

The Germanic Weak Preterite

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1 Introduction

The dental preterite of weak verbs remains one of the most troublesome chapters of Germanic historical-comparative grammar. The morphological provenience of its dental formative *-d-* has been debated for nearly two centuries, and there is still no consensus on whether it is a reflex of one or more of the Indo-European dental suffixes, a grammaticalized form of the light verb *dō* ‘do’, or some mix of these. The category’s phonological development within early Germanic presents a whole series of other mysteries. Why does the effect of syllable weight on umlaut in preterite stems differ in North and West Germanic, and for that matter why should umlaut be sensitive to syllable weight at all? Why does the dental preterite seem to undergo two distinct “phases” of umlaut in North Germanic, and why does this category alone undergo a special early phase of syncope in West Germanic?

Lahiri 2000 was the first to connect the morphological puzzle of the weak preterite’s etymology with some of the main phonological puzzles of its divergent evolution within Germanic. She proposed that the form’s periphrastic origin can actually explain its phonological peculiarities. The purpose of this paper is to propose a different way to make this link, which starts from the same morphological hypothesis, but supplies a much simpler account of the phonological development within the Germanic languages.

The idea that the dental preterite ending is descended from the past tense of the light verb *dōn* ‘do’ goes back at least to Bopp 1816. Though not uncontroversial, it is perhaps the most widely accepted etymology of the dental preterite (Streitberg 1896, Sverdrup 1929, von Friesen 1925, Tops 1974, Bammesberger 1986). From a morphological point of view, the assumption is certainly attractive. The templatic ablaut morphology by which “strong” verbs formed their past tenses, inherited from the Indo-European perfect, was restricted to monosyllabic roots. Longer verbs in Germanic would accordingly have formed their perfects with an

auxiliary, just as they do in Sanskrit (where disyllabic stems like *cint-ay-* ‘think’ form perfect with “be” or “do”, e.g. *cint-ay-ām ās-a* (or *cint-ay-ām ca-kār-a*). The Germanic periphrastic forms could have been later grammaticalized into inflected forms, exactly as the Sanskrit periphrastic forms were grammaticalized in Middle Indic. (1) shows this familiar grammaticalization trajectory, on the assumption that the reduction from second members of compounds to suffixes goes through a clitic stage (Lahiri 2000). (The symbols ω and α stand for Prosodic Word and Prosodic Stem, respectively.)

- (1) a. Compounding: [[Verb + Suffix] $_{\omega}$ + [Light Verb + Inflection] $_{\omega}$] $_{\omega}$
 b. Cliticization: [[Verb + Suffix] $_{\omega}$ + Clitic + Inflection] $_{\omega}$
 c. Suffixation: [[Verb + Suffix] $_{\alpha}$ + Tense + Inflection] $_{\omega}$

An uncontroversial instance of this trajectory is the grammaticalization of Latin *cantāre habeō* to French *chanterai* ‘I will sing’. Lahiri 2000 presents a parallel development in Bengali 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. The Germanic dental preterite can be assumed to have followed a similar path from the original light verb *dōn* to the suffix *-d-*.

- (2) *Latin*: [[cantā + re] $_{\omega}$ + [habe + ō] $_{\omega}$] $_{\omega}$
Old Bengali: [[bOš + i] + [ač + o]]
Germanic: [[tal + i] + [dēd + un]]

to

- (3) *French*: [chant + er + ai] $_{\omega}$
Modern Bengali: [bOš + (i) + č + o] $_{\omega}$
Old High German: [zel + i + t + un]

Lahiri 2000 posits that the new dental suffix goes through two stages, one where it is a stem extension, on a par with derivational suffixes, and another where it is treated as an inflectional ending.

- (4) a. [(Verb + Suffix + d) $_{Stem}$ + Inflection] $_{\omega}$
 b. [(Verb + Suffix) $_{Stem}$ + d + Inflection] $_{\omega}$

These different morphological structures, she proposes, are associated with different phonological effects, along the lines of level-ordered phonology. This is certainly a possibility, though one might wonder what would drive a reanalysis in which the ending migrates “downwards” from the stem level, the opposite direction from what is usually observed.

