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Scandinavian Front Umlaut Revisited and Revised

1 Introduction

The research is nowhere close to consensus in describing diachronically preliterary Scandinavian front umlaut, and in fact no closer to an adequate analysis of rounding umlaut or breaking. To a reasonable extent atomistic sound laws admittedly account for how reconstructed Proto-Germanic (PGmc) forms of departure and attested Old Scandinavian

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Abstract: To date, no analysis has adequately accounted for the attested distribution of front umlaut in Old Scandinavian. In this study attention is paid to unexpected outcomes that defy the generally accepted rules. In particular, the complications posed by *iʀ*-umlaut are refined into an acid test against which existing hypotheses fail. A genuinely novel proposal is developed, based on the assumption that in prominent syllables contrast well into the umlaut period was upheld between descendants of Pre-Germanic (PreGmc) */e/ and */i/ respectively, even upon the Pre-Scandinavian raising of **e*. Upon such raising the descendants of PreGmc */e/ had in all oral contexts evolved into a markedly fronted coronal vowel **î*, whereas in prominent syllables descendants of PreGmc */i/ had by default, with few exceptions, in a chain shift evolved into a non-umlauting dorsal vowel **ï*. Given the assumption that a light second syllable within a main stressed bisyllabic foot was prominent, the two vowels **î* and **ï*, active and inert as triggers for front umlaut respectively, could both have occurred in this position. By explaining their distribution in the lexicon, the notoriously intricate cruxes of *i*-umlaut may be neatly accounted for.

Key words: front umlaut, palatal umlaut, Proto-Scandinavian, Ancient Scandinavian, vowel systems, diachronic linguistics, historical phonology, phonological contrast.

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(OSc) terminal forms correlate. Nevertheless, most aspects of phonological change in between those states are disputed, and the precise circumstances determining when and why breaking or umlaut had been active or inert in fact defy an adequate coherent analysis. It is also ultimately unclear precisely which postulated sound laws were valid, with serious attempts having been made to explain several as results of analogical change.

The most infamous crux, though by no means the only one, concerns the conditioning factors by which *i/j*-umlaut came to appear in the precise lexical distribution that is attested.[1] In both western and eastern Scandinavian *i*-umlaut on non-palatal[2] vowels in light syllables is, contrary to expectation and unlike conditions in Old Gutnish and for example High German, absent across various inflexional classes. These include the preterites of class 1 weak verbs, exemplified by the Pre-Scandinavian (PreSc) 1. pers. sg. pret. **ta.li.ðō* > Old Norse (ON) *talða* 'I told, counted' (rather than expected *+telða*), and masculine *i*-stems, exemplified by PreSc nom./ acc. sg. **sta.ði-* > ON *stað-* 'place' (rather than *+steð-*). These unexpected outcomes must be contrasted with the fact that a palatal vowel occurring after a heavy syllable in the PreSc 1. pers. sg. pret. **dō.mi.ðō* had triggered front umlaut, resulting in ON *dœmda* ~ OSw *dømda* 'deemed, judged, sentenced', as well as in acc. sg. of the masculine *i*-stem **gas.ti* > *gest* ~ OSw *gæst* 'guest'. As will be accounted for below, attributing the difference merely to a distinction in syllable weight brings up a number of complications, which have turned out to be excessively thorny to untangle. A particular challenge is posed by a number of clearly delimited classes of words where front umlaut does occur in light target syllables quite regularly, but in contradiction to the more generally applicable rule.

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[1] The continued lack of a common opinion of the scholarly community is manifest, for example, in comments on the partly runology-based monograph on *i/j*-umlaut by Michael Schulte (1998; Rasmussen 2000: 158; Liberman 2001: passim), on the status of umlaut research in general (Liberman 2007: 13f), and in reciprocal criticism (Voyles 2005: passim; Kiparsky 2009: 28, 42–45; Iverson & Salmons 2012: 103–104; Fertig 2013: 18ff).

[2] Phonetically non-front vowels, including *a*, are denoted "non-palatal" in order to reserve terms like "back", "low" or "dorsal" for more precise phonological usage. Likewise, to avoid phonological denotation, phonetically front/non-back vowels may be referred to here as "palatal", even if the term ultimately will be shown to be imprecise in this context.

1.1 Aims, Method, Data, Periodisation and Presentation Conventions

The principal aim of this paper is to present and argue the key elements for a novel solution that can account for the distribution of front umlaut in the Scandinavian lexicon, and accordingly to explain under what conditions this primary phonological stage of sound change originally occurred, as well as, by implication, its relation to later analogical change and resulting synchronic morphological generalisations. A secondary aim is to demonstrate that this solution is more powerful and economical than some of the main hypotheses advanced in the last two decades, and especially in explaining the most notorious classic complications. The main findings, previewed in the abstract, are summarised in subsection 1.2. The analysis also entails rules for syllable prominence, which may be tested against the evidence of syncope.

First and foremost, the conventional methodology of historical phonology is applied, and most importantly internal reconstruction. In these applications particular consideration is given to the metaphonic effect that phonemes exercise on each other. It is assumed *a priori* that a vowel influences equivalent vowels in neighbouring syllables in an equal manner in equivalent contexts. Conversely, if the influence of a postulated proto-phoneme is not equal under equivalent conditions, its unity must be critically called into question. The pre-understanding of Proto-Scandinavian metrics relied upon here is not accounted for explicitly. The essential elements of it are deemed to enjoy broad scholarly agreement and are readily accessible in the public domain in the dissertation of Tomas Riad (1992) reflected in Lahiri et al. (1999) and developed in Kiparsky (2009: 16–19). The basics that are most relevant to the present analysis is also recounted in Schalin (2017: subsection 3.1).

The core material delimited for this study is the vocabulary of Old Norse, Old Swedish and Old Danish as reflected in etymological dictionaries (AEW, DEO, EDPG, PEO, SEO, VAEO) and handbooks, with a relative bias for cognate lexical items, the distribution of which extends to the east. More attested data than specifically addressed here have been taken into account in background research, and the examples chosen are intended to be representative and probative. Even so, the study is not as data heavy as its ambitious scope ultimately may require. Counter-examples, true or ostensible, may well have been overlooked and will hopefully be brought forward in coming discussions. In future discussion on the proposed hypothesis, the use of more thorough dialectal, philological and/or toponymical sources may be warranted.

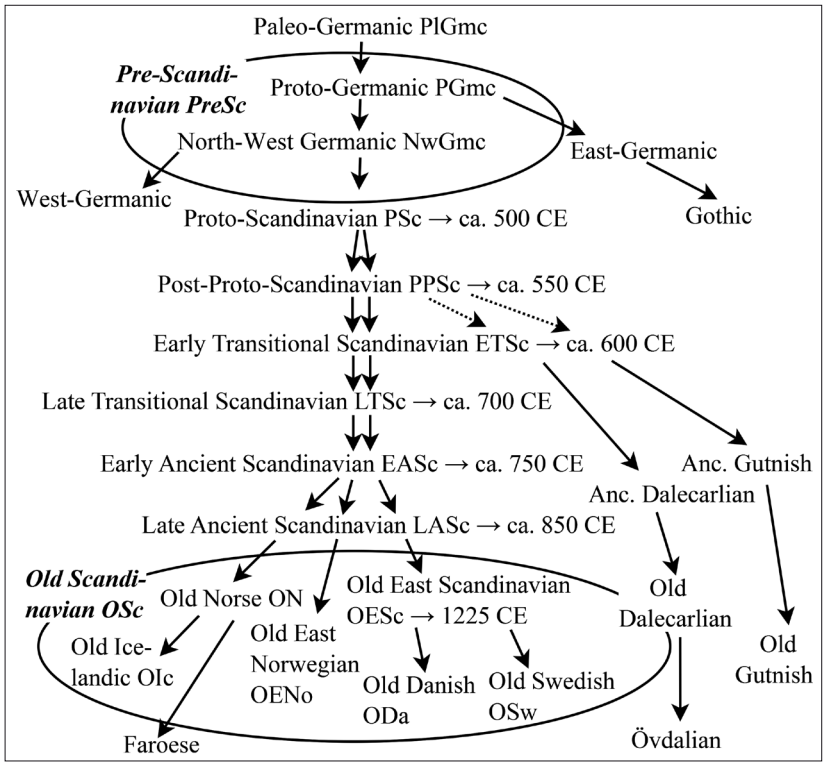

Figure 1†. Branching of preliterary Scandinavian languages.

