficient to establish that umlaut took place at Stage 1. Since syncope preceded umlaut, as argument 1 already makes clear, and the evidence given below further confirms, syncope must also have been complete at stage 1.

In addition to their unique syncope pattern, OHG weak preterites have the peculiarity that heavy stems are never umlauted in the preterite optative (Robinson 1980). In the indicative, a back vowel is expected because the *-i-* is syncopated, as in (10a). But in the optative, the ending *-ī* should then, on traditional assumptions, have triggered umlaut after syncope, which would have given **brenti* instead of *branti* in (10b).

(10) a. **brann-i-ð-ōm > branta* no umlaut because *-i-* is syncopated
b. **brann-i-ð-ī > branti* no umlaut in spite of *-i* (⊁ **brenti*)

It will not help to suppose that umlaut preceded syncope, for then we would expect **brenta* rather than *branta* in (10a). Moreover, umlaut preceded syncope, then we would still expect umlaut in the derivation of the optative, this time triggered by the medial *-i-*.

(11) **brann-i-ð-ī > *brenitī > *brenti*

Nor can we suppose that the weak preterite or optative suffix for some reason does not trigger umlaut. That the weak preterite suffix otherwise does trigger umlaut is clear from light stems where *-i-* is retained, such as (12a). That the optative suffix otherwise does trigger umlaut is clear from preterite-presents like (12b), where it directly follows the root, and which had been single words all along.[8]

(12) a. **tal-i-ð-ōm > zelita* 'told'
b. **mag-ī > megi* 'could' (Braune-Reiffenstein 2004: 306)

So the challenge is to explain what prevents umlaut in (10) **branniðī > brantī*, where both umlaut-triggering suffixes occur together. Robinson (1980) devises an ingenious analogical explanation, which is based on the idea that it was important to maintain distinct stem forms in the preterite optative and the present. As Robinson himself recognizes, the functional motivation for the analogy is weak because the categories were already well enough distinguished by their endings. It is not clear why their stems also needed to be kept apart from each other. Also, there is no direct structural relation between the present and preterite optative stems on the basis of which either could be derived from the other, which could motivate such a regular differentiation.

The present analysis suggests a different explanation. As syncope already reveals, the weak preterite stem in *-i* retained its status as a phonological word at least for some time during the West Germanic period. We observe now that umlaut in OHG could be triggered by a suffix with *-i-*, or, in the early period, even by a clitic with *-i-*, but *not by -i- in another phonological word*.

[8] Although the OHG spelling does not mark umlauting for *u* and *o*, present optatives of preterite-present verbs, such as *kunni* 'could', *durfi* 'were allowed to', *muoʒi* 'would have to' presumably had umlaut vowels too, on the evidence of the later dialects, including standard German *könne, dürfe, müsse*. The preterite optative is also umlauting in Scandinavian and in Old English (Hill 2004): ON 3.Sg.Opt. *vekðe*, vs. 3.Sg.Ind. *vakðe*, OE 3.Sg.Opt. *scylde* vs. 3.Sg.Ind. *sculde* (Sievers-Brunner 1951: 386).

(13) a. Umlauting by clitics in early OHG (Braune-Reiffenstein 2004 §26, A.3)
/mag iz/ → *meg iz* 'may it', /drank ih/ → *drenc ih* 'I drank' /gab ima/ → *geb ima* 'gave him', /girah inan/ → *gireh inan* 'avenged them'

b. No umlauting by second members of compounds (including phonologically word-like suffixes like *-līh*).
gast-wissī 'inn' (**gest-wissī*), *ōstar-rīchi* 'Austria', *Ara-frid* (PN), *gast-līh* 'hospitable', *kraft-līh* 'powerful', *kamar-ling* 'chamberlain', *forstant-nissi* 'understanding', *tal-ilī(n)* 'little valley'

On the assumption that umlaut applied at Stage 1, this generalization also explains why the optative endings fail to trigger umlaut in the weak preterite. Umlaut on the first member fails precisely when the optative ending is contained in a separate phonological word. This is the case at Stage 1, as in (14c), where the domains of umlaut are shown by underbraces.

(14) a. umlaut applies *$[\underbrace{[tal - i\,]}_{\omega}[-ðeðōm\,]_{\omega}\,]_{\omega}$ > *zelita* 'counted'

b. umlaut applies *$\underbrace{[mag - \bar{\imath}]}_{\omega}$ > *megi* 'could'

c. no umlaut *$[\underbrace{[brann - \not{\imath}]}_{\omega}[-ð - \bar{\imath}]_{\omega}\,]_{\omega}$ > *brantī, branti* 'burned'

2.1.4 Argument 3

The form (14c) illustrates another tell-tale phonological anomaly of the weak preterite. This is the word-final long *-ī* seen in first and third person optative *brantī*. It appears in Alemannic, and in the archaic Franconian represented by the Isidor MS; I'll refer to these dialects mnemonically as OHG-A. It is absent in the balance of Franconian dialects, and in Bavarian (OHG-B). Strong preterite optatives, on the other hand, have final short *-i* in both OHG-A and OHG-B. According to Braune-Reiffenstein (2004: 272, and the table facing p. 261) the oldest endings in this paradigm are as follows:[9]

(15) OHG preterite optative

	Weak		Strong
	OHG-A	OHG-B	OHG-A/B
1.Sg.	salb-ō-t-**ī**	salb-ō-t-**i**	nām-**i**
2.Sg.	salb-ō-t-ī-s	salb-ō-t-ī-s	nām-ī-s
3.Sg.	salb-ō-t-**ī**	salb-ō-t-**i**	nām-**i**
1.Pl.	salb-ō-t-ī-m	salb-ō-t-ī-m	nām-ī-m
2.Pl.	salb-ō-t-ī-t	salb-ō-t-ī-t	nām-ī-t
3.Pl.	salb-ō-t-ī-n	salb-ō-t-ī-n	nām-ī-n

The reason final *-ī* in the boldfaced forms is surprising is that OHG-A otherwise did not tolerate unstressed final long vowels. Although I cannot find this generalization stated in so many words

[9] Several of them are later extended: 2.Sg. *-s* > *-st*, 1.Pl. *-m* > *-mēs*, 2.Pl. *-t* > *-nt*.

in the literature, it is valid for early OHG, at least as the textual evidence is interpreted in Valentin 1969 and Braune-Reiffenstein 2004.[10] Specifically, final long vowels are regularly shortened in disyllabic and polysyllabic verb forms, as in the 1. and 3.P. singular and in the imperative of class 2 and 3 weak verbs:

(16) Final shortening in the OHG present optative and imperative

	Weak II	Weak III
1.Sg.	salb-**o**	hab-**e**
2.Sg.	salb-ō-s	hab-ē-s
3.Sg.	salb-**o**	hab-**e**
1.Pl.	salb-ō-m	hab-ē-m
2.Pl.	salb-ō-t	hab-ē-t
3.Pl.	salb-ō-n	hab-ē-n
Imper.	salb-**o**	hab-**e**

The weak optative preterite ending's resistance to the phonological ban on final long vowels in OHG diagnoses a special prosodic status. As in the case of umlaut presented in the preceding section, the assumption that the weak preterite endings are enclitics (Stage 2 of (5)) is not enough to explain the phonology. The reason is that the final shortening process applied actively even to enclitics, such as *dū* 'thou' and *nū* 'now' (B/R §282 A.2, §41 A.1). In order to preserve length, the boundary between the preterite endings and the stem had to be stronger than a clitic boundary, which is to say a full word boundary. This again forces the conclusion that the compound-like prosodic structure of Stage 1 in the grammaticalization trajectory (5) was retained in OHG-A.

2.1.5 Argument 4

The final piece of evidence that OHG-A is still at Stage 1 in (5) comes from another discrepancy between weak and strong preterites in just these diagnostic dialects. Their weak preterite indicative endings have long -*ō*- in the indicative plural, e.g. 3.Pl. Pret. *suohtōn* 'sought', where OHG-B has short or reduced vowels *(suohtun*, from *-*ton*), like the strong preterite in all dialects *(sungun* 'sang'). (17) shows the two sets of plural endings in their oldest attested shape (Braune-Reiffenstein 2004: §304, table).

(17) OHG weak preterite indicative plural

	Weak		Strong
	OHG-A	OHG-B	OHG-A/B
1 Ind.Pl.	salb-ō-t-ō-m	salb-ō-t-u-m	nām-u-m
2 Ind.Pl.	salb-ō-t-ō-t	salb-ō-t-u-t	nām-u-t
3 Ind.Pl.	salb-ō-t-ō-n	salb-ō-t-u-n	nām-u-n

[10] Three morphological categories require comment. Masculine -*u* stems probably once had the Gen.Sg. ending -*ā*, but this ending disappeared in OHG when these nouns went over to the the -*i* declension, being preserved only in two residual examples, *frid ō* (recorded twice) and *wit ō* (once) (Braune-Reiffenstein 2004: §220c, A.3). Within late OHG, long final vowels were secondarily reintroduced in two morphological categories. Final -*ā* was lengthened in the Nom./Acc.Pl. of -*ō*-stems, a development which first appears in Notker (*geba* > *geb ā*), Valentin 126, Braune-Reiffenstein 2004: §207 A.6 ("eine jüngere alem. Entwicklung", ca. 1000 A.D.). Secondly, final -*n* was lost in -*īn* feminines such as *h ōh ī(n)* 'height' (Valentin 124, Braune-Reiffenstein 2004: §228-229). Isidor regularly has -*īn* in these. Thus, in Isidor's dialect the final long -*ī* of the weak preterite optative is practically unique.

The two splits, optative *-ī* vs. *-i* in (15), and indicative plural *-t-ō-* vs. *-t-u-* in (17), go hand in hand. A given dialect has either both, or neither. This coincidence has not escaped notice, but it has certainly escaped explanation.

The split between weak and strong endings in OHG-A is puzzling because the long and short endings must ultimately have the same origin, and because it bucks the tendency to unify the strong and weak conjugations. According to Lühr's (1984) attractive proposal, the short endings are original, and come from **-ðum, *-ðuð, *-ðun*, haplologically simplified from the reduplicated preterite (IE perfect) light verb **ðeðum, *ðeðuð, *ðeðun* 'did'. OHG-A's long vowels would then be due to to analogy from the verb stem **ðō-* > *tō-* 'do'.[11] This verb's plural forms in their oldest attested OHG shape (according to Braune-Reiffenstein 2004: §280) are shown in (18).

(18) OHG plural of *tō* 'do'

	Present	Pres.Opt.	Preterite
1 Pl.	tōmēs	tōm	tātum
2 Pl.	tōt	tōt	tātut
3 Pl.	tōnt	tōn	tātun

Comparison of (17) and (18) shows that OHG-A's mysterious long-vowel weak preterite plural endings *-tōm, -tōt, -tōn* are identical to the present optative forms of *tō-* 'do' (middle column of (18)). But the *preterite indicative* endings can hardly originate directly as *present optatives* of 'do'. Rather, they must have been reconstituted from the stem *tō-* plus the secondary endings *-m, -t, -n* which are regular for the preterite — although these actually appear with *tō-* only in the optative, because this particular verb happens to have a synchronically irregular preterite that goes back to the I.-E. reduplicated perfect (last column in (18)).[12]

Such a reshaping of the weak preterites could only have been possible when they were transparently analyzable as compounds, which is to say at Stage 1.

Starting from this stage, the analogical change can be reconstructed as follows. The original formation was a compound of a deverbal nominal (perhaps a bound nominal in *-ī*, cognate with the Sanskrit *cvi*-stems, or an instrumental in *-ī*), with the inherited preterite of 'do'. This preterite originally had the stem *ded-*, with short *e* from the IE reduplicating syllable.[13] The compound was regularized by replacing *ded-* (OHG *tet-*) with the regular stem *dō* (OHG *tō-*) and inflecting the whole thing with the normal secondary endings of the past tense.

[11] Hill (2004) considers the long-vowel endings as original and the short endings in the B-dialects as imported by analogy from the strong verbs. He raises some objections to Lühr's analysis, which I think are satisfactorily answered by mine. Hill's own account, like Lühr's, begs for am explanation for why the dialectal distribution of vowel length is identical in the optative and indicative endings, and why the weak preterite paradigms get split by analogical changes. My proposal supplies this missing link here as well.

[12] The preterite of 'do', on the other hand, lengthened its vowel to join the 5th class of strong verbs (OHG *tātun* like *nāmun*). The same thing happened in Gothic, at least as far as we can tell from the forms that show up as weak preterite plural endings: 1.Du. *-dēdu*, 2.Du. *-dēduts*, 1.Pl. *-dēdum*, 2.Pl. *-dēduþ*, 3.Pl. *-dēdun*, all identical with the expected forms of the verb "do". The verb itself was then lost in Gothic, as it was in North Germanic.

[13] The short vowel is attested in 3.Pl. *dedun* in an Alemannic runic inscription from Schretzheim, ca. 600 A.D., Krause-Jankuhn 1966: 299, Lühr 1984.

(19)		*original paradigm*	*analogical paradigm*
	1.Pl.	[[tal-i] [ded-u-m]]	[[[tal-i] [dō]] -m]
	2.Pl.	[[tal-i] [ded-u-þ]]	[[[tal-i] [dō]] -þ]
	3.Pl.	[[tal-i] [ded-u-n]]	[[[tal-i] [dō]] -n]

Inflectional regularization of heads of compounds is familiar from cases like *forgoed*, which has replaced *forwent* in the usage of some people who would not dream of saying **goed*, or French *vous contredisez* (versus simple *dites*).

(20)	*original paradigm*	*analogical paradigm*
	[[for] [went]]	[[[for] [go]] -ed]
	[[contre] [dites]]	[[[contre] [dis]] -ez]

A functionally closer parallel to this double parsing are the Sanskrit verbs compounded with bound nominals in *-ī* (Pāṇini's *cvi*-formations). Pāṇini prescribes the absolutive allomorph *-ya* for them, according to the rule for compound verbs. But sometimes they take the allomorph *-tvā*, which goes on simple roots (Wackernagel-Debrunner 1954: 661), e.g. *mithunībhūya* and *mithunībhūtvā* 'having copulated':

(21)			
	a.	[[mithunī - bhū] ya]	(*-ya* selects a compound)
	b.	[[mithunī] [bhū - tvā]]	(*-tvā* selects a root)

Although the preterite-presents took no linking vowel in their weak preterite, their endings had the same prosodic status as the endings of the other weak preterites, as is clear from the consistent long *-ō-* in the preterite indicative and from the *-ī* in the preterite optative in OHG-A (Birkmann 1987: 135 ff.).

(22) a. Preterite indicative *-ō-*: *wisson, ondon, chondon, dorfton, solton, muoson, wolton, mahton* (Notker), *scolton, getorston, wizzon* (Williram)

b. Preterite optative *-ī*: *scoldii* (Isidor). Notker's *wissi. tohti, ondi, dorfti, solti, getorsti, muosi, wolti, mahti* also establishes *-ī*, for because short *-i* in Notker is reduced to *-e*).

In sum, weak preterites streamlined their plurals by replacing the suppletive past of the verb *tō-* with its regular stem, and inflecting it with the regular past tense endings. The pattern was strong enough to defy the otherwise strong tendency to keep the person-number endings of strong and weak verbs identical.