The link between the morphology and phonology of the weak preterite that I will explore here is more direct, and more radical. The core idea is simple: umlaut and vowel deletion took place *before* the light verb was morphologized to a suffix in West Germanic, and *after* this morphologization in North Germanic. Unlike all previous accounts, this achieves fully general and maximally simple formulations of umlaut and vowel deletion, both of which moreover can now be seen to be invariant throughout Germanic. In particular, umlaut applies to light and heavy syllables alike, and apocope and syncope apply freely in both branches, subject to the respective syllable and foot structure of each. No distinct “phases” or “stages” need be posited for of either process.

Let us take a closer look at the phonology. In a nutshell, the problem is that West and North Germanic seemingly differ in the conditions under which umlaut and syncope apply — a difference manifested *only* in the dental preterites. Whereas West Germanic *umlauts light stems* and *syncopates heavy stems* (see (5a)), North Germanic *umlauts heavy stems* and *syncopates both light and heavy stems* (see (5b)).

(5)	Germanic	Old High German	Old Icelandic	
	a. Light stems:	* <i>*taliða</i>	<i>zelita</i>	<i>talða</i> ‘counted’
	b. Heavy stems:	* <i>*dōmiða</i>	<i>tūomta</i>	<i>dōmða</i> ‘judged’

In Old High German, then, the distribution of medial *-i-* in dental preterites is governed by the weight of the preceding root syllable. The vowel is without exception lost after a syllable that is heavy in virtue of a long root vowel, as in (6a), a consonant cluster, as in (6b), or a geminate consonant (which then shortens again before the dental suffix), as in (6c). After short roots (whose final consonant are geminated before the stem-forming suffix *-j-*), *-i-* is normally retained, see (6d).

- (6)
- a. *tuomta* ‘judged’, *hōrta* ‘heard’
 - b. *dampfita* ‘steamed’ (from *dempfen*), *starcta* ‘strengthened’ (from *sterken*), *dursta* ‘thirsted’ (from *dursten*) *wanta* ‘turn’ (from *wenten*)
 - c. *stalta* ‘put’ (from *stellen*), *branta* ‘burned’ (from *brennen*), *kusta* ‘kissed’ (from *kussen*)
 - d. *nerita* ‘saved’ (from *nerren* < **ner-ja-n*), *knusita* ‘crushed’ (from *knussen* < **knus-ja-n*)

The distribution in (6) seems to indicate that medial vowels were lost after heavy syllables in Old High German. That is indeed what has always been assumed. Yet this putative syncope process would be extremely problematic, for it does not apply elsewhere in early Old High German, and is in fact massively contradicted by the data. Outside of weak past tense forms, Old High German regularly retains medial vowels, even after heavy syllables.¹

- (7) 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*, *gineritēr*, aber *hōrta*, *gihōrtēr*... — Sonstige ursprüngliche Mittelvokale werden im Ahd. (abgesehen von den ¶65 A. 3 genannten Fällen²) durchaus bewahrt; also z.B. Part. Praet. auf *-an*: *gibuntanēr*, *eigan* — *eiganemu*; *offanes*, schw. V. *offanōn*; Adj. auf *-ag*, *manag*, *heilag*, Gen. *manages*, *heilages*; Komparative wie *lengiro* zu *lang*. (Braune/Mitzka 1961:63).

The periphrastic origin of the weak preterites implies that the medial syllables of heavy-stem preterites need not have been lost by medial syncope: rather, they could well have been lost by word-final *apocope*, at a stage when the light verb had not yet become a suffix, when the stem before it was still an independent phonological word. That assumption immediately resolves the phonology, for it is a fact that West Germanic apocope took place precisely after heavy syllables. The distribution is especially perspicuous in Old English and Old Saxon (high vowel deletion

¹See also Baesecke 1918:66, 225 ff. for the details.