† Övdalian, the language of Älvdalen in the Swedish province of Dalarna, is also known by the exonym Elfdalian. In Figure 1 "Old Dalecarlian", unlike the other particularised Old Scandinavian languages and Old Gutnish, is a hypothetical ancestor, the geographical extension of which is left open.

No uniform or consensual standard for the periodisation of preliterary Scandinavian exists. The one used in Figure 1 is a synthesis specifically defined for the purpose of this research and aspires to describe turning points in accordance with structural shifts in the vowel system (further justified in Schalin 2017: subsection 3.3 and Section 6), including those that constitute the swift succession of Transitional and Ancient Scandinavian; here the research tradition which assumes significantly divergent times of syncope for the short oral vowels *-a*, *-i* and *-u* is accepted. Dates given for this essentially relative chronology are approximate, with a margin of uncertainty of some one to three generations of language learners. Figure 1 also serves as a reference for abbreviations of developmental stages used in this paper.

"Proto-Scandinavian" (PSc) refers to a developmental stage with no second syllable syncope and umlaut occurring in main stressed syllables only non-contrastively. The stage began after some shifts had occurred in how vowels were contrasted in the system, amounting to change that had set Proto-Scandinavian apart from its West Germanic sisters. This stage ended with the conclusion of early "Post-Proto-Scandinavian" (PPSc) *a*-syncope around 550 CE. A much earlier stage, in which the merger of **e* and **i* outside prominent syllables had not yet taken place, will be denoted "Paleo-Germanic" (PlGmc), and the stages between PlGmc and PSc will be denoted "Pre-Scandinavian" (PreSc; cf. Figure 1).[3] The latter term is intended to be chronologically indifferent with regard to "Proto-Germanic" (PGmc) and "Northwest Germanic" (NwGmc), the reconstructions of which will both be affected by the main findings.

Language material that is not representing attested runic script in bold type appears in italics. Where the language is not designated, italic font refers by default to Old Norse (without asterisk) or to Proto-Scandinavian (with asterisk). Hypothesised but counterfactual reconstructions are prefixed with a '+'-sign, and cognate or equivalent forms are connected with a '~'-sign. Regular sound change is marked with '>' or '<', mutation or borrowing with '→', while derivation by synchronic rules is marked with '~>' or '<~'.

Where metrical analysis is discussed, syllable breaks may be marked with a dot; the extension of the main stressed bimoraic foot (henceforth called "the main foot") shown with a double vertical line '‖'; the moraic segments may be underlined; and symbols in prominent syllables placed in bold, as exemplified by f. nom. sg. ****ga.ma*‖*lu*** > *gǫmul* 'old'.

According to convention, vowel length will be marked by a colon when presented in square brackets or slashes, by repeating the sign when representing bimoraic segments, but otherwise indicated by a macron '◌̄' above the vowel (except in standardised Old Norse spelling, where an acute accent '◌́' is used). The epenthetic vowel before a word-final resonant in Old Swedish will be standardised to 'ę'. Some unconventional symbols are used where warranted: for example the Scandinavian long non-prominent vowel, which upon shortening in preliterary times emerged as non-umlauting *-i-* ,will be marked *ɜ̄*, as *a priori* it was deficiently fronted, judging from its inertia as a trigger of potential front umlaut.

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[3] PlGmc will be represented as if Grimm's and Verner's laws had been completed, for reasons given in nt 17).

1.2 Main Findings and Structure of the Paper

A main finding of the paper is that the respective descendants of Paleo-Germanic */e/ and */i/, whenever positioned in a prominent syllable, had remained mutually contrastive well into the umlaut period. The most fundamental phonological contrast between them was their opposite phonological specification for a coronal feature. Therefore, the raising of some descendants of PlGmc */e/ in prominent syllables did not typically result in their merger with descendants of PlGmc */i/, but rather in a coronal (more specifically characterised: a laminal) vowel, henceforth denoted **î*.

Another main finding is that, in a light second syllable positioned after a light main stressed syllable, the phonological contrasts for vowel qualities were upheld in a manner equal to the manner applicable in positions of the main stress. This is inferred from the differing fronting influence that the descendants of these two Pre-Germanic vowels exercised from this triggering position. Accordingly, from that position the coronal vowel **-î*, being a descendant of PlGmc */e/, consistently triggered front umlaut, as exemplified by PreSc **framepō* > **fra.mî‖þu* > *fremd* 'furtherance, honour', whereas the descendant of PlGmc */i/, in places where it had developed undisturbed, emerged on account of a chain shift as a dorsal or dorso-palatal vowel, henceforth denoted **ï*, and thus normally remained inert as a trigger for front umlaut, as exemplified by PreSc **framiðō̄* > **fra.mï‖ðoo* > *framða* 'I carried out'.

Only exceptionally, in a very limited and natural set of contexts adjacent to coronal consonants, did the descendant of PlGmc */i/ develop conditionally into the coronal **î* and in those cases indeed also became an active trigger of front umlaut. The one most emblematic context where this regularly occurred was a tauto-morphemic PreSc sequence **-ïz-*, which did not develop into *+-ïz-* but **-îz-*, as exemplified by PreSc **fram-ïz-ō̄* > **fra.mî‖zoo* > *fremra* 'the anterior' (f. nom. sg.). Laminalisation had also happened sporadically between two coronal consonants, exemplified by PreSc **satiðaz* > **sa.tî‖ðaz* > *settr* 'set' (past participle). In this analysis a feature [coronal] is used as is conventional for such vowels, even if here it means more precisely laminal as opposed to both dorsal and apical articulation (see subsection 3.3).

In non-prominent syllables the descendants of the two vowels had merged in Pre-Scandinavian times in the context of an impoverished vowel system and had (whenever not becoming nasalised in TSc) resulted in a coronal **-î*. Thus, these oral descendants, which were positioned

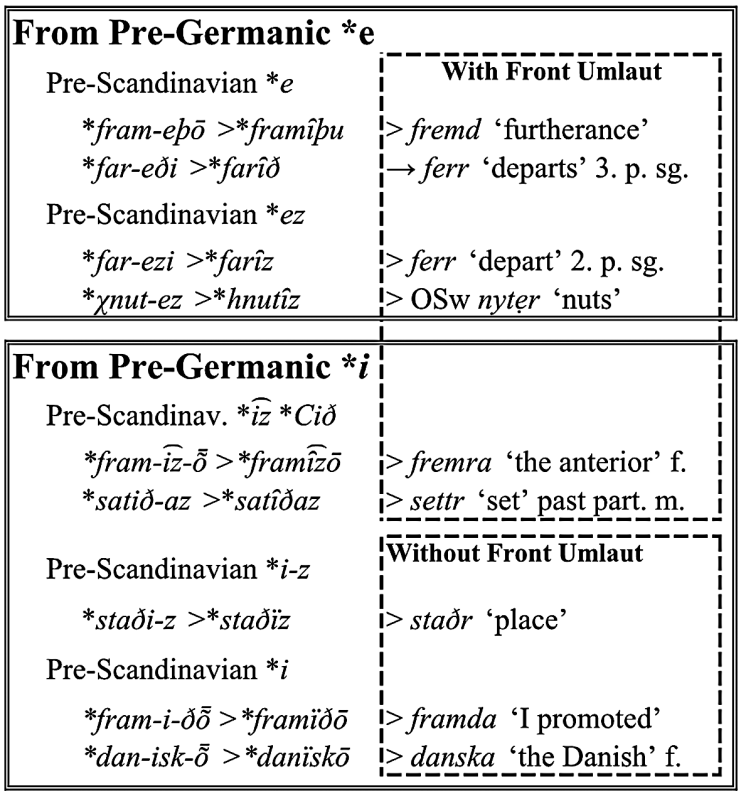

Figure 2. Front umlaut in short syllable and origin of trigger.