The reason the leveling was restricted to the plural is probably that the plural, as a marked morphological category *forme fondée*, was more susceptible to analogical remodeling. The phonological reduction in the singular would then be a consequence of its failing to undergo the analogical change, and being left with an opaque morphology, progressing to Stage 3 earlier than the plural.

Why did the same leveling not extend to the strong preterite endings? We now have an answer. Only the weak preterites were synchronically analyzable as compounds whose second part was recognizable as an inflected form of 'do'. Strong preterites were not subject to a parallel analogy because they were (and always had been) single words. Moreover, as single words they could not have sustained such an analogy without contravening the phonological ban on unstressed final long vowels.

2.1.6 Summary

The Old High German data requires syncope before umlaut, both applying to the still unfused prosodic compound structure at Stage 1 of (5). That implies the following chronology for Old High German.

(23) *Old High German:* (1) Syncope, (2) umlaut, (3) fusion.

The analysis has an interesting corollary. In order for syncope to take place after roots ending in geminates, such as /full-i-ta/ → *fulta* 'filled', /brann-i-ta/ → *branta* 'burned', /kuss-i-ta/ → *kusta* 'kissed', and after roots ending in *-t, -d*, such as /sand-i-ta/ → *san-ta* 'sent', /wart-i-ta/ → *war-ta* 'hurt', /haft-i-ta/ → *haf-ta* 'fasten', the output of syncope must have retained a geminate at the relevant point in the derivation in order to satisfy the constraint that a word must be minimally a bimoraic foot. Because word-final consonants don't make weight (they are extrammetrical), the CVC stem in forms like *ful-ta, haf-ta* could not be a prosodic word. In fact, in the second type of case, the geminate is occasionally written, e.g. *santta, haftta* in the *Abrogans* (the Keronian glossary). Syllable-final geminates, on the other hand, are never written, but we can be certain that they existed at one stage of OHG phonology, for they are created by West Germanic gemination. Similarly, the output of syncope in /nemn-i-ta/ 'named', attested in texts both as *nemta* and as *nenta*, must have been **nemnta* at that stage.

Our analysis has a further implies that the earlier a given dialect fused the stem with the past tense light verb (in other words, the sooner it reached Stages 2 and 3 in (5)) , the less likely it is to have leveled the weak preterite on the basis of the verb 'do'.[14] Now we can understand why only OHG-A among West Germanic dialects underwent this leveling. It is just that conservative group of dialects where the strongest phonological evidence for the internal word boundary in weak preterites persisted the longest, allowing them to preserve the weak preterite endings as separate quasi-words recognizably related to the verb 'do' nearly into the beginning of the historical period. When the endings lost their synchronic connection to the verb 'do', they were liable to fuse prosodically with the stem into polysyllabic prosodic words, hence becoming subject to the phonological ban on word-final long vowels in polysyllabic words.

We shall see that the relative chronology of fusion, umlaut, and syncope differs from one branch of Germanic to another, and separates early Germanic (excepting of course Gothic, where they did not take place) into five dialect groups. Most similar to Old High German, unsurprisingly, are the other West Germanic dialects, to which I turn next.

2.2 Old Frisian

With respect to umlaut and syncope, the Old Frisian system shares most features with Old High German but differs in one key respect.

As in Old High German, syncope of *-i-* regularly occurs after heavy syllables in weak preterites. And as in Old High German, there is no general regular syncope of medial vowels, though unstressed vowels sometimes optionally delete next to sonorants (Boutkan 1996: 33).

[14] In North German, the verb 'do' was lost entirely, which predicts early fusion, correctly as we shall see in section 3.

(24) *aldera* ‘parents’, *allera* ‘every’, ‘of all’, *kreftigia* ‘strengthen’, *andema* ‘breath’, *fing(e)ra* ‘of fingers’, *mann(i)ska* ∼ *menn(i)ska* ‘human being’, *biwilligia* ‘to grant’, *ferista, ferosta* ‘first’, *elleva* ‘11’, *hâveding* ‘chief’, *epenia* ‘to open’.

Unlike Old High German, however, the syncopated vowel leaves umlaut behind.[15]

(25) *hêrde* ‘ ‘heard’ *(hêra), lêrde* ‘taught’ *(lêra), reste* ‘rested’ *(resta), sette* ‘put’ *(setta), stêrde* ‘confirmed’ *(stêra).*

Final *-i-* is regularly syncopated after heavy syllables, usually with umlaut. As in Old High German, then, the medial *-i-* of preterites behaves like final *-i-*, and unlike other medial vowels. This accords perfectly with our hypothesis.

(26) *benk* ‘bench’, *brêd* ‘bride’, *dêd* ‘deed’, *drecht* ‘people’, *evêst* ‘envy’ (from **a~~þ~~-unsti-*, OE *æfst*, Vesp.Ps. *evest*, Swedish *avund*), *fek* ‘compartment’, *fest* ‘fist’, *flecht* ‘flight’, *hêd* ‘hide’, *heft* ‘custody’, *jest* ‘guest’, *jef, jeft* ‘gift’, *kleft* ‘farmers’ union’, *nêd* ‘need, force’, *werp* ‘throw’, *wirm* ‘worm’.

In some words, the expected umlauted form varies with an unumlauted form (see(27a)), and there are a the few outright exceptions which have only a back vowel (see (27b)). These may be due to borrowing from Old Saxon, or early transfer from the *-i-* stem class to other stem classes.

(27) a. *fell, fall* ‘fall’, *flesk, flask* ‘flesh’, *kreft, kraft* ‘strength’, *slêk, slei* ‘hit’, *sweng, swang* ‘swing’, *weld, wald* ‘force’, *werd, wird, word* ‘word’.

b. *wel-lust* ‘lechery’, *mûs* ‘mouse’, *thorst* ‘thirst’.

I conclude that Old Frisian underwent final syncope in weak preterites. This amount to saying that syncope in Frisian preceded fusion, as in High German. Where Frisian differs from High German is that umlaut preceded syncope.

(28) *Old Frisian:* (1) Umlaut, (2) syncope, (3) fusion.

2.3 Old Saxon

The Old Saxon pattern is similar to that of Old Frisian, but (as usual in Old Saxon) with some High German features. *-i-* triggers umlaut in weak preterites even when syncopated after heavy syllables:[16]

(29) *antkenda, -un, -um, -i* ‘recognized’ *(antkennian), gibelda* ‘equipped’ *(beldian), felda* ‘felled’ *(fellian), biglêdda* ‘gladden’ *(biglêdian) heftun* ‘tied’ *(heftian), lêrda* ‘taught’ *(lêrian), merda* ‘annoy’ *(merrian), binemda* (< **binemnda*) ‘named’ *(binemnian), giscerpta* ‘sharpened’ *(*scerpian), sencta* ‘sank’ *(senkian), wenda, -e, -un, in* ‘turned’ *(wendian).*

[15] Except, as usual, for the verbs that either lost *-i-* early or never had it, e.g. *sōhte* ‘sought’ *(sēka), santon* ‘they sent’ *(senda), latte* ‘led’ *(lêda).*

[16] Examples from Gallée 1910: §406 A.1, Sehrt 1966, and Köhler 1987: 77-109. As usual, verbs that lost *-i-* early or never had it are apparent exceptions: *sanda, senda* ‘sent’, *(sendian), warhta* ‘made’ *(wirkian).*

Syncope fails to apply in the weak preterites of a number of heavy roots, mostly ending in consonant clusters, e.g. *andwordida* 'answered' (a characteristic of Franconian dialects, Braune-Reiffenstein 2004: §363). Outside of weak preterites, syncope occurs sporadically without any clear-cut phonological conditions (Gallée 1910: 114). Thus, although the pattern is not as clear-cut in Old Saxon as in the other languages, weak preterites still have a noticeably different syncope pattern than other types of words, especially in the older texts (*Heliand, Genesis*, and the Glosses):

(30) *diur(i)đa* 'glory', *mâriđa* 'fame', *seliđa* 'house', *menniski* 'human nature', *craftigo* 'strong', *(sîđ-)wôrige* '(travel-)weary', *(gôd)-willige* 'well-disposed' (weak adjectives), *aldiro/eldiro* 'parent', *eldista* 'oldest' (Glosses), *egiso* 'horror', *engilos* 'angel's'.

I take these data to show that Old Saxon had the same relative chronology of the three processes as Old Frisian, namely with OHG-style pre-fusion syncope in weak preterites, but unlike OHG preceded by umlaut. However, Old Saxon has a greater admixture of High German borrowings.

If umlaut preceded syncope, and syncope preceded fusion, then transitivity yields a prediction: umlaut must have taken effect before fusion. This means that the weak preterite must still have had its internal word boundary at the time of umlaut, which would have blocked umlaut from applying, as shown in (14). Our prediction can be put to a test in those preterite-present verbs which formed weak preterites directly from the root, and these confirm it nicely:

(31) *scoldi, mosti, consti, (gi)dorsti, thorfti, woldi* $\sim$ *weldi(n)* (Gallée 1910: 268-272).

Our theory predicts that their prosodic structure at the time of umlaut was as in (32), where the domain of umlaut is shown by an underbrace.

(32) No umlaut: *$[\underbrace{[scol]}_{\omega}[-\eth-\bar{\imath}]_{\omega}\ ]_{\omega}$ > **scoldī, scoldi* 'should'

In contrast, we expect umlaut in preterite optatives of regular weak verbs, where it is triggered by the preterite formative *-i-* prior to syncope, as in (33a). These work just like the corresponding preterite indicatives (see (33b)).

(33) a. *wendin* 'they would have turned' *(wendian), antkendi* '(s)he would have recognized' *(antkennian)*

b. *wende, wendun* '(s)he/they turned', *antkenda* '(s)he/they

There is however a major discrepancy between Old Frisian and Old Saxon in the application of umlaut before syncopated final *-i-*. Old Frisian has umlaut in the majority of such words, as we saw in (26) , whereas in Old Saxon, the proportions are reversed.

(34) a. Rare type: *flesk* 'flesh', *leng* $\sim$ *lang* 'longer' (Adv.), *men(n)* 'men', *gestseli* $\sim$ *gastseli* 'guest hall' (a compound)

b. Common type: *gast* 'guest', *brūd* 'bride', *nōd* 'need, force'

(Krogh 1996: 177)

Two explanations have been suggested for the Old Saxon data. One is that the umlauted forms in (34a) are residues of original regular umlaut before deleted final *-i*, and that the cases in (34a) are High German borrowings. Another possibility is that the variation seen in (34) arose within Old Saxon by competition between umlaut and syncope, and has been consistently eliminated in the weak preterites by analogy (Krogh 1996: 179). The former view seems preferable because it explains why the Old Saxon non-umlauted words are also found in Old High German, whereas some of the umlauted ones are not. I will therefore adopt it here, though nothing in the larger picture depends on it.

The other signatures of the weak preterite's compound/clitic status that we found in OHG-A are not in evidence in Old Frisian or in Old Saxon, as expected given their generally less conservative morphology.

In sum: Old Frisian, and probably Old Saxon, both umlaut and syncope applied to the unfused weak preterite, as in Old High German, but they underwent umlaut before syncope, unlike Old High German. Old Frisian and Old Saxon share the latter feature with Old English, as we shall see next.

2.4 Old English

In Old English, as in Old Frisian and Old Saxon, umlaut *preceded* syncope of final vowels. There are two independent arguments for this chronology. First heavy *-i* stems which lost *-i* have umlauted front vowels, e.g. *giest* 'guest' *(< *gasti)*, *dǣd* 'deed', *hȳd* 'hide', *ēst* 'favor'.[17] Secondly, placing umlaut before syncope, accounts for the fact that heavy-stem weak preterites were umlauted prior to the loss of the triggering medial *-i-* in Old English. That is, it explains why Old English has no general *Rückumlaut*, unlike Old High German.

We can conclude that medial *-i-* in weak preterites and final *-i* were lost by the same sound change; what that change was remains to be determined. It *may* have been word-final syncope prior to fusion, as in OHG. Or, as far as these data go, it may have been a syncope process that applied both medially and word-finally after heavy syllables, in which case it might as well have followed the fusion of the weak verb stem and ending.

Phonological arguments for late fusion from ordinary weak preterite optatives like those in section 2.1 can't be used in Old English because, if umlaut preceded High Vowel Deletion, then umlaut would in any case have been triggered within the weak preterite stem by the suffix before it was deleted. Therefore all weak preterite forms, including the optative, will have umlauted stems anyway, which means that we cannot tell when they were fused: weak preterites could have lost their *-i-* either by final syncope before fusion, or by medial syncope after fusion. Besides, the conditions on medial syncope in Old English are quite complex and the original distribution has been obscured by massive analogical change.

One clear datum does point to early fusion, however. Old English (Mercian) 3.Sg.Opt. *scylde* vs. 3.Sg.Ind. *sculde* 'should' shows that optative (subjunctive) preterites of preterite-present verbs were umlauted (Sievers-Brunner 1951: 386-7, Hill 2004). If umlaut applied only within a phonological word, and the preterites of preterite-present verbs had the same complex structure as other

[17] Hogg 1992: 230 summarizes the argument. It has been standard doctrine since Sievers; but see Antonsen 2002 for a dissenting view. Hogg also notes that early syncope bled umlaut in first members of compounds, such as *samcucu* 'half-dead'.

weak verbs (as the consilient evidence of all the languages shows), then the weak preterite must have fused prior to umlaut, so that *scylde* at the time of umlaut had the structure (32), as in Old Saxon.

Seemingly at odds with the preterite-presents are the weak preterites of those roots that either never had a linking *-i-* in the past, or lost it *before* umlaut, and therefore (unlike ordinary weak verbs) did have *Rückumlaut* alternations in their paradigms (Sievers-Brunner 1951: 353, Hogg 1992: 136). These have no umlaut in their preterite optatives. Preterites like *sōhte* 'sought', *worhte* 'wrought', *(ge)brohte* 'brought', *(ge)þohte* 'thought', *(ge)þuhte* 'seemed', *(ge)sealde* 'sold, gave', *cwealde* 'killed', *sæde* 'said' function equally as indicatives and as optatives. However, this can be the result of leveling in accord with a regular pattern of Old English according to which the preterite optative stem is identical with the weak (plural) preterite indicative stem. On the contrary assumption that fusion was late and that the lack of umlaut in these preterite optatives is original, it is not so easy to explain how the preterite-present optatives got umlauted.

To summarize: Old English differs from continental West Germanic in having umlaut before syncope, and, probably, fusion before both.

(35) *Old English*: (1) Fusion, (2) umlaut, (3) syncope.

We have established that four heretofore unexplained features of the OHG weak preterites — three apparent phonological anomalies and a puzzling analogical change — are explained by the prosodic compound structure that the weak preterites inherited from their periphrastic origin, and uncovered a chronological split in the relative chronology of umlaut and syncope within West Germanic.

Before proceeding, let us turn to some ideas from recent phonology. They will help make sense of the results that we have so far, and they will be indispensable for the analysis of North Germanic below.