²This refers to a small set of words whose original medial vowels have been analogized to words with original epenthetic vowels. E.g. *meistar* ~ *meist(e)ra* — an originally disyllabic stem (in fact a loanword) which follows the pattern of an originally monosyllabic stem such as *fingar* ~ *fingra*.

as in *sunu* vs. *word* is a much discussed case in point). In spite of considerable analogical reshuffling,³ Old High German reflects the same distribution:

- (8) Old High German *-i* stems (original distribution)
- | | | | |
|-----------------|-------|--|-----------------------|
| <i>-i</i> stems | Light | <i>wini</i> ‘friend’, <i>quiti</i> ‘saying’, <i>turi</i> ‘door’ | (<i>-i</i> retained) |
| | Heavy | <i>gast</i> ‘guest’, <i>anst</i> ‘favor’, <i>durft</i> ‘need’ | (<i>-i</i> deleted) |
| <i>-u</i> stems | Light | <i>situ</i> ‘custom’, <i>fridu</i> ‘peace’, <i>fihu</i> ‘cattle’ | (<i>-u</i> retained) |
| | Heavy | <i>hand</i> ‘hand’ (later joined the <i>-i</i> stems) | (<i>-u</i> deleted) |

By attributing the deletion of the medial vowel in weak past tense forms to normal word-final apocope prior to grammaticalization we can eliminate the anomalous West Germanic syncope process outright — obviously a good result because it simply does not work outside the weak verb preterites, as shown by forms like *wirsiro* ‘worse’, *blintemu* ‘blind’ (dat.sg.) or those cited in (7).

Another benefit is that it directly explains the lack of umlaut in the forms with a deleted medial vowel, such as *tuomta* versus *zelita* (see (5)). For we know on independent grounds that word-final vowels were deleted before they could trigger umlaut — that is why long *-i* stems like *gast* ‘guest’ and *anst* ‘favor’ have no umlaut (contrast *meri* ‘sea’ from **mari*).

Note also that the proposed solution reduces the burden on the morphology to the irreducible minimum. All we need in order to get the phonology right is that the weak verb stem was a separate *prosodic word* in West Germanic when apocope took place. It need not have been a separate *morphological word* at that time, or indeed at any time. The identities of the morphological categories are also not important for our purposes — the phonology works regardless of whether the stem was an infinitive, or a verbal noun, or something else,⁴ and whether what followed it was a separate word (a light verb or an auxiliary, stage (1b)), or already degraded to a clitic, as a transitional stage between word and suffix (stage (1b)). The analysis is even consistent with the idea that the dental suffix is a conflation of the light verb *dōn* with one or more of the Indo-European dental suffixes (such as the perfect participle *-to-*), as long as it inherited its prosodic character from the former. Nor does it matter whether the tense suffix, once reanalyzed, became a class marker or an inflectional ending (or a stem-level or word-level ending). Sorting out all these options is an engrossing task for future research, but the phonological evidence discussed here does not contribute to it directly. By the same token, the hypothesis that the weak verb stem had the status of a separate prosodic word at the point at which West Germanic apocope applied stands on its own feet, being robustly compatible with a wide range of morphologization scenarios.

2 Explaining the phonological divergence

Now let us examine in more detail how the conditioning of apocope and syncope can be understood on these assumptions. With Optimality Theory, we suppose that phonological processes are limited by ranked violable constraints defined on

³Ultimately, most light *-i* stems adopted the declension of heavy stems, and nearly all heavy *-u* stems joined the *-i* stems.

⁴In Sanskrit, it is a special nominalized verb form derived by affixing *-ā* to the *present stem*. E.g. *cint-ay-* ‘think’ forms the periphrastic perfect *cint-ay-ām ās-a* (or *cint-ay-ām ca-kār-a*).

output representations. In particular, vowel deletion is governed by constraints on the prosodic form of words. The two most important families of such constraints, in Germanic and elsewhere, are those on foot structure and on syllable structure.

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 a moraic trochee, that is, a bimoraic unit consisting of two short syllables or a long syllable. As is not uncommon in moraic trochee systems, Light–Heavy sequences *could* be parsed into feet as a last resort in order to avoid metrically homeless syllables (the phenomenon called *resolution*).⁵ An additional proviso, formally corresponding to high-ranking NONFINALITY, is that word-final consonants are weightless (“extrametrical”).