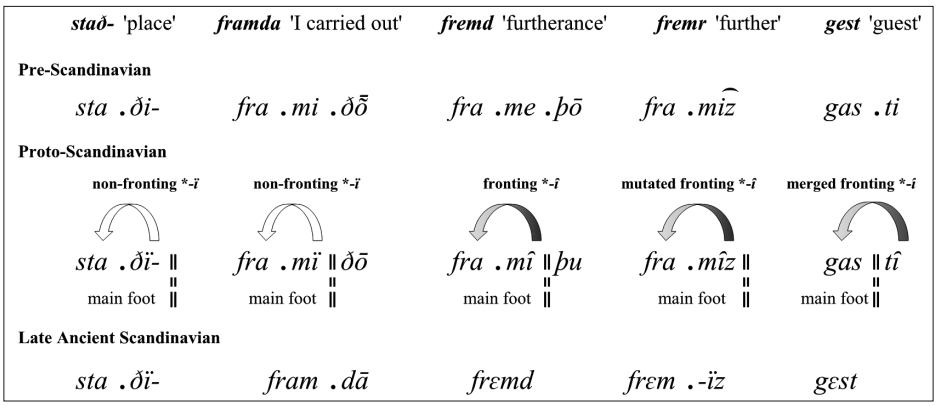

Figure 3. Contrastive coronality of triggers in non-prominent and prominent syllables respectively.

outside the main foot, regularly triggered front umlaut regardless of etymological origin, as exemplified by PreSc **dōm-i-ðō̄* > **dọọ‖mî.ðọọ* > *dœmda* and PlGmc **gasti* > **gas‖tî* > ASc *gɛst* > OSw *gæst* 'guest' ~ON *gest*. Given the conclusion that no such merger had occurred in a second light syllable within the main foot, makes it hard to avoid the ensuing conclusion that such a syllable was prominent.

Building on these immediate main findings, an analysis is developed that explains the distribution of front umlaut triggered by long vowels and derives the prominence of syllables outside the main foot by a count of moras from right to left. This analysis may correctly predict not only the fronting features of umlaut triggers but also the progression of syncope in a manner which conforms to the respective attested outcomes.

The study arrives at these solutions through a traditional kind of diachronic argumentation while built on prosodic theory. In order to enhance and deepen the analysis the paper benefits from being read in parallel with a more theory-specific phonological study based on the Contrastive Hierarchy Theory, published elsewhere (Schalin 2017). There the Proto-, Transitional and Ancient Scandinavian vowel systems are approached comprehensively, and the solution for front umlaut is derived from regularities concerning rounding umlaut and breaking in a way that is only cursorily recounted below (in Section 4). The two papers are mutually supportive as they arrive at the same novel solution for front umlaut by applying two quite independent lines of argumentation.

The paper is organised as follows: In Section 2 an outline of the point at issue is presented based on a classic problem configuration, which is critically evaluated, after which the data will be reconfigured. In Section 3 some paradoxes of *iʀ*-umlaut will be developed into an acid test, against which past research fails. In an interlude in Section 4 relevant new analysis regarding contrast in the PSc vowel system will be presented in order to contextualise the explanations given in the subsequent sections. The new solution, as summarised above, will be discussed in Section 5. In Section 6 an outline shows how the solution may be extended to a prosodic analysis for mora and syllable prominence. In Section 7 existing and competing explanations based on umlaut reversion will be shown to be unsatisfactory.

With the main findings previewed above in Figures 2 and 3, the presentation in Sections 2 and 3 will take a step back and begin with the status of the research before this article. The reasoning will advance logically from the well known towards the novel, which correlates chronologically with a direction from the later Scandinavian data towards earlier

PreSc reconstructions. The discussion in Sections 2 and 3 will not revise or display any novel reconstruction of vowel systems older than Proto-Scandinavian, and, accordingly, Pre-Scandinavian reconstructed forms are omitted in Tables 1, 2 and 3, only to appear in Section 4 and Table 4.

In Sections 4 and 5 the new reconstruction of Proto-Scandinavian will be reconciled with the Pre-Germanic origin of each vowel. This will be done exclusively on the basis of North-Germanic data. Even if, as is evident, there will be important implications for the reconstruction of Northwest Germanic and Proto-Germanic, no predictions are engendered for the reconstruction of Proto-West-Germanic, where the descendants of Paleo-Germanic */e/ and */i/ could plausibly have already rearranged as allophones in complementary distribution. Therefore, data from West Germanic could not possibly falsify the hypothesis and would thus be merely a distraction in this paper.

2 Scandinavian Front Umlaut Revisited

This section will focus on the distribution of front umlaut in the Scandinavian lexicon. In order to infer which rules had governed the fronting, the data need to be configured and the regular phonological output tentatively identified and delimited from output obscured by late analogical change and morphological generalisations. Before reconfiguring the data, the classic configuration will be presented and evaluated. In doing so, and in order to do full historical justice to the reasoning of past research, a distinction between coronal *î* and dorso-palatal *ï*, which until now have been assumed to constitute one single phoneme, will not at first be represented in reconstructed items. Before this distinction is discussed in Section 3 the diacritics that represent it will nevertheless be reintroduced beginning with subsection 2.3 in order to make maximally transparent thereafter the benefits of the present solution vis-à-vis front umlaut at each point of dispute.

2.1 The Classic Problem Configuration and Kock's Legacy

Quite different from light syllables, *i*-umlaut on non-palatal vowels in heavy syllables is usually present where historically a short palatal vowel *i* has occurred in the next syllable. Exceptions for heavy nominal stems are not rare, particularly in western Scandinavian, but they are of a char-

acter that is plausibly explained as expected outcomes of an early change of stem class with elements of analogical change (see for example Bibire 1975: 186–188; Schulte 1998: 68 nt 1 with references; Rasmussen 2000: 153; Iverson & Salmons 2004: 88, 91; Rishel 2008: 299f; Myrvoll 2012: 30f). The exceptions occur most famously in the feminine heavy *i*-stems, for example **burði-* → ON *burð* 'birth, descent' for the expected +*byrð* (compare, however, OSw *byrþ* 'ibid.').[4]

As the fronting in heavy syllables may be deemed phonologically regular, a fundamental problem concerns front umlaut in light target syllables. The set of data most frequently used to configure it, following the classic hypothesis of Axel Kock (1911–16: 38–43), is shown in Table 1, with the addition of symbols for modern metrical analysis as defined above.