2.5 How syncope is constrained

The restriction of word-final syncope to heavy or polysyllabic stems that we saw in Old High German is pan-Germanic. It was first identified as a word minimality effect by Riad 1992. He pointed out that Germanic feet must have at least two moras, and that words must contain at least a foot, so words must have at least two moras. Hence there are no [CV̆] words, and, because final consonants are weightless (by NON-FINALITY), no [CV̆C] words either.[18] The effect is to block final syncope in disyllables after a light syllable. Stems which are heavy or polysyllabic will satisfy the minimal foot requirement even after deletion of a final vowel.

Riad's constraint-based treatment fits seamlessly into Optimality Theory, which holds that phonological processes are driven by ranked violable constraints defined on output representations. In particular, vowel deletion is governed by constraints on the prosodic form of words:

[18] There was one systematic morphological exception (Riad 1992: 168): preterite singulars of the 5th class of strong verbs are all of the form CV̆C. I will assume the CVC ablaut template overrides the otherwise regular phonological pattern. Such cases are not uncommon: for example, strong past tense forms like *sang, swam* do not undergo the famous Philadephia Tensing rule). Formally, perhaps the weightlessness of final -C (NON-FINALITY) can be restricted to suffixes rather than to verbal roots. Word-final root consonants (unlike other final -C) would then be moraic, allowing *gaf, kuaþ, sat* etc. to constitute bimoraic feet, and thereby possible words.

stress, foot structure, and syllable structure. The conditioning of syncope can be understood as a way of resolving the competing demands of these prosodic constraints (Kiparsky 1998).

FEET have both a lower bound and an upper bound on their size. In the Germanic languages under discussion — as in modern English — the basic metrical unit is the MORAIC TROCHEE, a two-mora unit consisting of either two light syllables or one heavy syllable. The constraint that enforces the moraic trochee is (36a) FOOTBIN_{μ}. As is not uncommon in moraic trochee systems, Light–Heavy feet *can* be formed into feet as a last resort, when the alternative would be a metrically unparsed homeless syllable (this is called RESOLUTION).[19] There is an additional condition that word-final consonants are weightless ("extrametrical"), which corresponds formally to a high (perhaps undominated) ranking of (36b) NONFINALITY.

(36) a. FOOTBIN: A foot must contain at least two moras.

b. NONFINALITY: A word-final consonant is weightless.

If feet must have at least two moras (FOOTBIN), then, since words must contain at least a foot (in order to satisfy the prosodic licensing requirement), it follows that words must be minimally bimoraic; this minimum word length requirement excludes [C$\breve{\text{V}}$] words, and, insofar as final consonants are weightless, also [C$\breve{\text{V}}$C] words. Such a word minimality requirement will block word-final V-deletion (apocope) in disyllables after a *short* syllable, viz. $[\text{C}\breve{\text{V}}\text{CV}]_{\omega} \not\rightarrow [\text{C}\breve{\text{V}}\text{C}]_{\omega}$.

(37) Effect of two-mora foot minimum (parentheses mark final weightless consonants)

a. No final syncope: $[\text{CV.CV}]_{\omega} \not\rightarrow [\text{CV(C)}]_{\omega}$.

b. Final syncope OK: $[\text{CVV.CV}]_{\omega} \rightarrow [\text{CVV(C)}]_{\omega}$.

c. Final syncope OK: $[\text{CV.CV.CV}]_{\omega} \rightarrow [\text{CV.CV(C)}]_{\omega}$.

An example of this prosodic constellation is Finnish. Monosyllabic words may be of the form C$\bar{\text{V}}$C, but C$\breve{\text{V}}$C words are excluded, for they would be monomoraic because final -C is weightless. In certain registers, Finnish final *-i* may be elided, e.g. *olisi* → *olis*, *nousi* → *nous*, *veisi* → *veis*; this option is disallowed precisely in C$\breve{\text{V}}$CV disyllables: *pesi* $\not\rightarrow$ **pes*, *kosi* $\not\rightarrow$ **kos*.

The same constraining effect of foot minimality on final syncope is seen in Germanic, e.g. in the *i -stem* contrast between OHG *wini* and *gast* in (6), and, if our theory is right, also in the in weak preterite contrast between *tuomta* and *zelita* seen in (9).[20]

Syncope is also subject to constraints on SYLLABLES, which typically impose an upper bound on the complexity of the syllable rhyme, or on the number of moras in it. A common restriction of this type, also perceptively discussed for Germanic by Riad 1992, is the prohibition of superheavy (3-mora) syllables.

[19] E.g. in Light-Heavy disyllables, or Light-Heavy-Light trisyllables. For arguments that the Germanic languages have moraic trochees as their basic foot type, and analysis of the various ways in which prosodic structure constrains phonological processes in them, see Riad 1992 and Kiparsky 1998.

[20] Foot minimality can also restrict other processes than final syncope; such effects are also seen in Germanic, but they go beyond the scope of this paper (see Kiparsky 1998).

(38) *μμμ: A syllable rhyme is maximally binary.

Syllable structure constraints can block syncope when it would result in syllable that is too heavy. Unlike foot minimality, whose principal effects are seen in CV̆CV words, constraints on maximum syllable size will kick in medially as well. For example, the requirement that syllables must be monomoraic (CV) blocks any syncope whatever, and the requirement that syllables must have at most two moras blocks syncope after heavy syllables. Schematically, the latter case looks like this:

(39) a. Medial syncope OK: $[\text{CV.CV.CV}]_\omega \rightarrow [\text{CVC.CV}]_\omega$

b. No medial syncope: $[\text{CVV.CV.CV}]_\omega \not\rightarrow [\text{CVVC.CV}]_\omega$

Where word-final consonants are weightless (or "extrametrical"), as they are in Germanic, the effect is subtler. Word-final codas can then be longer than medial ones by exactly one consonant, with vowel deletion in final syllables applying to that extent more freely than medial vowel deletion.

(40) Effect of two-mora syllable maximum on deletion in final syllables, assuming extrametrical -C (in parentheses):

a. Syncope OK: $[\text{CV.CVC}]_\omega \rightarrow [\text{CVC(C)}]_\omega$

b. No syncope: $[\text{CVV.CV}]_\omega \not\rightarrow [\text{CVVC(CV)}]_\omega$, $[\text{CVC.CVC}]_\omega \not\rightarrow [\text{CVCC(C)}]_\omega$

An example is Cairo Arabic, where *μμμ prohibits words such as ***kalbna***, ***baabna***, and blocks the syncope process seen in *ᶜi.di.la* → *ᶜid.la* 'straight' (fem.) in words like *yik.ti.bu* ↛ ***yikt.bu*** 'they write'. As in Germanic, word-final consonants are weightless, so words of the type *baab*, *kalb* are admissible because they have only two moras. But, by the same token, words like ***bab***, ***kal*** are not admissible, because they have only one mora.[21] Under these circumstances, syncope is again blocked.

(41) No syncope: $[\text{CV.CV}]_\omega \not\rightarrow [\text{CV(C)}]_\omega$

In a nutshell: minimum foot size and maximum syllable size requirements yield two partially (but only partially) contradictory syncope patterns: in one pattern, a bimoraic foot minimum blocks word-final syncope after *light* monosyllabic stems, in the other, a prohibition of superheavy syllables blocks syncope medially after *heavy* and polysyllabic stems.

(42) $\text{CVCV}_\omega \not\rightarrow \text{CVC}_\omega$

[21] Similar regularities can arise morphologically through the stabilization of variants from analogical change. An example is the linking *-i-* which comes between a root and a following consonantal inflectional ending in the Sanskrit perfect. In the Rigveda, this *-i-* appears after roots ending in consonants only if they are heavy, i.e. if they have a long vowel or end in two consonants, e.g. *ūcimá* 'spoke', *paptimá* 'flew' vs. *jaganmá* 'went' (Whitney 1889:287). The generalization is that three-mora syllables are avoided at this morphological boundary (although there is no *general* ban of superheavy syllables in Sanskrit). For similar reasons, Najdi Arabic inserts *-i-* after a heavy syllable before a consonantal suffix.

a. …CVCCCV… $\not\rightarrow$ …CVCCCV…, …C$\bar{V}$VCV… $\not\rightarrow$…C$\bar{V}$C…

Both these patterns are typologically well attested. A language can have both together if the respective constraints are highly ranked. We have seen that West Germanic has the former pattern. I shall argue below that early North Germanic, like Arabic, was subject to both constraints.

According to the discussion of continental West Germanic in section 2.1, *-i-* in preterites of class 1 weak verbs was lost at a time when the stem of weak preterites was still a phonological word in its own right; hence *-i-* in these forms was subject to the constraints on final syncope. There is no need to postulate early medial syncope, unattested outside of weak preterites. The linking *-i-* in weak preterites was deleted after heavy and polysyllabic stems, but not in monosyllabic light stems, because of FOOTBIN. The reason polysyllabic stems pattern with the heavy monosyllabic stems is that they still satisfy FOOTBIN after syncope, e.g. [[mahal-i]$_\omega$[ðeð$\bar{o}$m]$_\omega$]$_\omega$> [[mahal]$_\omega$ta]$_\omega$ 'magnified'.

Umlaut could take effect only after light monosyllables because its trigger was lost in heavy and polysyllabic stems. Subsequently, the weak preterites undergo fusion, which is to say they lose their internal word boundaries and become simple words: [zeli-ta]$_\omega$ 'told', [h$\bar{o}$r-ta]$_\omega$, [mahal-ta]$_\omega$.

3 North Germanic

3.1 The two-mora syllable maximum

Early runic inscriptions (up to the 6th century) consistently preserve the unstressed vowels of final syllables (*þaliR, horna, dagaR, sitiR),* and the medial vowel in weak preterites *(satido, tawido, tawide, faihido, talgidai, raisido-kA)* (Krause 1971: 123). In the language of these inscriptions, the weak preterite is clearly fused already. The earliness of fusion is also shown by the fact that the preterite optative regularly umlauts in Old Icelandic (Noreen 1923: 363).[22]

Early fusion entails that North Germanic, unlike continental Germanic, lost the medial vowel in weak preterites when they were already single words, and therefore that the deletion was governed by the constraints on *medial* syncope — not by the constraints on final syncope, as in West Germanic. This establishes the order (1) fusion, (2) syncope.

Medial syncope is a process on which FOOTBIN has little detectable effect. It is mainly controlled by syllable structure. What are the relevant North Germanic syllable structure constraints?

Early North Germanic, unlike the Old Norse of later written texts, was subject to the prohibition that a syllable could contain no more than two moras — the three-mora prohibition (38) *μμμ (Riad 1992, Kiparsky 1998). The *μμμ constraint limited syllables to maximally two moras (CVC, C$\bar{V}$). Final consonants were weightless, so monosyllabic words could be of the form CVCC or C$\bar{V}$C.

(43)	runic	Old Norse	
	*ās*u*gīsalas*	*Ásgīsls*	(compound PN)
	wanðarāðas	*Vandrāþs*	(compound PN)

[22]The optatives of preterite-presents mostly do not umlaut in Old Icelandic. This is probably due to analogical leveling, for the oldest Icelandic MSS do have instances of umlauted optatives like *møne, myne, -i* (Stockholm Homilies) and *skyli* is attested twice even in the later *Möðruvallabók* (Birkmann 1987: 232).

I further assume that the bimoraic foot minimum constraint in FOOTBIN was also dominant in the earliest Old Norse, as first suggested by Riad 1992. Coupled with the obligatory weightlessness of final consonants, this constraint would have excluded monosyllabic CVC words (with short vowels and non-geminate -C), such as **mak, *ris, *tor*. Of course they existed in pronouns and other non-lexical vocabulary, but we can assume that at this stage there were as yet no lexical words (content words) of this form, excepting only the 5th class preterite singulars mentioned in fn. 18, where the morphological strong verb template dominates the prosodic constraint.

Independently of the direct but hard to interpret evidence from runic writing, the restrictive syllable structure of early North Germanic is revealed by phonological processes in North Germanic. These processes conspired to avoid 3-mora syllables; some of them by actively eliminating them, others by failing to take effect whenever they would have created them.

Active elimination of 3-mora syllables is achieved by deletion of *-j-*, by vowel shortening, and by the insertion of anaptyctic vowels.

In North Germanic, /j/ was deleted after heavy stems, and retained after light stems, where it formed a two-mora syllable.[23]

(44) a. Heavy stems: **hirð.joo* > NGmc **hir.ðo* (ON *hirþa*)

b. Light stems: **nið.joo* > NGmc **niþ.jo* (ON *niþja*).

West Germanic, tolerating 3-mora syllables, preserves *-j-* in the corresponding cases, e.g. OHG *hirtio* [hirt.jo].

Synchronically, I assume that the input was */hirð-joo/ and that the output lexical representation was */hirðijoo/, with vocalized [-ij-] by Sievers' Law. The form *[hir.ði.joo] would have undergone medial syncope, with the resulting *[hirð.joo] repaired to *[hir.ðoo]. The intermediate *[hirð.joo] is nowhere attested; evidently it was only a "virtual" stage in North Germanic and was immediately accommodated to the two-mora syllable maximum, by assumption a constraint on both lexical and postlexical words. To put the matter another way: the availability of *-j-*deletion as a "repair" strategy allowed early syncope after heavy syllables in forms like *[hir.ði.joo], even at a stage where *μμμ remained in force.

In North Germanic, 3-mora syllables were also eliminated by vowel shortening, as illustrated by these Old Icelandic examples:

(45) a. **lītl-er* > *litler* 'littler' (cf. *lītell* 'little')

b. **mīn-r* > *minn* 'mine' (Nom.Sg.Masc.), cf. Fem. *mīn* (remember that final -C does not count)

The runic material has numerous examples of vowel epenthesis (anaptyxis) serving to break up consonant clusters so as to avoid three-mora syllables.

(46) a. Kragehul *Asugisalas* (< **-gīs.las*).

[23]For an explicit OT treatment of these syllable-and foot-driven processes in compararative Germanic perspective see Kiparsky 1998.

b. Tune *worahto* (< **worh.to*); cf. Tjurkö *wurte*, By *orte*, Sölvesborg *urti*, where the same constraint is implemented by deletion, as in literary Old Norse.

c. Istaby *wulafR*, Stentoften *wolafR* (*wulfR* would have a three-mora syllable, since *-R* is weightless).

Finally, the avoidance of three-mora syllables explains why West Germanic consonant gemination did not apply in North Germanic.