If feet must have at least two moras (FOOTBIN) and words must contain at least a foot, then words must be minimally bimoraic; this minimum word length requirement excludes [C \check{V}] words, and, insofar as final consonants are weightless, also [C \check{V} C] words. Such a word minimality requirement will block word-final V-deletion (apocope) in disyllables after a *short* syllable, viz. [C \check{V} CV] _{ω} \nrightarrow [C \check{V} C] _{ω} . Finnish is an example of just this prosodic constellation. Monosyllabic words may be of the form C \check{V} C, but C \check{V} C words are excluded, for they would be monomoraic because final -C is weightless. In certain registers, Finnish final -i is deleted, e.g. *olisi* \rightarrow *olis*, *nousi* \rightarrow *nous*, *veisi* \rightarrow *veis*; this option is disallowed precisely in C \check{V} CV disyllables: *pesi* \nrightarrow **pes*, *kosi* \nrightarrow **kos*. The same constraining effect of word minimality on apocope is seen in Germanic, as illustrated by the Old High German *i*-stems in (8).

Vowel deletion is also subject to constraints on *syllables*. These typically involve an upper bound on the complexity of the syllable rhyme, or on the number of moras in the syllable. A common restriction of this type is the prohibition of superheavy (3-mora) syllables.

(9) * $\mu\mu\mu$: A syllable rhyme is maximally binary.

In a language with this constraint, medial V-deletion (syncope) might fail to apply after a *long* syllable: CVC.CV.CV \nrightarrow *CVCC.CV, and C \bar{V} .CV.CV \nrightarrow *C \bar{V} C.CV. An example is Cairo Arabic, where words such as **kalbna*, **baabna* are not possible for this reason, and the syncope process seen in words like *^ci.di.la* \rightarrow *^cid.la* ‘straight’ (f.) is blocked in *yik.ti.bu* \nrightarrow **yikt.bu* ‘they write’. As in Germanic, word-final consonants are weightless, so words of the type *baab*, *kalb* are admissible, but, by the same token, **bab*, **kal* are not possible words.

Now let us apply this idea to Germanic.

In West Germanic, by hypothesis, *-i/j-* in past tense forms of *-jan* verbs was lost at a time when the stem of weak preterites was still a phonological word in its own right; hence *-i/j-* in these forms was lost by apocope. Apocope would have had to apply to the *-i-* in the preterite of *-jan* verbs in heavy stems, but not in light stems, because of FOOTBIN. Since the umlaut-triggering vowel was lost in heavy stems, the later umlaut process could take effect only in light stems. Moreover, there is no need to assume an early medial syncope process, which would be otherwise unattested in the language. This accounts for all the West Germanic data discussed.

⁵For arguments that the Germanic languages have moraic trochees as their basic foot type, see Kiparsky 2000, and for other views, see Lahiri, Riad, and Jacobs 1999.

(10)	Light stems	Heavy stems
clitic stage:	[[zali] _ω ta] _ω	[[hōri] _ω ta] _ω
apocope:	[[zali] _ω ta] _ω	[[hōr] _ω ta] _ω
reanalysis:	[zalita] _ω	[hōrta] _ω

In light stems, the umlaut-triggering *-i-* is retained because : **zalita* → *zelita* ‘told’. In heavy stems, apocope takes effect, bleeding umlaut: *hōrta* ‘heard’ (≠ **hōrta*).

Polysyllabic stems are correctly predicted to pattern with the heavy monosyllabic stems in undergoing vowel deletion and no umlaut, for FOOTBIN does not block apocope in them, e.g. [[mahal+i]_ωta]_ω → [[mahal]_ωta]_ω ‘magnified’.

The apocope process just discussed, which applied early in West Germanic, did not extend to North Germanic, as contrasts such as Old Icelandic *gestir* (runic *-gastiR*) versus OHG *gast* demonstrate. 4th-7th century runic forms like *þaliR*, *horna*, *dagar*, *sitiR* preserve final vowels consistently. We can safely conclude that in this branch of Germanic word-final vowels were still intact at the point when the main verb fused with the following light verb into a single word (at stage (1c)). This conclusion is fully supported by runic weak past tense forms from the same period, such as *satiðo*, *tawiðo*, *fahiðo*, which retain the medial vowel, confirming that syncope in this category took place much later, perhaps not until the 7th-8th centuries — well after the weak past tense was fully grammaticalized.

If North Germanic weak past tenses lost their medial vowel when the weak preterites were already single words, their deletion must have been governed by the constraints on medial *syncope* — not by the constraints on apocope, as in West Germanic.