With the problem limited to these classic examples, an apparent regularity cannot escape the eye, that is, when a palatal trigger vowel had followed a heavy syllable (i.e. it had been situated outside the bimoraic main foot), front umlaut occurred (Table 1, column 1),[5] and when it followed a light syllable (i.e. it had been situated within the main foot), front umlaut would not occur (column 2) except where the trigger was exempt from syncope, in which case it would have functioned as a fronting trigger (column 3). Kock translated these regularities into a three-period chronology, where each phonological context correlated with a specific stage of language development, with front umlaut in each stage causally related to syncope in a different way. Accordingly, the first wave of syncope would have hit unstressed triggers following heavy syllables, and as an immediate consequence would have caused front umlaut ("syncope with umlaut"). In an ensuing development, triggers following light syllables would have lost their relative degree of stress and later ultimately undergone syncope, most notably, however, at a stage when the umlaut mechanism had in the meantime become disabled ("syncope without umlaut"). Later still, palatal trigger vowels that had escaped syncope altogether would have become active and, despite being spared re-

[4] The suggestion of Kortlandt (1992: passim), namely that umlaut would be irregular for short vowels also in heavy stems and regular only for long ones, does not accommodate the data very well, especially not eastern Scandinavian (Rasmussen 2000: 153).

[5] Short **a* was first fronted to short */æ/ or */ɛ/, which sometimes for ON is denoted <ę>, but more often as plain <e>. Long **ō* was fronted to rounded *ø̄*, which in Icelandic orthography is represented by <œ>. In italic script this symbol is not always distinguishable from unrounded <æ>, which is especially confusing because the two phonemes later merged in Middle Icelandic. Other vowels and diphthongs fronted by umlaut are *u* → *y*, *ū* → *ȳ*, *ā* → *ǣ*, *iu* → *ȳ* and *au* → *øy/ey*. Unlike Old High German, there are no grounds for separating chronologically front umlaut of low vowels from that of non-low vowels.

Table 1. Set of data to illustrate Kock's hypothesis, shown according to syllable weight.

	1. Heavy first syllable, front umlaut accomplished	2. Light syllable and deleted trigger, no front umlaut	3. Light syllable and remaining trigger, front umlaut accomplished
first class of weak verbs	**d<u>oo</u>‖m<u>i</u>ð<u>oo</u>* > *dœmda* 'I deemed, sentenced' 1. pers. sg. pret.	**t<u>a</u>l<u>i</u>‖ð<u>oo</u>* > *talða* 'I told, counted' 1. pers. sg. pret.	
masculine *i*-stems	**g<u>a</u>s‖t<u>i</u>z**/**g<u>a</u>s‖t<u>i</u>* > *gestr*/*gest* 'guest' nom. sg. / acc. sg.	**st<u>a</u>ð<u>i</u>z‖*/**st<u>a</u>ð<u>i</u>‖* > *staðr*/*stað* 'place' nom. sg. / acc. sg.	
instrumental suffix **-il-*	**b<u>a</u>n‖d<u>i</u>l<u>oo</u>z* > *bendlar* 'bands' m. nom. pl.	**k<u>a</u>t<u>i</u>l‖<u>oo</u>z* > *katlar* 'kettles' m. nom. pl.	**k<u>a</u>t<u>i</u>l‖<u>a</u>z* > *ketill* 'kettle' m. nom. sg.

duction, would have caused secondary front umlaut ("umlaut without syncope").

Kock's hypothesis was controversial from the time it was proposed and has had no subscribers since the advent of phonology as a discipline separate from phonetics. The criticism of it typically maintains that the supposed mechanisms of sound change are phonologically unnatural and the discontinuous sequencing too arbitrary and complex to be right. Explaining umlaut as caused by trigger loss is not only phonologically implausible, but also handled contradictorily within the hypothesis itself.

The struggle by linguists to give new answers to the old questions was scrutinised by Hreinn Benediktsson (1982) in his landmark article "Nordic Umlaut and Breaking: Thirty Years of Research (1951–1980)". Here he insightfully discussed the post-war efforts that had been based, alternately, on structural and generative phonological theory. Hreinn (ibid.: 1ff) showed that, despite initial optimism based on a strong faith in the new tools of linguistic theory, some of the traditional or classic problems had tended to persist "or continually to reappear, in one guise or another, and thus to continue to defy a convincing solution". The efforts had resulted in what Trygve Skomedal called a "sad state of affairs" (ibid.: 20f). The only point of consensus identified by Hreinn (ibid.: 5) was a negative one: the theoretical basis for the assumptions governing Kock's three-period hypothesis had been refuted.

The post-war denunciation of Kock's hypothesis has gone undisputed and is reflected among other places in accounts by Bengt Hesselman (1945: 3–15), Herbert Penzl (1951: 7–12), Robert King (1971: 2f), Paul Bibire (1975: 200–201), Timothy Reid (1990: 23f), Ottar Grønvik (1998: 50f), Paul Kiparsky (2009: 1), Gregory K. Iverson and Joseph C. Salmons (2012: 103), as well as David Fertig (2013: 11). Among such critical secondary accounts of Kock's hypothesis, Rischel's (2008: 199f) stand out as an accessible, concise, recent and theoretically clear one.[6]

It is perplexing that the unanimous denunciation of Kock's explanation has had remarkably little impact on the practice of configuring the problem on the basis of his analysis (Rischel 2008: 199f). This may depend in part on the lack of better explanations to take its place, as well as on the status that Kock's analysis has in obsolete, yet commonly consulted, handbooks.[7]

Hence, while the answers given by Kock are considered flawed, his problem configuration, here illustrated in Table 1, is still mostly accepted, even if it is no less dubious. Accordingly, most if not all efforts to explain Scandinavian front umlaut have continued to be based on the assumption that the main question to be answered is "why" or "how" rather than "whether" the difference in weight of a first syllable is the single most important condition that determined front umlaut.[8] Yet a comprehensive and critical look at the data surely reveals that Kock's analysis and the descriptive elements of his account are in a circular dependency on each other. Before reconfiguring the problem, it will briefly be outlined how preoccupation with the configuration in Table 1 has led research into an impasse of dissent and disarray. A more in-depth account of the most recent decades of research history will be published in the summary chapter of my doctoral thesis (Schalin forthcoming).

2.2 Typology of Traditional Solutions

Most standard solutions fall into two main categories, which further subdivide into numerous subcategories. One main category has been underpinned up to the present by a notion self-evident to the neo-grammarians,

[6] For earlier opinions see also the account by Aleksander Szulc (1964: 19ff).

[7] For example Noreen 1923 [1884]: §66; Wessén 1968 [1941]: §3.

[8] This is not to imply that the difference would not originally be phonological. Paul Bibire (1975: 204) rightly assesses isolated attempts for the purpose of replacing phonological explanations entirely by "analogical restructurings" as "a gesture of despair". A consensus around the phonological approach is also taken for granted in the configuration of contemporary research by Hreinn Benediktsson (1982: 25).

namely that the target vowels in light syllables that lack umlaut were never fronted to begin with. Sievers (1878) explained the outcome by means of chronology, namely by syncopation of the trigger before the productivity of front umlaut. Most other pioneers, here exemplified by Kock (1911–16) and Pipping (1922), attributed a pivotal role to a difference in accentuation. They believed umlaut to have been a rather instant event, by which fronting virtually migrated or rescued itself to the safe haven of the main stressed syllable as an immediate and direct consequence of the loss (or imminent loss) of a trigger vowel. Thus, according to them, triggers became active through weak articulation when deletion threatened. In their view this did not initially apply to a short vowel following a main stressed light syllable, because it carried a relative amount of stress.