(47) a. West Germanic *[tal.jan] > *[tell.jan] (OHG *zellen*)

b. North Germanic *[tal.jan] > *[tel.jan] (ON *telja*)

3.2 The three stages of syncope

3.2.1 The output of syncope is constrained by syllable structure

Kock claimed that syncope in Old Norse began after heavy syllables and later applied after light syllables. Over a century of diligent search for runic evidence to substantiate this chronology has drawn a blank. Birkmann's verdict (1995), based on a thorough sifting of the material, is that there is neither any support for it nor against it:

> Nach kurzer Sprechsilbe (auf Kurzvokal auslautend) wäre theoretisch eine weniger starke Tendenz zur Abschwächung vorstellbar, und somit ein zeitlich verzögerter Schwund der unbetonten Endsilbenvokale (entsprechend dem traditionallen Ansatz nach kurzer Stammsilbe). Dafür fehlen allerdings nach dem oben Dargelegten im späturnord. Runenmaterial die Belege... So muss die Frage, ob nach kurzer Sprechsilbe später synkopiert wurde als nach langer aus Mangel an Beweisen offen bleiben. (p. 184-5)

If I am right about how syncope works, then these efforts are doomed to failure because they are looking for the wrong thing. The weight of the preceding syllable yields too crude a classification of syncope contexts to be of much use for dating the progress of the change. It ignores other contextual factors which are implied by *μμμ and FOOTBIN, and which are demonstrably relevant to syncope. And it ignores the interplay of syncope with other phonological processes which repair the output to conform to the prosodic constraints. Whether syncope can apply in satisfaction of *μμμ is not determined just by its input context, but also by how it interacts with three other processes in particular: with deletion of *j, w, h*, with contraction of vowels in hiatus, and (especially in the Blekinge region of southeastern Sweden) with insertion of a svarabhakti vowel. All of these processes are active independently of syncope in other contexts. *j*- and *w*-deletion apply in word-initial position and medially before homorganic vowels, *h*-deletion applies in complex clusters, e.g. **worhte* > **worte* > *orte* 'wrought', and svarabhakti applies (precisely in Blekinge!) in CR- clusters, e.g. *bAriutiþ* 'breaks' (Stentoften), *wAritu* 'I write', *HArabAnaR* (Järsberg), *warAit* 'wrote' (Istaby), *Asugisalas, hagala* 'hail' (Kragehul). These same processes also collaborate with syncope, enabling it to apply in certain contexts where the two-mora syllable maximum would

otherwise preclude it.[24] In terms of the Stratal OT model that we will introduce below, this implies that the processes are active at the same stratum of the phonology as syncope.

In short, "when did syncope apply after heavy syllables, and when did it apply after light syllables?" is the wrong question. The right question is: how was syncope constrained by syllable and foot structure? Up to what point did it obey *μμμ, and up to what point did it obey FOOTBIN and NONFINALITY? This way of asking the question leads to a completely new solution.

The basis of the solution is a new periodization of runic Old Norse into three syncope stages. STAGE 1 begins about 550 A.D. and involves syncope under the strict control of *μμμ and the two-mora word minimum, with final consonants weightless (not counting as moraic). At STAGE 2, beginning about 600, Old Norse syllable structure changes radically and syncope becomes capable of creating three-mora syllables of the form CVCC and C$\bar{V}$C. About two centuries later (800 or a little later), the prosodic repertoire is expanded again and STAGE 3 of syncope begins, where C$\breve{V}$C words, up to then prohibited by the bimoraic minimal word constraint and the weightlessness of final -C, become admissible. Since C$\breve{V}$ words (such as **sŭ*) remained impossible, the bimoraic minimal word constraint must have remained in force. The innovation, then, was that final -C became capable of bearing weight, and thus of supplying the requisite second mora in words like *sŭn*.

The proposed chronology of pre-syncope Stage 0 and Stages 1-3 of syncope differs from the standardly recognized two-stage division into early runic and Viking age Scandinavian mainly in that it replaces the so-called "transitional" period with its mix of early runic and Viking age features[25] by the succession of two well-defined and internally coherent prosodic structures and syncope patterns, Stage 1 (550-600) and Stage 2 (600-800).

The pre-syncope Stage 0 and Stages 1-3 of syncope are documented below. The inscriptions are cited and dated according to Krause-Jankuhn 1966 (KJ) and Krause 1971 (K), to which page references are given. Birkmann 1995 (B) tends to date them a little earlier, as indicated below, but without significantly changing the overall relative chronology. For later inscriptions from Stage 3, which are not covered by Krause, I follow Birkmann and Nielsen 2000 (N).

3.2.2 Stage 0

Syncope did not begin until about 550 A.D. Runic inscriptions dated before about 550 retain medial and final vowels in essentially their Proto-Nordic form. Here I cite only examples from 500-550 in order to document the final phase of Stage 0; all the earlier inscriptions of course consistently show lack of syncope as well.

(48) STAGE 0 (—550 A.D.): no syncope.

a. Medial syllables:

1. *Wiwila* [wīwila] (Veblungsnes, ca. 550, KJ 126; or ca. 500, K 172).

[24] Positing separate sound changes to do the work of syncope combined with deletion, contraction, and epenthesis would be an unnecessary complication. It would also miss the generalization that each of the other processes is already required in the phonology at this stage of the language. In any case, even under this alternative the point remains that until about 600 A.D. Old Norse phonology obeys *μμμ and the two-mora word minimum constraint based on FOOTBIN.

[25] Birkmann 1995, Barnes 1998, Nielsen 2000: 255, with fn. 26.

2. *aluko* (?) (Førde, 550?, KJ 109).
3. *raisido-kA* 'I raised' (Ellestad, dating disputed: 500-550 according to Antonsen 2002: 300; an archaizing inscription from ca. 800 according to KJ 132).

b. Final syllables:

1. *WidugastiR* (Sunde, ca. 500, KJ 198).
2. *SaligastiR, ÞaliR* (Berga, ca. 500, KJ 193).
3. *haukoþuR* 'hawker' ('hawkeye') (Vånga, ca. 500, KJ 147).
4. *erilaR* 'priest' (?), *wilagaR* 'cunning' (Lindholm, early 6th c., KJ 69).
5. *Asugisalas, erilaR* (Kragehul, early 6th c., KJ 64).
6. *HarabanaR, erilaR, waritu* [warītu] 'I write' (Järsberg, 500-550, KJ 156).
7. *irilar, Wiwila* [wīwila] (Veblungsnes, ca. 550, KJ 126; or ca. 500, K 172).
8. *laiþigaR* (Møgedal, 500-550, KJ 195).
9. *hiwigaR, -winaR* (Årstad, ca. 550, KJ 130).
10. *SigimaraR* [-māraR] (Ellestad).

3.2.3 Stage 1

At STAGE 1 from 550 to 600 A.D. syncope applies, but only where *μμμ and FOOTBIN permit. Final *-C* is weightless, that is, it does not make a mora. The two-mora syllable maximum and the two-mora word minimum are never transgressed. This is achieved not just "passively" by blocking of syncope, but, where possible also "actively" by repairing the output of syncope with glide deletion, contraction, or epenthesis, as the case may be. The point is that syncope applies both after light syllables and after heavy syllables, but *only when the output conforms to* *μμμ *and* FOOTBIN. Thus, in the derivations below, the parenthesized intermediate representations were probably never pronounced as such. They were virtual forms, repaired directly by one of these processes. Starred forms are reconstructed phonological forms, unstarred forms are transliterations of the actual runic word, with its assumed pronunciation indicated in square brackets where necessary.

(49) STAGE 1, 550-600: syncope where *μμμ and FOOTBIN permit; final *-C* weightless.

a. Syncope in medial syllables: two-mora maximum allows -V̄, -VC, but not -V̄C or -VCC.

1. **satidō* > *sate* [satte] (Gummarp, ca. 600, KJ 205; B 141).
2. Nom.Sg. **hrōrijaR* (> **hrōrjaR*) > *HrōreR* (By, 550-600, KJ 158; ca. 500, B 176).
3. 3.Sg.Opt. **wǣtijē* (> **wātjē*) > *wate* [wātē] 'wet!' (Strøm, ca. 600, KJ 110). However, it may be a 2.Sg. Imperative from *wǣtǣ* (Antonsen 2002: 159).
4. **wiwijon* > *wiwjo* (Eikeland, ca. 600, KJ 47; ca. 550 on archeological grounds according to B 84).
5. **hawiþu* > *haþu* [hāþu] 'mowing' (Strøm, ca. 600, KJ 110; 550-600, B 176). But see B 176, Antonsen 2002: 160 for divergent interpretations of this word.

6. **wulfijaR* (> **wulfjaR*) > **wulafjaR* > *-wulafiR* (Istaby, ca. 625, KJ 218; ca. 590, B 142).[26]

b. Syncope in final syllables: two-mora maximum plus weightless final -C. Allows final -V̄, -V̄(C), -VC(C), disallows -V̄C(C) or -VCC(C).

1. **laþōþu* > *laþōþ* 'invitation' (Acc.Sg) (Halskov, date?, Krause 1971: 149).
2. 1.Sg.Pres. **fāhi(j)u* > *fahi* [fāhi] 'I depict' (Noleby, late 6th c., KJ 148, B 176; RAsum, 550-600, KJ 267).
3. **wiwaR* > *wir* [wīr] (Eikeland, ca. 600, KJ 47; ca. 550 on archeological grounds according to B 84).
4. **wulfaR* (> **wulfR*) > *-wolafR* (Stentoften, older part of the inscription, ca. 600?, KJ 209; ca. 590, B 142).[27]
5. **wulfaR* (> **wulfR*) *-wulafR* (Istaby, ca. 625, KJ 218, ca. 590, B 142).
6. **æftiR* (> **æftR*) > *AfatR* 'after' (Istaby).

c. The bimoraic foot minimum blocks syncope in CV̆CV words (including as parts of compounds).

1. *alu* (Kinneve, late 6th c., KJ 114, Körlin, late 6th c., KJ 105).
2. *-ekA* 'I' (Ellestad)
3. *Hari-, Haþu...* (Istaby, Stentoften).

d. Where glide deletion and epenthesis are inapplicable, the bimoraic syllable maximum blocks medial syncope after heavy syllables.

1. *HrōraR* (By, 550-600, KJ 158).
2. *fahide* [fāhide] 'depicted' (Halskov).

Phonological analyses typically ignore the anaptyctic vowels in *-wolafR* and the like for purposes of determining syllable weight. This is a consequence of the view that the applicability of syncope is determined solely by the input context. On our view, the applicability of syncope is rather determined by the resulting output context. From that perspective, it is necessary to take them into account, for they obviously serve to simplify syllable structure, in particular to eliminate forbidden superheavy syllables and to break up certain consonant clusters. If they were not relevant to syllable weight, their distribution would be difficult to understand. Accordingly, I assume that the rune carver who wrote e.g. *AfatR* and *-wolafR* actually pronounced these words with two syllables. Indeed, I assume that the very possibility of this pronunciation is what licensed the early syncope that these words underwent.

Taking epenthesis into account has an interesting consequence. Syncope actually does not reduce the number of syllables in these words. So syncope, in these words at least, can't be driven

[26] Krause's dating of this particular inscription is based entirely on linguistic criteria, including syncope, rather than on runological or archeological criteria. In fact, it presupposes the traditional chronology of sound changes which is under question here. The present treatment would suggest a slightly earlier date, one more in line with Birkmann's.

[27] Occurs as the second part of two compound names, both in the final "curse" portion of the inscription, which according to KJ 214 is linguistically earlier than the rest of the inscription, which he dates to 650. So we can suppose this portion represents the language of Stage 1, from 600 or earlier.

just by the constraint *σ, which requires the number of syllables to be minimized. The input and output are tied on this constraint. Rather, the prosodic advantage of syncopated *afatR* and *wolafR* is that they consist of a single foot, a resolved moraic trochee, while *aftaR* and *wolfaR* consist of a foot plus a syllable:

(50) a. Before syncope: $[af]_{\phi}[ta]_{\sigma}$(R), $[wol]_{\phi}[fa]_{\sigma}$(R)

b. After syncope: $[a.fat]_{\phi}$(R), $[wo.laf]_{\phi}$(R)

Thus, in cases where *σ does not decide, it seems that syncope is driven by the STRICT LAYERING constraint.

In the contexts where syncope is allowed, there are some residual examples of retained vowels in final position after heavy syllables in this period: *hali* [halli] 'stone' (Acc.Sc), *horna* 'horn' (Strøm), *writu* [wrītu] 'I write' (Eikeland), and perhaps *laþodu* [laþōdu] (Trollhättan, date uncertain KJ 266). Some of this retention in final position may represent the kind of variation expected in an ongoing sound change. Some of it might also be due to analogical leveling, since both heavy and light disyllabic stems would have, according to my proposal, undergone *lautgesetzlich* syncope in some case forms but not in others, depending on the case ending.

3.2.4 Stage 2

Around 600, the *μμμ prohibition is "repealed". Syncope from now on takes effect even where it produces superheavy syllables. The two-mora word minimum remains inviolable until about 800. I will refer to the period 600-800 as STAGE 2.

(51) STAGE 2, 600-800: syncope no longer subject to *μμμ, but remains subject to FOOTBIN and weightlessness of *-C*.

a. First instances of new extended syncope, producing final -V̄C(C) and -VCC(C) (trimoraic syllables, plus weightless -C).

1. **haƀukaR* > **haukaR* > *-haukR* 'hawk', second part of compound name (Vallentuna, before 650; perhaps ca. 600, B 91). Not an unambiguous case of -V̄CC because the stem could conceivably still be disyllabic *ha.wukR*.
2. **hrōþu-waldaR* > *RhoaltR* (Vatn, 700 or earlier, KJ 152, B 176). The first part **hrōþu-* would have syncopated at Stage 1 already.
3. **taitaR* > *TaitR* (Tveito, 7th c. or later, KJ 202, B 176).
4. **brȳtir* > *bArutR* [brȳtR] 'breaks', **lausaR* > *-lausR* 'loose', **haidiR* > *haidR* 'brightness' (Björketorp, ca. 675, KJ 217; ca. 590, B 142).
5. **fiskaR* > *fiskR* 'fish', **mennaR* > *manR* [mennR] 'men' (Eggja, ca. 700, KJ 227; ca. 650, B 114).
6. **uddaR* > *UdR* [uddR], (Roes, ca. 750, KJ 235).
7. **wōþinaR* > *Uþin* [ūþinn], **unninR* > *unin* [unninn] (Ribe, before 750, B 313; ca. 720, Grønvik 1999).
8. **wulfas* > *-wulfs* 'wolf's' (Rävsal, ca. 750, KJ 184; B 334 however dates it to the 9th century, in which case it would belong in the next group, Stage 3 below).

b. More examples from this period of the earlier type of syncope which began at Stage 1.
    1. **sunuR* > *sunR* ‘son’ (Sparlösa, before 800? B 247). (Unfortunately there are no examples from Stage 1 of inflected *-i, -u* stems, light or heavy, with or without syncope!).
    2. **staþiR* > *statR* [staþR] ‘stands’ (Flemløse, ca. 800, B 346).
    3. **niþjaR* (> **niþiR*) > *niþR* ‘offspring’, *þiaurikR* [þio:ðri:kR], **fatilaþaR* > *fatlaþR* ‘bound’ (Rök, 800-850, B 314).
    4. **tīwaR* > *tīuR (yiur)* ‘Tyr’ (Ribe).
    5. **staina* > *stain* ‘stone’ (Acc.) (Eggja, K 93).
    6. **nakuþano* > *nakþan* ‘bare’, **foglaR* > *fokl* ‘bird’, **mawiđe* > *mađe* [*mā̄đe] (Eggja, KJ 227, K 143, B 160).
    7. **nawihlewa* > *nAhli* [nā̄hlē̄] ‘death-protection’ (Strand, 650-700, KJ 49).
    8. **spahu* > *sba* [spā̄] ‘prophesy’ (Björketorp, KJ 214 ff., B 120 ff.).

c. Still no syncope in CV̆CV words (including as parts of compounds).
    1. *sunu* ‘son’ (Dat.) (Sölvesborg, 750-800, N 100; Helnæs, Rök, 800-850; cf. B 222, 345, 291)
    2. *alu* (Setre, 7th c.. KJ 114)
    3. *kuþumut* [guþumund] (Helnæs, B 345)

At Stage 2, medial syncope seems to have gone to completion, but there are still some unsyncopated *final* syllables: *wiltiR* (Eggja), *Airikis*, *maguR* ‘offspring’ (Sparlösa), *HeldaR* (Tjurkö, KJ 173), *sitiR* ‘sits’, *garuR* ‘bold’, *tigir* ‘20’ (Rök). B 178, 313 suggests that some of these cases of non-syncope are only apparent and that the vowel is actually epenthetic (svarabhakti), which he points out must be assumed anyway for the Rök stone’s *uintur* [wintr] and the Ribe skullbone’s *ulfuR* (before 750), indicating merger of *-r* and *-R* by this time.