Its subsequent deletion is not governed by final apocope, but (as has of course always been assumed) by medial syncope, which is not constrained by FOOTBIN but by syllable structure. What are the relevant North Germanic syllable structure constraints? The Runic evidence shows that early North Germanic, unlike the Old Icelandic of later written texts, was subject to the three-mora prohibition (9) * $\mu\mu\mu$.

(11)	attested Runic form	ON version	
	<i>irilaR</i> (early 7th c.)	<i>iarl</i>	‘earl’
	<i>āsugīsalas</i> (ca. 400)	<i>Āsgīsls</i>	(compound PN)
	<i>wanðarāðas</i> (6th c.)	<i>Vandrāþs</i>	(compound PN)

This suggests that there was a shift in the syllable structure of North Germanic between the runic period and later Old Icelandic, dating perhaps to the 7th century:

- (12)
- a. Early North Germanic (Runic): the $\mu\mu\mu$ constraint limited syllables to maximally two moras (CVC, C \bar{V}), excepting monosyllabic words as usual.
 - b. Later (Old Icelandic): CVCC- and C \bar{V} C-syllables became admissible, and arose through syncope, apocope, and certain other processes.

Independent evidence for the more restrictive syllable structure of early North Germanic compared to West Germanic is that North Germanic evaded 3-mora syllables both ‘actively’, by deletion of *-j-* in overlong syllable and by shortening, and ‘passively’, by failing to lengthen. In all these respects it contrasts with West Germanic, which tolerated 3-mora syllables (Kiparsky 1998):

- (13) a. North Germanic: [*hirð.joo] → NGmc *[hir.ðo] (ON *hirþa*); light stems kept *j*, e.g. *niþja*.
 b. West Germanic: no deletion, e.g. OHG *hirtio* [hirt.joo].

High ranking of the * $\mu\mu\mu$ constraint also blocks Coda gemination in North Germanic, leading to another isogloss between the two groups:

- (14) a. North Germanic *[tel.jan] (ON *telja*).
 b. West Germanic *[tal.jan] → *[tell.jan] (OHG *zellen*)

Another consequence of high-ranked * $\mu\mu\mu$ is that it constrained Apocope, as can be seen in in *-i* stems (here we can assume that *-r* is parsed as an extrasyllabic mora):

- (15) Apocope in light stems: [sta.ði(-R)] → [stað(-R)] (↯ *[steð(-R)])
 No apocope in heavy stems: [gas.ti(-R)] → [ges.ti(-R)] (↯ *[gast(-R)])

From (12)-(15) we can infer that in North Germanic, medial syncope would have been originally restricted to *light* stems by * $\mu\mu\mu$. Therefore, syncope would have removed the trigger for umlaut in light stems, leaving scope for it to apply only in heavy stems. Hence we would have originally had **dōmiða* → **dōmiða* (later **dōmða*), but *taliða* → *talða* (and not ↯ **telða*).

- | | | |
|----------------------------|---|---------------------------|
| (16) | Light | Heavy |
| Structure at suffix stage: | [CVC+i+ð+a] _ω | [CVVC+i+ð+a] _ω |
| Syncope in light stems: | [ta.li.ða] _ω → [tal.ða] _ω | [dō.mi.ða] |

We cannot be sure that this was a synchronically stable stage, but if it was, it is of the type that is intractable in parallel OT. On the other hand, it can readily be modeled in Stratal OT (constraint-based Lexical Phonology). A stem-level constraint system with the ranking FOOTFORM ≫ *3-MORA ≫ * σ provides the input to a word-level constraint system, where * σ ≫ *3-MORA.

Our conclusion that medial syncope applied first in light stems and then in heavy stems reverses the traditionally assumed chronology. The basis for the handbooks' assumption of the opposite chronology is the analogy to apocope in *disyllables*, which indeed did apply first in heavy stems, e.g. *kuþumu[n]t, sunu* (Helnæs, ca. 800), which would be ON *Guþmund, sun* ([guþu]_ω[mundu]_ω, [sunu]_ω). In view of the considerations presented above, this inference is invalid. If both the minimum foot/word constraint FOOTBIN and the maximum syllable constraint * $\mu\mu\mu$ were dominant in early Old Norse, and final -C was weightless (NONFINALITY), then *final* apocope would have taken place in *heavy* stems, and *medial* syncope would have taken place in *light* stems. This would be a system like the one of Cairo Arabic, mentioned above. And it fits exactly both the syncope data and the distribution of umlaut seen in the early records.