From the mid-twentieth century onwards structuralist phonology has propagated a very different idea, namely that front umlaut must have first occurred uniformly at an allophonic level. Often this has been accompanied by the notion that umlaut by nature was driven by an easing of the co-articulatory effort and was occurring in anticipation of a sharply rather than a weakly pronounced trigger vowel. This logic is typical of another main category of explanations, which states that, while synchronic phonetic fronting of non-palatal vowels would have occurred unconditionally before a palatal trigger, it would in most light stem paradigms have failed to become phonological and later would have reverted to the base form of the source phoneme. According to Penzl's (1951; 1984; cf. Elmevik 1993: 82) proposal, the original trigger vowel having been deleted early, an unsyncopated non-palatal vowel would consequently have moved up from the third syllable to take its place as a trigger and caused active *Rückumlaut*, or "reverse umlaut". This is not the idea entertained by most proponents of umlaut reversion, who do not attribute the relapse of fronting to a backing trigger, but merely to a demise of the fronting rule, whether involving a depalatalisation of the trigger or merely a deactivation of the umlaut mechanism. In order to accommodate the additional stages required to explain such passive umlaut reversion, a solution to the anomalous distribution of *i*-umlaut has been sought by assuming the later syncope of triggers after light syllables. Such proposals are reviewed in Section 7 below. The first to propose this idea was Bengt Hesselman (1945: 3–15), who also foreshadowed the advent of similar, but structuralist explanations. The idea of umlaut reversion has also merited non-structuralist reformulation in the elaborated works of Michael Schulte (1998) and Gregory K. Iverson and Joseph C. Salmons (2004, 2012).

In contrast to the tradition of umlaut reversion continued by Schulte as well as Iverson and Salmons, many modern theoretical phonologists represent an ongoing backlash against assuming initial exceptionless synchronic application of phonetic umlaut and its subsequent conditioned reversion.[9] Most regrettably, however, the return of researchers to the first main category of explanations, which in some ways revives a prestructuralist research tradition, has nevertheless not promoted any convergence towards consensus. On the contrary, the reliance on shaky conjecture has allowed contradictory conclusions to be drawn from the same data: in order to cause front umlaut, the syllable carrying the trigger has been thought to be too strongly stressed on the one hand (Braroe 1979) or too light on the other hand (Rischel 2008). Alternatively, the target vowel has been thought to be too light or too weakly articulated to undergo umlaut (Bibire 1975, Riad 1988, Lahiri 2000). The trigger has also at times been claimed to stand too close to the target (Basbøll 1993, Suzuki 1995, Grønvik 1998: 52f). With regard to invoking possible parallels in documented languages to support these hypotheses, there is much to be desired.

The mutual contradictions among these explanations illustrate that the problem of establishing a causal link between a hypothetical prosodic system, a hypothetical sequencing of syncope and equally hypothetical postulates concerning the umlaut mechanism has indeed proved insurmountable without resorting to overt or tacit *ad hoc* assumptions and/or circular reasoning. The unknowns of the equation seem to have been too many to cope with. The tendency to engage in conjecture is, however, fully understandable, because the alternative is not very attractive either; merely to restate the descriptively obvious in an *ad hoc* fashion, namely that in a certain prosodic context pure and simple, front umlaut just happens to be inert or its phonologisation happens to be aborted or reverted, is in effect void of explanatory power (Hreinn Benediktsson 1982: 34).

The point cannot be sufficiently stressed that, in order to convince, a hypothesis must be verifiable or falsifiable against recalcitrant data that do not fall within a comfort zone delimited *a priori* as a platform to argue a hypothesis. In the present study, checks and tests against ill-fitting paradigms that too often have been set aside from the scope of interest are

[9] On this point research history is here interpreted differently as compared to the account of Iverson & Salmons (2012: 103–104). The difference may be one of perspective. In North America the other main category of explanations also had a stronghold during the heyday of structuralism. Moreover, Iverson and Salmons seem to be unaware of some of the Scandinavian proponents of umlaut reversion, such as Dyvik, Skomedal and Widmark, as no references are made to them.

used in the construction of the argument from the outset. In another paper (Schalin 2017), this approach of using multiple cross-checks is taken even further to utilise unexplained anomalies of rounding umlaut and breaking in a unified analysis.

2.3 Reconfiguring the Problem

The classic question with regard to front umlaut and syllable weight has now been cursorily outlined. The working assumption tested next is that the difficulty in finding a good answer may reflect that the problem is poorly framed because of an unfortunate bias in configuring the data.

Therefore, more data will be brought in that do not conform to the problem configuration in Table 1, but rather challenge its validity. To begin with, the regularities in columns 1 and 2 of Table 1, which are redisplayed in blocks 1 and 2 in Table 2, do not predict the effect of some other palatal trigger vowels. Front umlaut does typically occur, even in a light syllable, when it is targeted by a long trigger vowel, as for example in f. nom. sg. **glaðī̄* > *gleði* 'joy', as well as by a trigger vowel in a third syllable, as in f. nom./ acc. pl. **anuðîz* (or **anaðîz*) > *endr* 'ducks'.[10] These observations on long trigger vowels and remote umlaut on rows (d) and (e) in block 3 of Table 2 seem to strengthen the impression that the trigger, in order to be phonologically active, must be located further away or outside the main foot.

Rows (a) to (e) in Table 2 could still be captured under a single generalisation if framed broadly enough. In the words of Anatoly Liberman (2001: 87; note also considerations along the same lines by Suzuki 1995): "When *i* belonged to the initially indivisible group, it did not cause umlaut, or, to put it differently, umlaut needed an agent external to the prosodic structure in which it occurred". Nevertheless, merely to restate the obvious does not qualify as an explanation or, in the words of Liberman himself (ibid.), "It remains to explain why this rule existed, which is not easier to do than for a mouse to bell a cat".[11]

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[10] In order to establish the front umlaut as phonological in this plural, it would have to be reconstructed **anuðîz*, as customary (see VAEO: s.v. 'and'), rather than **anaðîz* (EDPG: s.v. 'anað-'), since a medial *-a-* is not otherwise known to relay fronting in Scandinavian. Another example that has been invoked is **arutî-taug-* > *ørtug* ~OSw *ørtugh* 'coin', which for reasons unknown is reconstructed in EDPG (s.v. 'arut-') without the fronting trigger. Michael Schulte's (1998: 223–226) account of remote front umlaut, which is the most thorough among recent explanatory efforts, leaves the reader uninformed whether remote umlaut was also triggered by a short trigger.

[11] Moreover, attributing the umlaut output to prosody pure and simple is quite clearly counter-intuitive, because one should *a priori* not expect fronting to be less active when the

Table 2. Occurrence of front umlaut in Old Scandinavian, a selection.

	1. Heavy first syllable, with front umlaut	2. Light first syllable, no front umlaut
a) first class of weak verbs	**dōmîðō* > *dœmða* 'I deemed etc.' 1. pers. sg. pret.	**framïðō* > *framda* 'I carried out, performed' 1. pers. sg. pret.
b) masc. *i*-stems	**gastîz**/**gastî* > *gestr*/*gest* 'guest' nom. sg. / acc. sg.	**staðïz*/**staði* > *staðr*/*stað* 'place' nom. sg. / acc. sg.
c) other probative comparative data	**barnîskō* > *bernska* 'the childish' f. nom. sg.	**danïskō* > *danska* 'the Danish' f. nom. sg.
	**langîstō* > *lengsta* 'the longest' f. nom. sg.	**batïstō* > *bazta* 'the best' f. nom. sg.

	3. Light first syllable, with unexpected front umlaut
d) long triggers	**gladǐ̄-* > *gleði* 'joy' f. nom. sg.
e) remote umlaut	**anuðîz* > *endr* 'ducks' f. nom./acc. pl.
f) first class of weak verbs	**salîðō* > *selda* 'I sold'1. pers. sg. pret. **satîðaz* > *settr* 'set' past participle m. nom. sg.
g) comparatives	**batîzō* > *betra* 'the better' f. nom. sg. **framîzō* > *fremra* 'the anterior' f. nom. sg.
h) indic. pres. of some strong verbs	**farîz* > *ferr* 'depart' 2. pers sg. (cf. analogical OSw *far*) **farîð* > *ferr* 'departs' 3. pers sg.
i) root nouns	**hnutîz* > OSw *nytęr* ~ODa *nytær* ~ON *hnøtr* 'nuts'
j) abstracts < **-îþu*	**framîþu* > *fremd* 'furtherance, honour' f. nom./acc. sg.