3.2.5 Stage 3

After 800, syncope is further generalized and reaches its maximal scope, due to NONFINALITY becoming inactive. Although the bimoraic word minimum restriction remains in force as before (blocking CV̆ words, among other effects) it no longer inhibits syncope because final consonants can now make weight (i.e. count as a moraic). Below I show only unambiguous instances of CV̆C words arising from this extension,

(52) STAGE 3, after 800: full syncope, unconstrained by μμμ or FOOTBIN.

a. *ut:staþ:niþ* (compound, Acc.Sg.) [niþ] ‘offspring’, [staþ] ‘settlement’ (Gimsøy, early 9th c., B 324).

b. *sun* ‘son’ (Acc.Sg.) (Rønninge, Tryggevælde, ca. 900, Nielsen 2000: 98; Mejlby, Haddeby, 10th c.).

c. *ver* ‘man’ (Acc.Sg.) (Tryggevælde, Glavendrup, ca. 900).

Now we come to perhaps the most widely debated topics in Germanic phonology: the phonologization of umlaut vowels, and interaction of syncope and umlaut in Old Norse. In order to get a handle on these processes, we will have to make another detour into phonological theory.

4 How the umlaut vowels became phonemic

4.1 The structuralist theory of phonologization

The structuralist understanding of phonologization is that conditioned allophones become phonemes when their conditioning environment is eliminated by sound change. It was presented and illustrated with OHG umlaut by Twaddell (1938), and six years earlier in an article in Finnish on synchronic and historical structural phonology by V. Kiparsky (1932), fresh from a visit to Prague where the new theory was just then taking shape.[28] Kiparsky and Twaddell argued that the umlaut vowels became distinctive when the *i* or *j* that conditioned them was reduced or deleted, at which point lexical representations were restructured with the former allophonic variants as phonemes.

(53) a. Old High German:

- Nom.Pl. /huot-i/ → *hüeti* 'hats, helmets'
- Dat.Sg. /huot-e/ → *huote*

b. Middle High German:

- Sound change: *hüeti* > *hüete*
- Restructuring: /huot-i/ > /hüet-e/

Although this mechanism of phonologization, which later came to be called SECONDARY SPLIT, has become enshrined in the textbooks, there remains a nagging question: when the conditioning environment goes away (by reduction of *-i* to *-e* or to *ə*, in this case), why does its effect remain?[29]

The problem of phonologization exposes the impossibility of pure structuralism. Two solutions have been proposed. In a paradoxical marriage of synchronic structuralism to diachronic neogrammarianism, Saussure and Bloomfield located sound change outside of the linguistic system that it is destined to transform. More recently, the opposite move of enriching the phonology with phonetic information has gained popularity. It abandons the original concept of a phoneme as a contrastive entity and posits that phonemes-to-be somehow get phonologized *before* they become contrastive through the loss of the conditioning factor. I will take up these solutions in turn and argue for a version of the latter, embedded in the Stratal OT framework.

Let us refer to the sharp segregation of historical change from synchronic structure as SAUSSURE'S FIREWALL. It holds that everything in grammar is interrelated as a system, but sound change has no access to that system. Blindly and structure-independently, it alters the material implementation of speech. The abstract synchronic system, characterized by networks of relations and systems of constraints, is affected only indirectly. The synchronic constraints in the mind of the speaker and the historical processes that modify the articulation of speech are formally and ontologically distinct. Constraints are GENERAL (transparent, or inviolable, in current terminology),

[28] Kiparsky's account is actually superior to Twaddell's in that it avoids the latter's misplaced faith in the phonemic character of OHG orthography. Kiparsky's academic mentors eventually managed to dissuade the young graduate student from continuing his forays into phonological theory and other such modish nonsense, in the interests of his career.

[29] Two quotes from the umlaut literature: "Why do allophones sometimes remain and other times revert?" (King 1971: 4). "Why did the front vowels not become back again, why did the frontness stay, once the influence of /i j/ was removed?" (Liberman 1991: 126).

whereas processes are ACCIDENTAL and PARTICULAR. Constraints are PRECARIOUS (they could be overturned by the next change), while processes are IMPERATIVE (sound change is exceptionless).

As phonetic processes, umlaut and reduction/syncope altered the physical aspect of speech, and had very different effects on the system. The structural reflex of umlaut was the constraint "no back vowels before *i*". Vowel reduction and subsequent syncope had no *phonetic* repercussions on the umlaut vowels, but an all the more drastic impact on their *phonological* status: it caused them to be reanalyzed as distinct phonemes. The new phonetic givens lead to a restructured phonological system with new phonemes /ü/, /ö/ and a new constraint 'no unstressed full vowels". The site of phonemic contrast has been relocated one syllable to the left.

This is a consistent theory of sound change, but the dualist ontology of Saussure's Firewall is a heavy price to pay. It excludes all structural explanations for sound changes and for constraints on sound change of the sort pioneered by Jakobson and since pursued in different ways by Martinet, Labov and others, and, still differently, in generative and OT work. In particular, it makes inexplicable the fact that sound change never subverts phonological universals.

The theory also faces some purely descriptive problems. The most obvious of these is the fact that the predicted secondary split sometimes fails to occur. Instead, the conditioned allophones just disappear. For example, vowel fronting in various dialects of English (e.g. in *calf, goat, cough*), and vowel backing *(girl,* dialectally in *kit)* usually don't produce contrasts between front and back *k* such as structuralist doctrine predicts should arise (an exception is the Jamaican English contrast *cat* [k^{y}at] vs. *cot* [kat] or [kɒt], Wells 1982: 569). Commenting on a proposal that umlaut vowels disappeared in Scandinavian when the triggering front vowels were syncopated, Benediktsson (1982: 9) states: "The principle that phonetic variants, in consequence of the conditioning factors, may 'revert to the neutral starting-point', as Skomedal formulates it . . . , though perhaps consistent with generative theory, seems hardly compatible with those of structural phonology; at any rate, if it is accepted, the principle of phonemicization is then reduced to an ad-hoc postulate, of little or no explanatory value."

Such cases were discussed under the heading of "rule insertion" in generative theorizing on sound change (King 1973). Another type of rule insertion, also problematic for the structuralist account of secondary split, as well as for the theory espoused by Blevins 2004, is that a sound change can interact with, and be constrained by, existing phonological processes and constraints in the language. King notes that Old English syncope of unstressed *e* in words like *bindest* 'you bind' and *bidest* 'you ask' feeds the previously existing voicing assimilation rule, so that the outcome is *bintst, bitst*. Saussure's Firewall here predicts that syncope should extend the voicing opposition to what was until then a neutralizing assimilation environment, creating a contrast between previously existing assimilated clusters such as *-ts-* and new clusters from syncope such as **-ds-*. This is certainly a possible outcome, but it is not what happened in Old English; there is no reason to believe that clusters such as **-ds-* ever existed, even immediately after syncope.

The third problem is that sound changes can be *blocked* by existing synchronic constraints. For example, syncope can fail to apply just in those cases where it would create a prohibited stress configuration (e.g. a lapse or clash), or a prohibited syllable structure or foot structure, as we saw in section 2.5. In English, the variable pre-sonorant syncope in words like *generative* is inapplicable before a stressed syllable, as in *generate (*gen'rate)*, where it would produce back-to-back stresses,

which are disfavored in English. Technically, such conditions on sound changes can be specified as conditioning factors, but only at the cost of a loss of the generalization that the conditioning factors are manifestations of active phonological constraints of the language.

The first two types of problematic cases are the historical analogs of the two types of transparent rule interaction in synchronic phonology: vowel backing bleeds *k*-fronting, and syncope feeds voicing assimilation. The third type of problematic case also involves transparent interaction, in the sense that sound change avoids creating surface exceptions to a constraint that is operative in the language.

In short, sound changes can interact transparently with existing processes. Such transparent interactions can involve feeding or bleeding by the sound change, or blocking of the sound change by a constraint. Alongside such transparent interactions, sound change can also result in opacity, which in terms of change means phonologization and the creation of new contrasts. Structuralist historical phonology has privileged the latter scenario to the point of all but ignoring the well-documented possibility of transparent interaction.

Post-structuralist theories which relate historical and synchronic phonology have been unable either to replicate Saussure's Firewall without some extrinsic stipulation, or to derive the generalization that it is intended to capture in some other way. Classical generative grammar's unification was accomplished by generalizing the processual approach and modeling sound change as the addition of rules. The question then arose where they are added. Obviously rules cannot be added anywhere, but saying that they are added to the end of the grammar is both stipulative and fails to do justice to the cases of "rule insertion".

King (1971) argued that sound changes interact transparently only with "phonetic rules" — the "trivial case" of rule insertion, as he called it. His observation has held up well; the "non-trivial" cases have been fairly convincingly explained away (see most recently Jasanoff 2003). Let us assume that the phonetic rules of King's generalization can be equated with postlexical rules. We can then rephrase his generalization like this:

(54) a. SECONDARY SPLIT: Sound changes render lexical processes opaque.

b. BLOCKING AND "RULE INSERTION": Sound changes interact transparently with postlexical processes.

4.2 Phonologization: the Stratal OT approach

How are these issues addressed in constraint-based theories such as OT, which eliminate processes in favor of constraints, and model sound change as the promotion of markedness constraints? Here it is important to distinguish parallel and stratal versions of OT. As we shall see, the generalizations in (54) are predicted by Stratal OT. According to this theory, constraints interact transparently within a level. Promotion of a postlexical constraint will therefore lead to blocking and rule insertion effects. Blocking arises when the promoted postlexical constraint is dominated within the postlexical phonology by an antagonistic constraint (e.g. syncope by a restriction on syllable structure). "Rule insertion" (a misnomer in this framework, of course) arises when the promoted postlexical constraint winnows away candidates that would otherwise emerge as winners by the lower-ranking postlexical constraints.

Secondary split, on the other hand, arises because constraints do not interact transparently with constraints at earlier levels. It is the masking of a lexical process by a postlexical one, that is, by the sound change qua promoted markedness constraint.

Before going into the details, let us emphasize that this solution is not available in parallel OT. As far as I can see, parallel OT actually has no coherent characterization of secondary split, for reasons which are homologous to its failure to deal with opacity. To see why, consider a bare-bones OT constraint system for the pre- and post-phonologization stage of umlaut.

(55) a. AGREE(FRONT): no back vowels before *i, j* (the constraint that enforces umlaut).

b. IDENT(Hi): underlying high vowels are realized as high.

c. **ü, *ö*: rounded vowels are back.

d. REDUCE: no full (unreduced) unstressed vowels.

(56)

	Stage 1: allophonic umlaut				
Input	Output	AGREE(FRONT)	IDENT(Hi)	*ü, *ö	REDUCE
uCi	uCi	*			*
	☞ üCi			*	*
	uCe		*		
	üCe		*	*	
uCe	uCi	*	*		*
	üCi		*	*	*
	☞ uCe				
	üCe			*	
üCe	uCi	*	*		*
	üCi		*	*	*
	☞ uCe				
	üCe			*	

Vowel reduction results from promoting REDUCE over IDENT(Hi). But on any ranking, this undoes umlaut:

(57)

	Stage 2: promotion of REDUCE (wrong!)				
Input	Output	REDUCE	AGREE(FRONT)	IDENT(Hi)	*ü, ö
uCi	uCi	*	*		*
	üCi	*			*
	☛ uCe			*	
	üCe			*	*

The bottom line is that Saussure's Firewall has no place in constraint-based theories such as OT. This is no great loss because, as noted above, it is stipulative, kills structural explanations of sound change, and even on the descriptive side creates more technical problems than it solves.

The natural move — available only in the Stratal version of OT — is to adopt a solution of the second type, namely to assume that prospective phonemes are already phonologized by the time they become contrastive (Ebeling 1960, Korhonen 1969, Liberman 1991). For example, if the umlaut vowels are already phonemes (or QUASI-PHONEMES, as Korhonen calls them) before the *-i-* that conditions them is lost, then they would naturally remain unaffected by the latter sound change. In Stratal OT, this amounts to saying that the umlaut vowels become introduced in the lexical phonology.

This approach to phonologization seems more promising, as long as we can specify when and why non-contrastive features become assigned in the lexical phonology — why allophones become quasi-phonemes — independently of the post hoc information that they are phonologized when another sound change occurs. This is a long-standing unsolved problem. It has been suggested that features tend to be phonologized if they belong to a feature class which is already distinctive (Kiparsky 1988). Though generally consonant with observations about priming effects in sound change, this idea is not precise enough to make predictions about when phonologization will take place. Another suggestion, made by Janda (2003: 413) in a vigorous plea for early phonologization, is that allophones become quasi-phonemes "for reasons having to do with phonetic distance". Disappointingly, he does not say how much distance, and on what dimension, or even cite evidence that distance matters at all.

A starting point for a more substantive theory of phonologization might be Jakobson's observation that allophonic properties can become perceptually more salient than the phonemic ones that condition them (Jakobson, Fant, and Halle 1952). Russian [ɨ] and [i] are allophones of /i/ after respectively back and front consonants, yet the allophonic vowel distinction is a more salient cue to the contrast than the phonemic consonantal one (especially in the case of sibilants because of their high-frequency noise, e.g. /si/ [sɨ] and /sʹi/ [sʹi]). Related to this perceptual saliency of the vowels, as Jakobson pointed out, is the fact that [ɨ] and [i] are perceived as categorically distinct elements, and even reified in the metalinguistic terms [ɨkatʹ] 'to pronounce [ɨ]' and [ikatʹ] 'to pronounce [i]'). The vowels [ɨ] and [i] are like two phonemes in that any unrounded high vowel token is assigned to one or the other type; perceptually they are two distinct categories. Other Russian vowels are also strongly affected by palatalization: e.g. /a/ is fronted towards [æ] to varying degree before, after, and most of all between palatalized consonants, but the allophones are apparently not categorically perceived as belonging to two types; correspondingly there is no *[ækatʹ] 'to pronounce [æ]'.

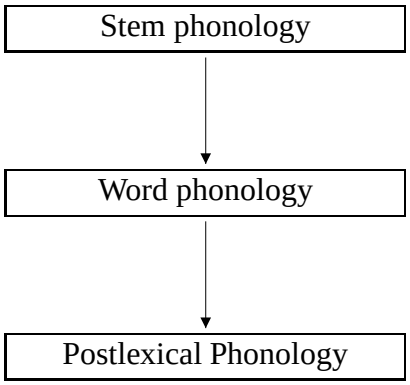
So let us start from the hypothesis that allophones become quasi-phonemes when they become governed by categorical rather than gradient constraints (Flemming 2001), and acquire greater perceptual salience than their conditioning environments. How are these two properties related to each other, and how we can build a theory of phonologization on them? In structuralist phonology, categoriality and saliency is attributed to phonemic representations. Feature specifications at the phonemic level are understood as categorical, while allophonic/postlexical feature specifications may be gradient. And phonemic representations specify all invariant distinctive features of the language. But quasi-phonemes are not allowed at the phonemic level because of the rather fundamental property that it excludes redundant, predictable feature values from lexical representations.