In the last period of apocope, it seems that the effects of *3-MORA become morphologized to some extent. In the *-ja* stems it dominates FOOTFORM:

- (17) Light *-ja* stems: *kyn* 'kin', *ber* 'berry', *fen* 'fen'
 Heavy *-ja* stems: *rīke* 'kingdom', *kuæþe* 'saying', *dōme* 'judgment'

On the other hand, 3-mora syllables eventually became admissible, so that syncope is extended to heavy stems:

- (18) **dōmiða* → *dōmða*, *gestiR* → *gestR*.

Analogical developments such as *talða* > *telða* and N.Pl. *steðir* > *staðir* also indicate morphologization of Umlaut. Apparently it became a stem-level process and ceased to be triggered by word level (inflectional) suffixes. (Cf. Lahiri 2000, and the parallel later development of *u*-Umlaut, see Kiparsky 1984.)

	c.	Apocope	heavy stems	light stems, later heavy stems
		Light <i>-i</i> stems	<i>wini</i> (<i>Ab</i>)- <i>guti</i>	<i>vin</i> (> <i>vin+r</i>) <i>guþ</i>
		Heavy <i>-i</i> stems	<i>gast</i> <i>-durft</i>	* <i>gestir</i> > <i>gest+r</i> (Umlaut!) <i>þyrft</i> > <i>þurft</i> (Umlaut!)
(19)		Light <i>-u</i> stems	<i>sunu</i> (> <i>sun</i>) <i>fridu</i>	<i>son</i> (> <i>son+r</i>) * <i>frið</i> (> <i>frið+r</i>)
		Heavy <i>-u</i> stems	<i>hand</i>	<i>hǫnd</i>
		Light <i>-ja</i> stems	<i>beri</i>	<i>ber</i>
		Heavy <i>-ja</i> stems	<i>tuom</i> (> <i>a</i> -stem)	<i>döme</i> (Umlaut!)
		Light <i>-wa</i> stems	<i>haro</i> , <i>-u</i>	<i>hǫr</i> ‘flax’
		Heavy <i>-wa</i> stems	<i>drang</i> (?)	<i>þrong</i> ‘throng’

I conclude that the proposed perspective is no less fruitful on the North Germanic side. It sweeps away the unnatural restriction of umlaut to heavy stems posited in previous analyses. Umlaut can now be assumed to apply identically and in full generality in all branches of Germanic. And we can bid good riddance to any weight conditions on umlaut, which were phonetically quite arbitrary — why would a *heavy* syllable be more likely to assimilate to a following high front vowel? — as well as suspiciously redundant on account of repeating a condition which is needed for syncope anyway, where it *does* make excellent phonetic sense, for the reasons just explained. In any case, there is plenty of evidence that umlaut did apply also in short stems, such as the nouns *teļiþ*, *lykell*, *fetell* (versus Rök *fatlaþR* from /*fatilaðVr*/, where it was bled by syncope). These data then fall out straightforwardly.

A second gain for North Germanic is that the difference between the conditioning of final apocope and medial syncope is derived on principled grounds from the fact that the output of the former (but not of the latter) is subject to word minimality constraints.

3 Conclusion

I summarize my conclusions as follows:

- a. Germanic has the same grammaticalization trajectory as Romance and Middle Indic, whereby light verbs/auxiliaries become suffixes viz. (1). Lahiri was right in seeing this morphological development as the key to the phonology of the Germanic weak preterites.
- b. The *-i-* of weak preterites was lost in WGmc before grammaticalization, hence by apocope, in NGmc after grammaticalization, hence by syncope. This explains the divergence of forms in West Germanic and North Germanic.

- c. The differences in V-deletion processes between West Germanic and North Germanic follow from the respective syllable structures of these dialects.
- d. Umlaut need not be restricted to heavy stems in North Germanic. The restriction is rather that heavy stems do not lose the umlaut-triggering vowel by medial syncope, because of early North Germanic's resistance to super-heavy syllables.
- e. There is no need to posit an otherwise unattested medial syncope process for early Old High German.

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