Finally, there are further problematic data involving several contexts where front umlaut in light syllables after all does occur, even if a short trigger within the main foot was deleted during the syncope period, i.e. in contradiction to the apparent regularities of Table 1. The most illustra-

trigger stands prosodically closer to the target. Conversely, one would expect a stronger tendency for metaphony when the two first syllables in the relevant cases are paired within the perimeters of the main stressed bisyllabic foot. Precisely in such a context feature levelling is amply attested in medieval Scandinavian balance dialects (Riad 1998: passim; Iverson & Salmons 2012: 105f). Also, as shown by the author elsewhere (Schalin 2017: subsection 4.2), rounding umlaut would have been more rather than less effective under equivalent prosodic circumstances. Last but not least, if the absence of *i*-umlaut in light syllables had been caused by prosody pure and simple, an explanation would be needed for why a similar outcome was not equally caused under seemingly equivalent conditions in Old Gutnish or even in the relevant ancient dialects of West Germanic, including High German.

tive examples, as shown in rows (f) to (j) in block 3 of Table 2, include the PSc suffix *-*îþu* (with PreSc shortening of the word-final vowel *-*ō*# well before the umlaut period), forming feminine abstract nouns, as well as several suffixes taking the PSc form *-*îz*(-). Accordingly, **framîþu* > *fremd* and **framîzō* > *fremra* 'the anterior' (f. nom. sg.), both with front umlaut, contrast with the preterite **framïðō* > *framda* 'carried out, performed' (1.pers. sg.) without front umlaut.

In the scholarly approach to all this data, which has been poorly framed, a certain bifurcation of the discussion may be readily observed. Analyses, which more or less comprehensively aspire to account for the data, in whole or in part, in the tradition of, for example, Skomedal (1980: 120–124), Widmark (1991: 118–137), Elmevik (1993: 81–83) and Grønvik (1998: 52f), fail to make a convincing case in terms of theoretical linguistics. On the other hand, many hypotheses that struggle to make linguistic sense in terms of a natural progression of sound change do not even aspire to account for the unexpected data. The latter applies in particular to hypotheses narrowly based on a single prosodic postulate, such as those of Steblin-Kamenskij (1959), Suzuki (1995) or Lahiri (2000). Theory-driven studies that are meagre on data have in fact all too often taken the prerogative of addressing only the configuration of Table 1.[12]

Notice that further below the data that do not conform to the canonical problem configuration of Table 1 will be utilised as a resource for arguing a novel solution, one that bridges the gap between the data-heavy and the theoretically-motivated traditions. The solution involves that by means of a chain shift contrast was preserved in prominent syllables between a dorso-palatal trigger vowel */ï/ evolving from PlGmc */i/, as in **framiðō̄* > **framïðō* > *framda*, and a coronal trigger vowel */î/ evolving from PlGmc */e/, as in **frameþō* > **framîþu* > *fremd*.

The rule represented by cases of so-called *iʀ*-umlaut deserves an analysis of its own, which is undertaken in the next section. It will be shown that this sound law certainly seems required by the data, and while it defies accommodation in the traditional problem configuration, it may be neatly accounted for by a rule of natural phonological change, given the general approach of the present hypothesis.

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[12] Against that background the sardonic judgement by Jens Elmegård Rasmussen (2000: 143) cannot be deemed completely out of place: "The descriptive facts being basically clear, the subject has been a much-favoured testing ground for new theories in phonological analysis and linguistic change. The record is not an entirely flattering one, for the real advances scarcely outnumber instances of collective disregard of words of reason and rallying around popular, but unfounded, *idées fixes*".

3 An Acid Test against *iʀ*-Umlaut

The main assertions argued in this section are the following: First, it will be shown by means of discussing the set-up in Table 3 that front umlaut in light syllables is indeed phonologically conditioned by a tauto-morphemic sequence **-îz̄-*. Kock (1892: 257–265; 1911–16: 57–58) already addressed the unexpected exceptions recurring in the material by formulating an atomistic sound law, which he coined *iʀ*-umlaut. The regularity is demonstrated by sub-minimal pairs, with all other segments being etymologically equal or equivalent, pairs which beyond reasonable doubt cannot all be attributable merely to analogical change.

Secondly, it will be shown in dialogue with previous research that this anomalous sound law is extraneous to previous explanations of front umlaut. Those who have not simply disregarded or summarily dismissed it have still failed to give an adequate explanation. The problem is how to

Table 3. The effect on front umlaut of **-z(-)* following a short palatal trigger after a light syllable.

	1. Trigger *-ï- not followed by -z – no front umlaut	**2. Hetero-morphemic *-ï-z – no front umlaut**	**3. Tauto-morphemic *-îz̄(-) – front umlaut accomplished**
Trigger following obstruent	**ba.tïs‖tō > bazta* ‘the best’ f. nom. sg. (also younger analogical *bezta*)	**ma.tï-z‖ > matr* ‘food’ m. nom. sg. **sta.ðï-z‖ > staðr* ‘place’ m. nom. sg.	**ba.t-î‖z-ō > betra* ‘the better’ f. nom. sg. **hnu.t-îz‖* > OSw *nytęr* ‘nuts’ f. nom./acc. pl.
Trigger following nasal	**fra.mï‖ðō > framda* ‘I carried out’ 1. pers. sg. pret. **da.nïs‖kōz > danskar* ‘Danish’ f. nom./acc. pl.	**mu.nï-z‖ > munr* ‘mind’ m. nom. sg.	**fra.m-î‖z-ō > fremra* ‘the anterior’ f. nom. sg. **fra.m-îz‖ > fremr* ‘further’
Trigger following liquid	**spu.rï‖ðō > spurða* ‘I asked’ 1. pers. sg. pret. **ta.lï‖ðō > talða* ‘I told, counted’ 1. pers. sg. pret.	**ma.rï-z‖ > marr* ‘sea’ m. nom. sg.	**fa.r-îz‖ > ferr* ‘depart’ 2. pers. sg. (cf. OSw *far*) **fu.r-î‖z-ō > fyrra* ‘the former’ f. nom. sg.
Trigger following /w/	**ha.wï‖ðō > háða* ‘I implemented’ 1. pers. sg. pret.	**ma.wï-z‖* > OSw† *mār* ‘maiden’ f. nom. sg.	**fa.w-î‖z-ō > færra* ‘the fewer’ f. nom. sg.

† The probativity of ON equivalent *mær* is lost through western *ʀ*-mutation. See nt 15.

explain why it could override the conditioning based on syllable weight in cases where the two rules show up as if in conflict.

Recalling the main findings discussed in connection with Figure 2, this rule will at the end of the day be shown to be a subordinate exception to a main rule governed by the etymology and prominence status of the trigger. Within that narrower context, *iR*-umlaut is easily understood as a phonologically natural development, with parallels in Scandinavian sound history. Data to illustrate the problem, which are already included in Table 2, are supplemented and reconfigured in Table 3.

As shown in column 3 of Table 3, a tauto-morphemic sequence *-$\widehat{\text{îz}}$(-) regularly correlates with front umlaut despite the location of the trigger vowel within the main foot rather than outside it. This correlation contravenes the ostensible regularities based on syllable weight in Table 1. Thus, a comparison of the examples in Table 3, column 3, with those in columns 1 and 2 indeed defies all hypotheses formulated on Scandinavian front umlaut, or more precisely all based on the traditional problem configuration and on one single trigger vowel, *+i*. This complication has been correctly highlighted, yet not explained, for example by Cathey (1972: 34ff) and Rischel (2008: 219).