Stratal OT phonology provides a solution here. It is a more articulated theory than parallel OT in that it incorporates Lexical Phonology's stratal organization (level-ordering) to OT's parallelism of constraint interaction (Booij 1996, 1997, Orgun 1996, Kiparsky 2000; for diachronic phonology,

see especially Bermúdez-Otero 1999, 2006a, 2006b, Bermúdez-Otero and Hogg 2003). Stratal OT does not in principle banish predictable feature values from lexical representations. Rather, it claims that lexical representations are determined by best satisfaction of the lexical phonological constraints. They will include such redundant feature values as those lexical constraints may assign. For this reason they can accommodate quasi-phonemes.

For Stratal OT, the grammar is a hierarchy of serially related modules, each of which is a parallel constraint system of the classical OT type (without Output-Output constraints, Sympathy constraints, Lexical Conservatism constraints, Base-Reduplication constraints, Turbidity, Targeted constraints, or any other added transderivational devices).

(58)



As in Lexical Phonology and Morphology, the Stratal OT levels are morphological as well as phonological subsystems, which form a hierarchy of domains: stems, words, phrases. A constraint system of level *n+1* may differ in ranking from a constraint system of level *n* by promotion of constraints to undominated status. Each is governed by a (parallel) constraint system, but they interface serially. The interaction of constraints is determined by the intrinsic relation of the levels. A constraint at level *n* is visible to a constraint at level *m* iff $n \leq m$. Opacity reduces to constraint masking, and "cyclic" effects reduce to ordinary faithfulness: bigger constructions inherit the phonological properties from the smaller constructions they contain, in so far as compatible with the applicable constraints.

Postlexical processes may be restricted to certain prosodic domains, of which the smallest is the CLITIC GROUP, and the larger ones are the PROSODIC PHRASE, the INTONATION GROUP, and perhaps others (Inkelas & Zec 1990). Lexical processes apply to stems (level 1) and prosodic words (level 2).

If we reconstruct quasi-phonemes in Stratal OT as lexically specified but distributionally predictable phonological segment types, we get an interesting additional prediction. In Stratal OT, lexical representations are specified by the word-level constraint system. This entails that quasi-phonemes are elements whose distribution is governed by or relevant to at least one lexical constraint, therefore within the domain of a prosodic word. The same elements may of course also figure in postlexical constraints.[30]

[30] For example, in Russian [i] and [ɨ] play a role in the lexical phonology, but [i] becomes [ɨ] after a velar consonant across a word boundary within a clitic group or phonological phrase. See Rubach 2000, Blumenfeld 2001, Padgett 2003 for discussion of this interesting case.

That leads directly to a solution for the secondary split problem. Processes become phonologized when they become applicable to the lexical phonology — formally, when the constraints that drive them are promoted over the antagonistic faithfulness constraints in the lexical constraint system. At that point their outputs become quasi-phonemes, understood as "lexical allophones". The effect of this promotion is that they assign categorical feature values, that their distribution is determined by constraint that operate within the word domain, and that in virtue of these very facts they are perceptually salient in the sense stated above. Other than the fact that "real" phonemes have an at least partly unpredictable distribution, there is no basic difference between quasi-phonemes and ordinary phonemes on this view.

The promotion of constraint rankings from the postlexical phonology into the lexical phonology does not mean that those rankings necessarily cease to apply postlexically. The process is, in fact, the generalization of new constraint rankings from the postlexical phonology, where they are first introduced as sound changes, into the lexical (word-level and unltimately stem-level) phonology. The cause of this spread of constraint rankings, I conjecture, is a preference of learners for assigning structure as early as possible. That is, there is a bias in acquisition in favor of locating information in the lexicon.

Although the phonologization of a process in this sense is compatible with its continued postlexical operation, the next step is typically disappearance of its postlexical reflexes — formally, by the promotion of antagonistic faithfulness constraints in the postlexical phonology. Once this happens, there is unambiguous evidence for the phonologization, in that the process ceases to apply across word boundaries, its output is strictly categorical, and it is perceptually salient.

In the final act of this phonologization scenario, the potential contrasting quasi-phonemes becomes overtly manifested. This can happen either when a sound change (the promotion of a constraint in the postlexical phonology) renders their conditioning environment opaque (this is so-called secondary split), or when new lexical entries from borrowing or other sources exploit them. On this understanding, the rise of phonological contrasts is analogous to the rise of phonological opacity by constraint masking.

Returning to umlaut, we can now offer an analysis of the phonemicization of front rounded vowels. As a sound change, umlaut is the acquisition of the constraint ranking (59) in the postlexical phonology. The vowels *ü, ö* (and *æ*, if that is the output of umlaut at this point) are in complementary distribution with *u, o, a*.

(59)

	The sound change: postlexical umlaut				
Input	Output	AGREE(FRONT)	IDENT(Hi)	*ü, *ö	IDENT(Back)
uCi	uCi	*			
	☞ üCi			*	*
	uCe		*		
	üCe		*	*	*
uCe	uCi	*	*		
	üCi		*	*	*
	☞ uCe				
	üCe			*	*
üCe	uCi	*	*		*
	üCi		*	*	
	☞ uCe				*
	üCe			*	

In the second phase of the change, the ranking (59) enters the word phonology. At that point, the umlaut vowels become quasi-phonemes, present in lexical representations and constituting inputs to the postlexical phonology. Since lexical umlaut at first applies in a subset of the contexts in which postlexical umlaut applies, this is initially a covert change. It becomes overtly detectable at the latest in the next phase, when back vowels are restored before clitics with *-i-* in configurations like (13), while umlaut continues to apply within the phonological word. Formally, this means that IDENT(Back) is promoted in the postlexical phonology but remains dominated by umlaut in the lexical phonology. The umlaut vowels are not yet overtly contrastive.

In the third phase, another sound change affects the umlaut-triggering *i*, *j* in such a way as to causes the conditioning of umlaut to become opaque. Let us continue to assume that this happens through the promotion of REDUCE in the postlexical phonology. Lexical umlaut vowels are unaffected, both phonetically and phonologically. The change in the postlexical phonology that masks the context of umlaut does, however, cause them change from *covertly* contrastive to *overtly* contrastive elements at this point. In principle, they might also become overtly contrastive through the acquisition of any lexical item with an umlaut vowel in a non-umlauting context, whether through borrowing, onomatopoeia, or word-formation, along the lines of the Russian example cited above).

In Old High German, this final phase of the change is reached when postlexical vowel reduction (by promoted REDUCE), applying to the output of (59), produces contrasts between *uCe* and *üCe*:

(60)

Input	Overt phonologization: postlexical Vowel Reduction					
	Output	REDUCE	IDENT(Back)	UMLAUT	IDENT(Hi)	*ü, *ö
üCi	uCi	*	*	*		
	üCi	*				*
	uCe		*		*	
	☞ üCe				*	*
uCe	uCi	*		*	*	
	üCi	*	*		*	*
	☞ uCe					
	üCe		*			*
üCe	uCi	*	*	*	*	
	üCi	*			*	*
	uCe		*			
	☞ üCe					*

Although the postlexical promotion of REDUCE renders the conditioning of umlaut opaque, the lexical umlaut vowels themselves are retained. They just become overtly contrastive elements at this point.

Whereas Saussure's Firewall prises apart sound change and phonology and fences them off into separate formal and ontological worlds assigned to distinct fields of inquiry, this alternative explains phonologization through the internal stratification of phonology into a lexical and a postlexical component. But that stratal organization is independently motivated by rich evidence, including cyclic (paradigmatic) effects and phonological opacity. In fact, secondary split is just the historical counterpart of opacity, and Stratal OT provides the same solution to both.

This theory predicts that any phonologization process will proceed in three overt stages. All of them can be documented for umlaut in Old High German. In the earliest stage, after the sound change enters the language, umlaut was postlexical, and hence crossed lexical word boundaries, applying within clitic groups as we saw in (13). In early OHG, umlaut became a lexical process, and ceased to apply across word boundaries, but was still transparently conditioned within the lexical word. The umlaut vowels were now quasi-phonemes. In the third stage, they became overtly contrastive as a result of sound changes that rendered their conditioning environments opaque.

The theory also predicts that our three criteria for quasi-phonemes should be satisfied at the second stage. As far as it is possible to tell, this is the case. The first criterion is certainly satisfied, for umlaut at that stage became restricted to applying inside lexical words. The second criterion is also satisfied: umlaut vowels must have been more salient exponents of vowel frontness than their triggers, at least in the normal cases where the umlaut vowels are stressed and the context is unstressed. The third, categoriality, is hardest to verify. The vowels *ü, ö* began to be written only late, because the Latin alphabet had no letters for them, but the umlaut of *a* was written *e* already at the second stage, that is, well *before* the reduction of *-i* to *-e* that (on the structuralist view) caused it to become phonemic. This could be taken as an indication that they were perceived as categorically distinct from *a* at stage 2, i.e. prior to the point at which the structuralist theory of

phonologization claims that they became phonemic.

Crucially, Stratal OT departs from Lexical Phonology by giving up structure-preservation ("Strata, yes, structure-preservation, no", as the slogan of Roca 2005 has it). To put it another way, Stratal OT severs the structuralist link between CONTRASTIVENESS (unpredictable distribution), a *structural* notion, and DISTINCTIVENESS, a *perceptual* notion.[31] Phonemes are contrastive and distinctive, allophones are non-contrastive and non-distinctive. The other two combinations are the surprising ones. Quasi-phonemes are non-contrastive but distinctive — that is, they are predictable but perceptually salient. The fourth logically possible case, contrastive but nondistinctive elements, exists as well. These are NEAR-MERGERS (Labov 1994, Ch. 12), as when a speaker reliably produces near-merged sounds slightly differently, but cannot distinguish between them, in the speech of other such speakers or in her own speech, e.g. *source* and *sauce* in New York. The four cases are shown in (61).

(61)

	contrastive	non-contrastive
distinctive	phonemes	quasi-phonemes
non-distinctive	near-mergers	allophones

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.

Finally, Stratal OT also offers a solution to the empirical problems for Saussure's Firewall that we identified above. It predicts that sound changes will relate transparently to other postlexical processes. This has the three consequences that we cited above as difficulties for Saussure's Firewall.

First, when conditioned allophones are created in the postexical constraint system, they will just disappear when their conditioning environments are lost, and no secondary split will occur. In other words, sound changes can bleed existing postlexical processes. That is, they can eliminate some of their former inputs. English velar to palatal assimilation is postlexical, since it is determined by the context across word boundaries (e.g. *sock it* vs. *sock us*). Stratal OT predicts that under these circumstances it cannot become phonemic by secondary split. Therefore, vowel fronting and backing sound changes do not result in a contrast between front and back *k*. While quasi-phonemes survive the loss of their conditioning environment, postlexical allophones disappear.

The second consequence is that a sound change can feed other existing postlexical processes, i.e. add new inputs to them. Consider a language that has obligatory voicing assimilation of obstruents within some postlexical domain, such as the phonological phrase or the phonological word (the clitic group). The prediction is that when sound change creates sequences of obstruents in such a language, voicing assimilation will automatically eliminate them, as in the previously mentioned Old English example *bidest* (> **bidst*) > *bitst*. The parenthesized intermediate form is a "virtual" stage which is not pronounced but forms part of the sound change itself. We shall see instances

[31] This link was axiomatic at least in post-Bloomfieldian Americal structuralism. Bloomfield himself allowed distinctive sounds to be non-contrastive, for example if they were morphologically predictable, a practice later condemned as "mixing levels". The Prague school distinction between phonetic and allophonic processes might also be seen as implying the separation of distinctiveness from contrastiveness.

of such feeding interaction of sound changes with existing phonological processes in Old Norse below.

Third, sound changes can be blocked just in case their output does not conform to a constraint that holds at the postlexical level. This too will play a major role in our analysis.

In order to account for secondary split and neogrammarian exceptionlessness, we don not have to stipulate that the promotion of constraints is limited to the postlexical stratum. Constraints can be reranked at any stratum. Reranking at the word and stem levels simply amounts to another type of change, namely analogy (including LEXICAL DIFFUSION, the extension of a lexical rule to new items, Kiparsky 1995).

Armed with these concepts, we are ready to tackle the interaction of umlaut with syncope in North Germanic, probably the biggest remaining conundrum of Germanic historical phonology.

5 Syncope and umlaut in North Germanic

5.1 Old Icelandic

From the progression from Stage 1 to Stage 3 we can infer that syncope in North Germanic originally applied after light syllables except where FOOTBIN and NONFINALITY prevented it, and after heavy syllables wherever deletion and/or epenthesis could interact with syncope so as to to maintain *μμμ. In light stems, medial syncope would then have removed the trigger for umlaut, e.g. **taliða* > *talða*. But in heavy stems like **dōmiða* > **dömiða*, *μμμ forced retention of the medial vowel at Stage 1, and the retained vowel triggered umlaut. At Stage 2, when three-mora syllables became possible, **dömiða* then became *dömða*. In the forms below, hyphens mark morpheme boundaries and periods make syllable boundaries.

(62)		*Light*	*Heavy*
	Input:	[tal-i-ð-a]	[dōm-ið-a]
	Syncope, Stage 1:	[tal.ða]	—
	Umlaut:	—	[dö.mi.ða]
	Syncope, Stage 2:	[tal.ða]	[döm.ða]

High-ranked *μμμ also constrains final syncope. Here the weightless of final consonants must be taken into consideration (the NONFINALITY constraint (36c)). This effect can be seen in *-i* stems. The derivations below are parallel to (62).

(63)		*Light*	*Heavy*
	Input:	[stað-i-(R)]	[gast-i-(R)]
	Syncope, Stage 1:	[stað(R)]	—
	Umlaut:	—	[ges.ti(R)]
	Syncope, Stage 2:	[stað(R)]	[gest(R)]

Parentheses indicate the weightlessness (or 'invisibility') of final *-R*. When this weightless part of the syllable is "subtracted" from the output form, the residue can be seen to obey *μμμ, which explains the difference between light and heavy stems.[32]

[32] Analogical redistribution resulted in much variation and some paradigm types were practically eliminated. In Old Icelandic *-i* stem nouns, the distribution of umlaut vowels is only tenuously related to syllable weight any more (Noreen

At this point it is necessary to clarify how the two syncope processes are related to each othe and to umlaut. If the second syncope is a generalization of the first, how can the first apply before umlaut while the second applies after it? And if they are distinct processes, what is the historical connection between them?

It is easy to model the synchronic system and the change in Stratal OT. As explained in section 4, the grammar includes separate lexical and postlexical constraint systems, which are parallel, though they interface serially. The word phonology outputs words, which are combined in the syntax into phrases and sentences. These must satisfy the postlexical phonology. By default, each stratum has the same constraint system. However, language change can bring about new rankings by promoting constraints at any stratum; the promotion of markedness constraints in the postlexical phonology is SOUND CHANGE.