Some triggers of *iR*-umlaut are contained in more or less moribund morphemes, a fact which renders highly unlikely that all instances of fronting would be attributable to analogical change. Such residual archaisms are some plurals of feminine monosyllabic stems, exemplified by f. nom./acc. pl. OSw *nytęr* 'nuts' ~ODa *nytær* ~OIc *hnøtr* < **hnutîz* (Schulte 1998: 244f; VAOE: s.v. 'nøtt').[13] The lexically distributed allomorph *-*îz*- of the two comparative suffixes is also apparently archaic, as the other allomorph *-*ōz*- had become productive in the formation of new comparatives. The allomorph *-*îz*- is furthermore identical with a suffix, which, without further endings, forms umlauted adverbs like *fremr* 'further' < **framîz* and *fyrr* 'before' < **furîz* (DEO: s.v. 'før'). The implausibility of analogical origin was well argued already by Kock (1892: 258–261) , who points out how few the relevant heavy stems were and how they lacked models for the alternation *-o-/-ø-* so important in light stems.

In the indicative present of several classes of strong verbs with light stems, *iR*-umlaut occurs only in western Scandinavian, as in 2. pers. **farîz* > (and 3. pers. **farîþ* →) *ferr*. In these cases, it is admittedly diffi-

[13] Even if the PGmc reconstruction for *dyrr* 'door' is a complex matter (EDPG: s.v. 'dør'), the pl. tantum in Scandinavian also points to **durîz*.

cult to exclude *a priori* the introduction of the umlaut vowel by analogy with heavy stems. But on closer scrutiny one must agree with the argument against analogy by Kock (1892: 259–260), as well as with Bibire (1975: 191f), who states that there is no easy explanation for why analogy would have operated in some classes of strong verbs and not in others.

Too often *iR*-umlaut, when not completely ignored, has been dismissed with sweeping and inadequate statements, as Kjell Venås (1973: 158) objected to in his criticism of Robert D. King (1971). In the present millennium few theoretically-orientated papers have even bothered to mention this stumbling block. Even those scholars who have acknowledged the existence of *iR*-umlaut as a trace of a phonological generalisation have tended to patch up their analyses in a less than convincing manner only after addressing the classic problem configuration of Table 1 (this would largely apply to Voyles 1982: 275; Reid 1990: 39; Grønvik 1998: 50, 62; Schulte 1998: 244–246). Calls to find an acceptable solution for the crux of *iR*-umlaut (Kratz 1960: 477; Hreinn Benediktsson 1982: 35–37) remain unanswered and as valid as ever. Thus, the fact that the paradigms displaying *iR*-umlaut are ill-fitting and represent apparent phonological archaisms should be seen as a resource for problem solving rather than as an irritant or a distraction. This may not quite amount to the "firm ground" on which to stand in order to "move the Earth", but it may serve as a useful and consciously chosen entry point for abductive reasoning.

3.1 Prosodic Approaches to *iR*-Umlaut

The crucial contrast caused by the tauto-morphemic sequence *-*îz*- is well illustrated in medial sequences, where it undoubtedly changes the umlauting effect when it occurs after a light syllable, as shown in the trisyllables in column 3 of Table 3 above, as mutually contrasted against equivalent trisyllables in column 1. Considering that the sub-minimal pairs are indeed very similar in their prosodic structure, these pairs constitute a manifest stumbling block for all explanations that rely on prosodic structure to account for the absence of umlaut in light syllables in column 1 (and column 2) of Table 3; evidently, if front umlaut is assumed to work from every second mora (Rischel 2008), to be inhibited from working within the main foot (Suzuki 1995), to be otherwise conditional upon the stress pattern or metrics of the word (Bibire 1975, Braroe 1979, Basbøll 1993), or if it is assumed to be conditioned, plain and simple, by the weight of the target syllable (Lahiri 2000), then the outcome as con-

cerns front umlaut should have been equal for **fra.mï‖ðō, *spu.rï‖ðō, *ha.wï‖ðō* and **ba.tïs‖tō* in comparison to **fra.m-î‖z-ō*, **fu.r-î‖z-ō, *fa.w-î‖z-ō* and **ba.t-î‖z-ō* respectively.

The same problem effectively prevails if syncope is assumed to have hit the vowel at a time when it was not yet an umlaut trigger. This has recently been argued anew by Paul Kiparsky (2009: 19–41). According to him, the trigger vowel in the examples listed in columns 1 and 2 in Table 3 (and in block 2 in Table 2) would have been deleted before the productivity front umlaut. Conversely, in the cases listed in block 1 in Table 2, such as **doo‖mîðoo*, **gas‖tîz* and **bar‖nîskoo*, syncope would have been delayed, owing to a prosodic constraint against main stressed syllables with more than two moras. In case syncope had been allowed, ill-formed trimoraic syllables would have emerged in *+doom‖ðoo* and *+gastz* (not to mention, for that matter, potentially a pentamoraic syllable in m. nom. sg. *+barnskz‖*). The delay would have been just long enough for front umlaut to become productive. The analysis, however, fails the acid test against the data, as it unavoidably would predict counterfactual lack of front umlaut for the examples in column 3 in Table 3. Or simplified into a rhetorical question: if syncope had hit the medial vowel in **fra.mï‖ðō, *spu.rï‖ðō, *ha.wï‖ðō* and **ba.tïs‖tō* at an early time when it was not yet an umlaut trigger, whence does front umlaut originate in the examples **fra.m-î‖z-ō-*, **fu.r-î‖z-ō, *fa.w-î‖z-ō* and **ba.t-î‖z-ō*, which (assuming they were prosodically equivalent in all respects) should have lost the vowel in the medial syllable at the same time?

Joseph Voyles (1982: 275) has clearly implied that the deletion of the vowel in the case of *-î‖z-* would have been later than in the sequence *-ï‖ð-* due to the divergent influence of the two respective post-vocalic consonants. According to him, early syncopation of medial *-i-* next to a heavy third syllable "apparently did not apply, if the following syllable began with /r/" [*sic*]. From the context it is evident that he here anachronistically anticipated a merger of */z/ with */r/, which took place centuries later, namely, at the turn of the millennium (Larsson 2002: 35; Schalin 2016: 251f). His argument could not be made any more acceptable even if it was modified to mean that an intermediate successor of */z/ caused the delay of syncope in question, as opposed to */ð/. It is clear from syncopation rules that vowel deletion was inhibited by either syllable prominence or syllable weight (Section 6 below), the latter in turn dependent on the sonority of consonants in the rhyme. While there are no positive indications that the successor of */z/ would have moved towards increased scalar sonority centuries before its merger with */r/, there is

unambiguous counter-evidence that its sonority still patterned with other obstruents as late as the ninth century. Indeed, still during the time of the LASc vowel reduction a tauto-syllabic */z/ in the rhyme did not add weight to a non-initial syllable, evident in accomplished vowel deletion in (early) OSc **bɛtʀ* 'better' (adverb, developing to ON *betr* ~OSw *bætẹr*) < ASc **bɛtiz* (< PSc **batîz*). This contrasts with the inhibition of vowel reduction caused by any of the sonorants */l/, */n/ or */m/, exemplified by *yfir* 'over', resulting from ASc **yƀir* (< PSc **uƀîrî*). In the case of **bɛtʀ* the vowel was deleted owing to non-prominence caused by monomoraicity of the syllable, which therefore must have been closed by a weightless consonant (Riad 1992: 43f, 118ff).[14] Even in the event that the cause for delayed medial syncope before */z/ would have been something different from sonority, it would pose insurmountable problems to assume that this characteristic in ETSc was singled out for the voiced fricative */z/ as opposed to the equally voiced fricative */ð/, thus creating a distinction that nevertheless would have randomly vanished before the LASc vowel reduction.