At Stage 1 of syncope the constraint ranking is FOOTBIN $\gg$ *μμμ $\gg$ *σ (where *σ is the constraint which drives deletion). On this ranking, syncope applies unless it produces three-mora syllables or subminimal feet/words. We also assume that syncope is limited to unstressed syllables, in virtue of a Faithfulness constraint MAXV́, which requires stressed vowels to be realized in the output.[33]

At Stage 2 of syncope, *μμμ comes to be dominated by *σ in the postlexical phonology. The effect is that the output of the word-level constraint system now undergoes a generalized syncope process, which applies even where it produces superheavy syllables, as in *dömiða* > *dömða*. However, this postlexical deletion leaves umlaut in place, which has already applied at the word level. This is the normal source of opacity effects in Stratal OT; in fact, Stratal OT claims that all phonological opacity flows from the stratal interaction of constraints.

The phonologization of umlaut starts with the introduction of the umlauted vowels into the lexical phonology:

(64)

	The lexical phonology				
Input	Output	AGREE(FRONT)	*μμμ	*σ	IDENT(Back)
tal-i-ða	tal-i-ða	*		***	
	tel-i-ða			***	*
	☞ tal-ða			**	
	tel-ða			**	*
dōm-i-ða	dōm-i-ða	*		***	
	☞ döm-i-ða			***	*
	dōm-ða		*	**	
	döm-ða		*	**	*

1923: 266, 271). Umlaut is no longer triggered by inflectional suffixes, though it remains a live and productive process in derivational morphology. See Lahiri 2000 for discussion; compare also the parallel development of *u*-Umlaut in later Icelandic (Kiparsky 1984).

[33]Since stress is predictable, and therefore by Freedom of Analysis not necessarily specified in underlying representations, this constraint relies on the stratal aspect of the theory. The constraint cannot do the job in parallel OT, and it is not clear what would.

At first, the postlexical phonology has the same constraint ranking as the lexical phonology. In the next phase, IDENT(Back) is promoted, causing umlaut to stop applying postlexically; at this point back vowels are restored in postlexical configurations such as (13), and the umlaut vowels *ü*, *ö* become quasi-phonemes, potentially but not yet actually contrastive within lexical words.

(65)

	The postlexical phonology: second phase				
Input	Output	IDENT(Back)	AGREE(FRONT)	*μμμ	*σ
talða	taliða		*		***
	teliða	*			***
	☞ talða				**
	telða	*			**
dömiða	dōmiða	*	*		***
	☞ dömiða				***
	dōmða	*		*	**
	dömða			*	**

In the next phase of phonologization, overt contrasts between umlauted and nonumlauted vowels are created. This happens at the latest at Stage 2 of syncope, when syncope is generalized by promotion of *σ over *μμμ in the postlexical phonology (its relative ranking with respect to IDENT(Back) and AGREE(FRONT) is immaterial). From now on it applies even when three-mora syllables result, as in *dömða*.

(66)

	The postlexical phonology: third phase				
Input	Output	*σ	IDENT(Back)	AGREE(FRONT)	*μμμ
talða	taliða	***		*	
	teliða	***	*		
	☞ talða	**			
	telða	**	*		
dömiða	dōmiða	***	*	*	
	dömiða	***			
	dōmða	**	*		*
	☞ dömða	**			*

Notice that this solves another puzzle of generative historical phonology, which was articulated in that tradition as the observation that the analogical generalization or reordering of a rule often looks like the addition of a generalized copy of it at the end of the phonology (see Robinson 1976 for a study of this problem in the context of German umlaut).

The upshot is that Old Norse requires early fusion, like Old English, but syncope (in its initial restricted form) before umlaut, as in continental West Germanic.

(67) *Old Norse:* (1) Fusion, (2) syncope, (3) umlaut.

Although syncope precedes umlaut, it interacts with umlaut differently than in West Germanic because it initially caters to a stricter syllable structure. The scope of final and medial syncope follows from each dialect's maximal syllable and minimal foot constraints. Small though the differences in the prosodic systems are, they have dramatic consequences for the operation of syncope.

5.2 Old Gutnish

The results of the preceding section date Old Norse umlaut to the end of Stage 1, around 600 A.D. Had umlaut taken place just half a century earlier, it would have applied before *every -i-*, including those later syncopated. And had it taken place two centuries later, it would not have applied before *any* syncopated *-i-*.

The first of these outcomes is realized in at least one dialect of Nordic. Pipping (1901) noted that in Old Gutnish, umlaut applies regularly even in light syllables before syncopated *-i-*. Carlsson 1921 supported Pipping's findings with ample additional material from isolated lexical items and from morphological categories such as the weak preterite, whose stem is always umlauted before syncopated *-i-*, e.g. *berþi* 'bore', *spyrþi* 'asked' (Inf. *beria, spyria)*, in striking contrast to Old Icelandic *vakþe* 'waked'. This evidence shows that on Gotland umlaut took effect *before* Stage 1 of syncope. In terms of the absolute chronology of the sound changes, this could mean several things. Gutnish either had earlier umlaut (Syrett 1994: 197) or later syncope, or both.[34] In any case, whatever the absolute chronology of umlaut and the first stage of syncope in Old Gutnish, their *relative* chronology is clear: umlaut took effect before syncope. In this respect Scandinavia is split: Gotland, its southeasternmost part, goes with the North German coast and with England, and parts company with Norway and Iceland.

This division of Scandinavia makes it likely that there were intermediate regions that umlaut and syncope reached more or less simultaneously, with variation perhaps resolved case by case on a lexical or morphological basis. Denmark and Southern Sweden may have been such transitional zones, on the evidence of such variation as *stað*∼ *stæð*, Danish *bøg* vs. Sw. *bok* 'beech', Old Swedish *brun* ∼ *bryn* 'edge, brow', *stuþ*∼ *styþ* 'support', *nut* ∼ *nyt* 'nut', *Dan(ir)* ∼ *Dæn(ir)* 'Dane' — words in which West Scandinavian consistently has back vowels.[35]

A feature that unites Eastern Scandinavian (including Old Gutnish, I will assume, though I have no specific information on that point) with Old Frisian and Old Saxon is that the preterite optative endings do not cause umlaut. This is true of weak verbs, e.g. Old Swedish *valði* 'he would choose', *krafþe* 'he would demand' (Old Icelandic and Old Norwegian *velþi, krefði*) (Bandle 1973: 34), preterite-presents (Birkmann 1987: 314) and strong verbs (Noreen 1913: 216). This could be understood on the assumption that umlaut preceded fusion and that the strong verbs then adopted

[34] An inscription from Lokrume in Gotland, variously dated from 650 to as late as 900, has unsyncopated Acc.Pl. *kumlu* 'monuments' and *kuþuiu* [guþvīu] (from **-wīhu*); elsewhere *-u* would be syncopated at Stage 2 and we would have *kuml*, *Guþvī* (Snædal 2002: 51, Snædal s.a., but see Birkmann 1995: 235). If the earlier dating is correct, this inscription would establish that syncope was late in Gutnish.

[35] Syrett 1994: 197 cites such cases to argue that "*i*-umlaut can be viewed as an innovation beginning in the East Norse area and spreading westwards…". He also cites umlaut across former compound boundaries in Danish names like *Esbiorn, Eskil*, where the Western dialects have *Ás-*, but it seems to me this just indicates early fusion in these compound names, rather than early umlaut. Syrett conflates two claims: that umlaut in the dialects in question was earlier (hence applying before syncope), and that it was "stronger" (hence applying across a compound boundary). Both may be true (although I doubt the latter), but they are independent of each other.

the umlautless pattern of the weak verbs and preterite-presents by analogy. As far as syncope is concerned, the weak preterites tell us, as in Western Scandinavian, that it took place after fusion. So, these diagnostics suggest that the Old Gutnish relative chronology differs from that of West Scandinavian.

(68) *Old Gutnish:* (1) Umlaut, (2) fusion, (3) syncope.

If umlaut originated in the Baltic region it must have spread initially by sea. Gotlanders reportedly were the principal traders plying the east-west routes between Novgorod and England (Carlsson 1921: 51). If the archeologists are right that England was settled from Schleswig-Holstein and the Elbe-Weser region of North Germany (Nielsen 2000: 349), then the dialects where umlaut applied early would have been linguistically close and perhaps geographically contiguous at the relevant time, possibly even forming a loose dialect continuum extending from Gotland through parts of Sweden, Denmark, and coastal Northern Germany to the new settlements in England (cf. Nielsen 2000 on North/North Sea/West Germanic language contacts). In any case, these are the only Germanic dialects in which umlaut preceded the first stage of syncope, and on philological grounds it also applied earlier in them in terms of absolute chronology (England before 550, Western Scandinavian ca. 600 (see above), High German as much as a century and a half later (Braune-Reiffenstein 2004: §51 A.3).

A more precise demarcation of the dialects in question could be obtained by place names. The isogloss between umlauted and unumlauted names in **-staði* coincides with the division between the umlaut-first and syncope-first dialects. The umlauted type occurs in England *(-stead*, OE *-stede)*, Denmark *(-sted)*, Holstein and Northern Germany West of the Elbe south to Thüringen *(-stedt)* (Nielsen 2000: 310), and on Gotland *(-städe)*.[36] These are exactly the areas where umlaut preceded syncope. Moreover, the distribution of *-stedt* in Germany coincides with the wedge of Frisians and Saxons from the North Sea to Thüringen around 500 A.D., bounded on the east by Slavic peoples and on the west by Franconians (as mapped by König 1994: 58). The umlauted type is absent in Northern and Western Sweden, Norway, Iceland, the Netherlands, and the rest of Germany, where syncope preceded umlaut. On the assumption that these place names underwent syncope like polysyllables, they allow us to fix the boundaries of the dialect complex in question.

It is interesting that this swath of early umlaut dialects cuts across the North and West divisions of the Germanic family. It comprises at least three major dialects, which shared with their neighbors the traits that define the traditionally recognized major groupings of Germanic: Eastern Scandinavian with Western Scandinavian (North Germanic), Old Frisian and Old Saxon with Old High German (continental West Germanic).

5.3 Alternatives

My conclusion that Old Norse syncope was initially subject to the *μμμ constraint turns the still near-consensual Kockian story on its head. It comes a little closer to the dissenting view that syncope began after light syllables (Sievers 1878: 161, Penzl 1951, Fullerton 1977: 29), but differ from it in two all-important respects. The first difference is that it predicts early syncope even after

[36] 261 hits for *-städe* in Gotland on `http://www2.sofi.se/SOFIU/topo1951/_cdweb/index.htm`, plus two *-städ*, with just a handful of *-sted(e), -städ* elsewhere in Eastern and Southern Sweden (one or two each in Kristianstad, Malmöhus, Blekinge, Kronoberg, and Östergötland counties).

heavy syllables in those cases where contraction, glide deletion and epenthesis allow the *μμμ constraint to be maintained. The second difference is that it predicts late syncope even after light syllables where FOOTBIN and NONFINALITY require it. These predictions are borne out by the runic material; that is what makes the crisp periodization of syncope in section 3.2 possible.

With this in mind, let us review the traditional arguments for the majority opinion that syncope began after heavy syllables, and some of the recent analyses that depend on that chronology.

Advocates of the view that Nordic syncope began after heavy syllables often appeal to the parallel of West Germanic syncope. They overlook that syncope in each dialect responds to the specific prosodic constraints of that dialect, and that early North and West Germanic had different syllable structures. Early North Germanic had a two-mora syllable maximum, which blocked syncope after heavy medial syllables. West Germanic was not subject to this constraint.[37]

A fact that has been cited in support of earlier syncope after heavy syllables is that syncope of *word-final* vowels takes place late in *short disyllables*. E.g. the Helnæs inscription, from ca. 800 (the end of Stage 2), preserves final *-u* in *sunu* and in the first member of the compound name *kuþumu[n]t* (prosodically $[\text{sunu}]_\omega$, $[\text{guþu}]_\omega[\text{mund}]_\omega$), ON *sun, Guþmund*. But these data follow from the minimum foot constraint FOOTBIN plus NONFINALITY. Until Stage 3, NONFINALITY was inviolable, and **sun* was not a bimoraic foot. After final -C became weight-bearing, syncope could apply in such forms.

It is sometimes suggested that naturalness considerations favor earlier deletion after heavy syllables, in that there was a higher degree of stress after light syllables than after heavy syllables, typically with appeals to "vowel balance" phenomena in modern mainland Scandinavian dialects (Kock 1888, King 1971, Schulte 1998). The truth is that the only basis for supposing any stress at all on posttonic vowels in Old Norse are the supposed deletion facts themselves. And the inference from syncope to stress is invalid because syncope may be blocked not only by stress but also by other factors, including syllable structure, as it plainly is in Nordic. Commenting on the vowel balance hypothesis on the basis of his close examination of the relevant Swedish and Norwegian data, Riad (1992: 128) observes that "when the behaviours of the light stems is seen in its diachronic context, in Proto-Nordic and in present-day dialects, respectively, it is obvious that the similarity is superficial." It is more likely that that posttonic vowels were unstressed in early Germanic and that vowel balance arose later in some dialects of mainland Scandinavia, and perhaps in Frisian (Smith and van Leyden MS).

The claim that syncope took effect first after heavy syllables in North Germanic receives no support from historical phonology either. On the contrary, it causes nothing but trouble for the analysis of umlaut. This can be seen once again in two noteworthy newer studies which rely on this chronology, Iverson & Salmons (2004) and Schulte (1998).

Iverson & Salmons (2004) propose that umlaut applied before syncope and that inflectional paradigms were realigned on the basis of syllable weight after umlaut became opaque. They illustrate their idea with a hypothetical scenario for *-i*-stems. They start with a reconstructed opposition [steðiR] vs. [gestR], resulting from umlaut followed by syncope after heavy syllables.

[37] In Gothic, the incidence of final syncope is governed almost completely by the quantity of the affected syllable, the quality of the vowel, and its position in the word (final vs. medial). The only case of sensitivity to the weight of the stem is perhaps that short *-u* is dropped after some heavy stems (not in *-u* stems, however).

(69)

	Light	Heavy
Input:	/stað-iR/	/gast-iR/
Umlaut:	steð-iR	gest-iR
Syncope:	—	gest-R
Output:	[steðiR]	[gestR]

They suppose that the stem vowel of *gestR* was then reanalyzed as an underlying /e/, presumably with a morphologically conditioned "Rückumlaut" rule added to the grammar to derive residual unumlauted forms in the paradigm, such as *gast*, which are eventually leveled out. Later, syncope was extended to the environment after light syllables, which removed the umlaut-triggering *-i-* in words like **steðiR*. At this crucial juncture, they assume that the system was radically reanalyzed. Umlaut disappeared from the grammar, and *light stems resurfaced as back vowels*, e.g. **steðiR* > *staðR*; the new derivations being:

(70)

	Light	Heavy
Input:	/stað-iR/	/gest-iR/
Syncope:	stað-R	gest-R
Output:	[staðR]	[gestR]

The idea is that umlaut disappeared by a "catastrophic" restructuring when it became opaque, at which point the umlauted vowels reverted to the original back vowels in those contexts where umlaut had been transparent, i.e. before an overtly retained *-i-*, and were retained in those contexts where umlaut had been opaque.

Since umlaut is clearly part of the lexical phonology well before this point, such a reversal is incompatible with the theory of sound change proposed in section 4. It falters on empirical grounds as well, for two reasons.

The first reason is quantity-sensitivity of umlaut before derivational suffixes. Consider the suffix **-isk*, as in Old Icelandic **ðaniskaR* > *danskr* 'Danish' (short stem) vs. **barniskaR* > *bernskr* 'childish' (long stem). On Iverson & Salmons' proposal that umlaut vowels become phonemic at the stage corresponding to paradigm (69), the grammar would at that point require a morphophonological umlaut rule triggered by suffixes like **-(i)sk*, to derive such alternations as *barn-* 'child' ∼ *bernskr* 'childish'. Unlike the older phonologically conditioned umlaut rule, this newly restructured morphophonological umlaut rule remains transparent after syncope, since it is triggered by specific morphemes such as **-(i)sk*. By their hypothesis that umlaut applied before syncope, the morphophonological umlaut rule must be surface-true after both heavy and light stems at this point, so there is no reason to restrict it to heavy stems. Why, then, does it cease to apply after light stems, and why does it do so at the same time as the *phonological* umlaut rule does in paradigms like (70)? Why would a learner gratuitously undo umlaut in words like **denskr* 'Danish' (from the stem *dan-*), which conform to the still exceptionless morphophonological umlaut rule, so as to create exceptions like *danskr*? And why does this happen in all words derived from light stems and in no words derived from heavy stems?

The same argument extends to all umlaut-triggering morphology, including denominal weak verbs. If heavy-stem weak verbs like *verma* 'warm', *herma-st* 'harm oneself', *fylla* 'fill', *dœma* 'judge' were restructured with front vowels, then a morphophonological umlaut rule was needed

to account for the consistent frontness of the root vowels in this class of verbs, and to derive their phonemic front vowels from the back vowels of the bases *varm-*, *harm-* *full-*, *dōm-*. This rule, "weak verbs of the first conjugation have umlauted stem vowels", applied transparently also to light-stem weak verbs such as *telja* 'count', *temja* 'tame', *velja* 'choose' (from *tal-*, *tam-*, *val-*). So why would it mysteriously have stopped applying in their past tense forms, which on Iverson & Salmons' chronology were at that point **telþa, *temþa, *velþa*? What could have motivated the reversion of /e/ to /a/ in a context where /e/ was robustly supported by a morphophonological umlaut pattern? If *talþa, tamþa, valþa* never had /e/ in the first place, because syncope preceded umlaut, the paradox disappears.

The second argument concerns the assumption that the umlaut vowels are phonologized in heavy stems but not on light stems. This is not how leveling usually works in morphology. Typically, the surviving alternants in leveling are "important" forms such as the nominative singular (Lahiri and Dresher 1983/4). So one would have expected restructuring to /e/ also in a short stem such as *stað-* in (69), where the majority of forms, including the nominative singular and plural, had *e*. Restoration of the back vowel is even more unexpected in the weak preterite paradigm, especially in morphologically underived verbs. On Iverson & Salmons' premise that umlaut preceded syncope, *all* forms of the present and preterite would have had front vowels, so where does the back vowel come from? There is even a class of morphemes that according to Iverson & Salmons' account would have had umlauted vowels throughout, yet reacquired underlying back vowels, such as Old Icelandic *ketill*, Nom.Pl. *katlar* (similarly *fetill* 'fetter', *depill* 'puddle', *snepill* 'snip, flap', *hefill* 'bunt line, clew line', *lykill* 'key', *tygill* strap', *trygill* 'little trough, tray', and with leveling of the back vowel through the whole paradigm, *drasill* 'horse', *skutill* 'harpoon', *stuðill* 'rack', *svaðill* 'slippery place', *vaðill* 'ford'). If heavy stems like *gest-* with their paradigmatic umlaut alternations escaped back vowel restoration because they were restructured with /e/, then a fortiori a word like *ketil-*, where learners *always* heard *-e-*, should have been restructured with /e/ too.

All these cases are completely unproblematic for my account, which predicts that umlaut should be bled by medial syncope after short vowels at Stage 1, as in *katlar* and *danskr*, while it should take effect before later syncopated *-i-*, as in *bernskr*, and before preserved *-i-*, as in *ketill*.

Schulte (1998) argues that umlaut became phonemic not through syncope but through vocalization of *-j-* to *-i-* in *-ja* stems (*"saṃprasāraṇa"*). He postulates the development **baðja-* > [*bæðja] > *[bæði] > [bæð] 'bed', with early umlaut followed by two rounds of syncope, the second of which is parallel to *[staði] > [stað]. The idea is that the rise of contrasts such as *[bæði] : *[staði] results in phonologization of the previously allophonic umlaut vowels.

What is not clear is how such an opposition could possibly have arisen. Like everyone else, Schulte accepts that both *i* and *j* originally triggered umlaut phonetically. But he says that umlaut vowels before *i* were not phonologized, because *i* "was not yet significantly reduced" (p. 186). But then, if *[stæði] got phonemicized as /staði/, why did *[bæði] not likewise get phonemicized as /baði/? And how did *[stæði] get to be pronounced [staði] again? A clue to what Schulte has in mind is his statement (p. 185) that *i* after light syllables ceased to be umlaut-inducing because it merged with vocalized *j*, which was no longer umlaut-inducing because it had already discharged its umlauting force.[38] So *[stæði] reverted to [staði] after (and indeed because) **baðja-* had be-

[38] "Der Fortsetzer dieses *j* bewirkt naturnotwendig keinen *i/j*-Umlaut mehr, da *j* dies bereits bei seinem Übergang zo *i* getan hat." (185)

come *[bæði].[39] But even if the "umlauting force" of *i* was spent, why did that cause the already umlauted [stæði-] to *revert* to [staði]? And why did *[bæði] (whose *i* from *j* we are told had also "spent" its umlauting force) not at this point likewise revert to *[baði]? In short, how could these two word types remain distinct after *saṃprasāraṇa*? There is some similarity here to Iverson & Salmons' idea that some phonetically umlauted phonemic back vowels reverted to phonetic back vowels, but in Schulte's proposal the conditions under which the reversion happens, and the principles behind it, are more obscure, and therefore difficult to assess.[40]

For my solution, the *-ja* stems are unproblematic. The simplest assumption is that *-ja* stems underwent syncope, like all other forms, with no *saṃprasāraṇa* (for the reasons succinctly stated by Bibire 1971), and that the resulting word-final *-Cj* clusters were then reduced to *-C* at Stage 3, when the two-mora word minimum ceased to apply.[41] The heavy *-ja* stems (*-ija* stems by Sievers' Law) underwent the combination of syncope and *j*-deletion described above.

(71) a. Light *-ja* stems: **kunja* > *kynj* 'kin' (whence *kyn* at Stage 3)
b. Heavy *-ja* stems: **dōmija* > **dömija* > (*dömja* >) *döme* 'judgment'

It follows correctly that the *-ja* stems underwent umlaut whether the stem was heavy or light.

One study which does not assume that syncope in Old Norse applied first to heavy syllables is Lahiri (2000). Biting the bullet, Lahiri simply supposes that umlaut was categorically restricted to heavy syllables. This stipulation is phonetically dubious and factually problematic. We would not expect weight conditions on umlaut — why would a *heavy* syllable be more prone to assimilate to a following high front vowel? Weight conditions make much better phonetic sense for syncope, if properly related to the language's prosodic givens. (For Old Norse they unfortunately got formulated backwards because scholars were fixated on the apparent West Germanic parallel and neglected the distinctive syllable structure of Old Norse itself.) A hurdle for Lahiri's solution is also that umlaut clearly did apply also in short stems wherever the conditioning *-i-* was retained, as in *teliþ, lykell, fetell*. Should we hypothesize a second umlaut process for these? My proposal derives them quite simply by regular umlaut.[42]

6 Conclusions

My tentative chronology of the three processes in the five dialect groups is summarized in (72).[43] The dialects are listed roughly from north to south.

[39] "Die Entwicklung des phonematischen *i*-Umlauts in */staði/ = *[stæði] wird durch das Aufkommen des neuen Typus */bæði/ = *[bæði] regelrecht unterbunden. In der Tat kommt es auf dieser Stufe durch Einfluss der *ja*-Stämme zu einer Reversion der subphonematischen Umlautwerte: */staði/ = *[stæði] ⇒ [staði] und */taliðō/ = *[tæliðō] ⇒ *[taliðō]. . . " (184).

[40] Many of Benediktsson's critical remarks on Skomedal 1980 would apply also to the two proposals just considered.

[41] There should be no objection to final *-Cj* on phonetic grounds, least of all from a Scandinavianist (Schulte 1998: 174); on the contrary, examples like modern Icelandic *grenj* 'complaint' or Swedish *vänj* 'accustom!', *tälj* 'whittle!' show it to be a normal outcome when final are lost after such clusters in Scandinavian languages, arguably more plausible than the popularly conjectured *saṃpras ārаṇa*.

[42] Some proposals impose stress conditions on umlaut, in addition to weight conditions on syncope. Pipping 1922 posits a low degree of stress for umlaut-triggers, and Bibire 1971 posits stress conditions on the umlauting vowels themselves.

[43] I leave out Gothic, because umlaut and fusion did not happen there, or at least had not happened at the time it was recorded.

(72)	Western Scandinavian	Fusion	Syncope	Umlaut
	Old English	Fusion	Umlaut	Syncope
	Old Gutnish	Umlaut	Fusion	Syncope
	Old Frisian	Umlaut	Syncope	Fusion
	Old High German	Syncope	Umlaut	Fusion

As discussed above, Denmark and southern mainland Sweden are liminal zones where the eastern system most clearly documented in Gotland meets the Western system of Norway and Iceland. With some misgivings, we classified Old Saxon as belonging with Old Frisian, but with a greater admixture of High German elements.

For each of the five dialect groups, transitivity yields a nontrivial empirical prediction, which is confirmed by the material. For example, in Old High German, Rückumlaut establishes that syncope preceded umlaut, the absence of umlaut in the preterite optative establishes that umlaut preceded fusion. This implies by transitivity that syncope preceded fusion, a prediction unambiguously borne out by the unique syncope pattern of weak preterites. Similar predictions follow for the other four.

Another nice property of (72) is that each pair of dialects adjacent on the list differs in the minimal possible way, namely in the relative chronology of just two of the processes. This is an encouraging sign that the typology may reflect the reality of the early Germanic dialect situation in terms of a wavelike spread of innovations between neighboring dialects.

To reconstruct the history behind (72) we need criteria for distinguishing spread from polygenesis. All three innovations are natural, but umlaut is cross-linguistically the least common of them, and therefore the most likely of them to have been a single innovation that spread throughout Germanic.[44] Assuming it was, (72) tells us that it originated in the Baltic region,[45] and spread from there westwards, and then north and south, at first quickly in what seems to have been a contiguous set of dialects linked by maritime trade and migrations, and later more slowly by land. It is assumed to have reached England about 500-550. Other dialects underwent umlaut later, after syncope had already taken effect: Western Scandinavian about 600 (section (3)), High German not until 750 or so (Braune-Reiffenstein 2004: §51 A.3).

Syncope could have spread as well, but it is such a ubiquitous sound change that it could just as easily have arisen separately; our finding that it operated differently in North and West Germanic because of their different syllable structures speaks for independent origin at least in these branches.

As for fusion, it almost certainly did not spread by contact; as a grammaticalization process, it is endogenously driven by a language-independent tendency to reduce unmotivated structural

[44] We cannot tell whether it ever reached Gothic. Early Germanic loans in Finnish reflect a stage without umlaut, e.g. *patja* 'mattress' (not **pätjä* or **petjä*), from **badja* 'bed'.

[45] Perhaps significantly, umlaut is also a feature of Livonian, across the Baltic from Gotland, now on the brink of extinction but at that time the language of a Baltic superpower.

complexity (Kiparsky, to appear). In the weak preterite, the complexity takes the form of a mismatch between prosodic compounding and morphological affixation. (72) tells us that Old English and Scandinavian eliminated the mismatch earlier than continental West Germanic. The reason is fairly obvious. Fusion is more likely when the morphological relation between the verb 'do' and the weak preterite endings is obscured. In North Germanic, the loss of the verb *dō-* would have made the weak endings synchronically unanalyzable, practically guaranteeing early fusion. In Old English, early fusion would have been facilitated by the morphological irregularity of the preterite *dyde* 'did'. Within continental West Germanic, the generally conservative OHG-A dialects (Alemannic and archaic Franconian) retained the prosodically composite weak preterite the longest, arguably up to historical times, because they retained plenty of morphological and phonological evidence for it. Retention of such a feature does not necessarily mark off a dialect group; more likely the OHG-A dialects are just remnants of a form of OHG which was once more widespread.

For historical Germanic phonology, the main results of this study are twofold. First, it demonstrates that the weak preterite's periphrastic origin is the key to its exceptional behavior in West Germanic, and to the morphological reformation it underwent in the most conservative varieties of Old High German. Because syncope preceded fusion in continental West Germanic, there is no need to posit an otherwise unattested medial syncope process for their weak preterites. In OHG-A dialects, late fusion explains the failure of umlaut in their weak preterite optatives, and the unique final long vowels of their weak preterite optatives, and provides a grounding for the analogical remodeling of their weak preterite indicatives. This provides the strongest possible confirmation for the view that the principal source of the weak preterite's dental suffix was the verb **dō-/*dē-* rather than the participial suffix **-to-* (or some other dental formative), although it is fully consistent with the assumption that the weak preterite system secondarily incorporated formations with those dental suffixes.

My second principal finding is that the umlaut and syncope patterns of North Germanic differ from those of continental West Germanic for two reasons. Syncope took place after the ending had fused with the stem into a single phonological word, and it was at first constrained by the more regimented syllable structure of early Old Norse. A welcome corollary is that umlaut in North Germanic turns out to look very much like umlaut in the other Germanic languages, and interacts with syncope in the same way, *mutatis* the crucial *mutandis*. The result adds a new facet to the differentiation of common Germanic into its dialects.

In retrospect, the traditional messy picture of early Germanic syncope can be seen as an artifact of neogrammarian atomism. Structuralism, generative grammar, and Optimality Theory have all struggled in different ways to shake off this inheritance, but it has proved to be rather persistent, probably for a combination of reasons. Its hallmark is the separate analysis of every part of language: treating phonology independently of word structure, separating internal and external linguistic history, characterizing analogical changes by local schemata (proportions or the like) without proper consideration of the overall morphology they are embedded in, letting idiosyncratic sound changes without known typological parallels go unquestioned, and defining the conditioning of phonological processes solely in terms of the input string to which they apply (e.g. the weight of the preceding syllable). I have tried as best I could to follow the opposite approach: systematically relating phonology to morphology and to prosodic word structure, matching dialect groupings to toponymy and historical data, grounding analogical changes in the grammatical system, seeking to maximize the regularity, naturalness, and generality of sound changes, and focusing on the inter-

action of phonological processes in terms of their output configurations and the overall prosodic constraints that control them. It is impossible to live up fully to the ideal of this integrated methodology, but it is worth trying. Even the present inadequate attempt has paid off with a more orderly system for each of the branches of Germanic, and with a better understanding of their shared history and their divergence.

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