The phonological solution to *iʀ*-umlaut proposed by Ottar Grønvik (1998: 50), which bears similarities to an idea of Hesselman (1945: 13f; reviewed by Bibire 1975: 191), approached this fronting differently – as a special case of a more general prosodic exception. Grønvik postulated regular *i*-umlaut in short syllables when triggered by vowels in closed or heavy syllables, but regular absence of *i*-umlaut when a potential trigger stood in a light open syllable. Grønvik assumed that a closed syllable in this position was heavier than an open one, a condition which in turn would have affected the umlaut mechanism. Hesselman had assumed that the vowel in such a closed syllable was qualitatively more radical and that this condition in turn altered its fronting capability. Both Hesselman (1945: 14) and Grønvik (1998: 62) syllabified the words *+ba.tï.staz* and *+da.nï.skaz* 'Danish' with an open medial syllable. This conveniently fitted their assumption that the aperture of the syllable had inhibited front umlaut (cf. *baztr* and *danskr*), but is nevertheless *ad hoc*, because "words divided as *v.CCv*" would not conform to default rules of Germanic syllabification (Riad 1992: 86f). Moreover, whether evaluating Hesselman's or Grønvik's argument, it is justifiable to say that invoking the aperture/closure of triggering syllables in the explanation provides false predic-

[14] Rischel (2008: 208–209) assumes greater sonority for both */z/ and */ð/ based on his idea of syncope as mora deletion. Even if his analysis is not compatible with that of Riad, it does also not permit a differentiation between the sonority of */z/ and */ð/, which would be required to make the ideas of Voyles workable.

tions, not only for the nominatives of short masculine *i*-stems in column 2 of Table 3, but also for whole classes of trisyllables represented by examples in column 3 (not to mention the feminine abstracts in *-*îþu*). This problem would require further auxiliary assumptions, the accumulated burden of which is untenable. Grønvik (1998: 62), for example, explains the trisyllabic comparative **ba.t-î‖z-ō* (with the trigger in an open syllable) by analogy with the corresponding adverb **ba.tîz* > **bætiz* > **bɛtz* > *betr* (with the trigger in a closed syllable).

Most importantly, the more general assertion that fronting triggered from a closed syllable would be different from fronting triggered from an open syllable is by itself inescapably reliant on the precondition that the two types of syllables would differ in weight. Yet the postulate by Grønvik – that a closed word-final syllable (even if closed by an obstruent) would carry more accent than an open one – is not compatible with the prosodic conditions of Transitional Scandinavian. The weightlessness of word-final consonants in Proto-Scandinavian is well established (Kiparsky 2009: 16, 19f, 23) and in Transitional Scandinavian it still applied to obstruents (Schalin 2017: subsection 6.2.3).

Hence, if *iʀ*-umlaut is to be taken seriously, there are no viable ways to reconcile it with any explanation whatsoever based directly on different prosodic contexts, nor on different sequencing of syncope, a sequencing which in turn would have been dependent on different prosodic conditions. Disregarding explanations of analogy, which in this case have been argued to be implausible, the solution to the problem of what caused *iʀ*-umlaut in column 3 should therefore, by a process of elimination, be one of segmental phonology instead, i.e. the contrastive difference must have been embedded somehow in the phonological features of the triggering sequence *-*îz*(-).

3.2 Approaches of Segmental Phonology to *iʀ*-Umlaut

Recalling that a syncopated */i/ as a main rule does not constitute a fronting trigger after a light syllable, there can hardly be more than three mutually exclusive solutions to explain the problematic exception to that rule, namely why the tauto-morphemic sequence *-*î͡z*(-) does cause fronting after a light syllable. The alternatives would have to be that either */z/ had prior to syncope changed */i/ into becoming a fronting trigger (Seip 1919: 87–88) or, conversely, that */i/ before its deletion had changed */z/ into becoming a fronting trigger active after syncope (Bibire 1975: 192; Reid 1990: 39). Furthermore, it has been proposed, seemingly in a

gesture of despair in the face of the data, that */z/ in itself would have constituted a remote or non-local fronting trigger, the effect of which was blocked by all vowels except the short */i/ (Skomedal 1980: 121f). The aim is to show by a process of elimination that only the first alternative, advocated by Seip, has the potential to pass pertinent acid tests, both against attested data and phonological naturalness.

As shown next, the latter two of the three alternatives face serious problems in accounting for the mechanism that is supposed to have transmitted the fronting to the first syllable. Further flaws in these alternatives are well illustrated by the non-occurrence of front umlaut in examples like *barr* 'needle of coniferous tree' < **barza-* (VAEO: s.v. 'bar²') or Sw & Norwegian *harr* 'Thymallus thymallus' < **harzu-* (VAEO: s.v. 'harr'), providing, of course, that the assimilation *-rz- > -rr-* was yet to occur.

As regards the fronting mechanism that was suggested by Skomedal for the third alternative, there are no parallels among the phenomena of Scandinavian umlaut, which is commonly considered to be metaphonic, to fronting triggered non-locally by a non-adjacent obstruent. The parallel to *j*-umlaut, invoked by him, has a limp, while the trigger there was vocaloid. Moreover, a test against the example words *barr* and *harr* is fatal; in the absence of any vowel at all standing in the blocking position in **-arz-*, no obstacle to the assumed umlaut mechanism was in place and his hypothesis predicts counterfactual front umlaut *+berr* and *+herr*. The parallel to *j*-umlaut, invoked by Skomedal, here turns against his hypothesis, as front umlaut indeed occurs in sub-minimally equivalent cases like *sverja* 'swear' < **swarjan-* as well as *her-* 'army, crowd, mob' < **harja-*.

Alternative 2 in Table 4 has been justified by means of the generalisation that *iʀ*-umlaut in that case could be understood as a special case of *ʀ*-mutation. The nature of *ʀ*-mutation should be recalled; it causes regressive assimilation in parts of Scandinavia when */z/ immediately follows a main stressed non-palatal vowel or diphthong. Typical example

Table 4. The main logical alternatives to explain *iʀ*-umlaut segmentally.

1. /z/ changed preceding /i/ in the pertinent context well before syncope into becoming an active fronting trigger /i̯/ (Seip 1919: 87–88)	2. /i/ changed /z/ before syncope into becoming a fronting trigger /z i̯/, activated after accomplished syncopation of the intermediate vowel	3. /z/ in itself was a non-local fronting trigger, but all vowels except /i/ prevented its influence from reaching the main stressed syllable

words include PSc n. nom./ acc. sg. **deuza* '(kind of) animal' > OIc *dýr* as opposed to OSw=ODa *diūr* (VAEO: s.v. 'dyr') and PSc n. nom./ acc. sg. **kaza* 'vessel, container' > ON *ker* as opposed to OSw=ODa *kar* (VAEO: s.v. 'kar').[15] According to Bibire (1975: 192), alternative 2 "affords the closest parallel with *R*-mutation", while according to Reid (1990: 39), "*R*-mutation provides a parallel for this development". These claims are unwarranted, because the assimilatory mechanism of *ʀ*-mutation proper is based on adjacency to the vowel and does not pass through other consonants. As front umlaut is not known to work from non-adjacent fricatives, the mechanism necessary to mediate this alleged kind of *iʀ*-umlaut would require a complex sequence of phonologically significant changes before targeting the main stressed vowel, first progressively into the fricative, making it an active trigger, and then after syncope regressively into the intermediate consonant, as follows: **framiz* > +*framizʲ* > +*framzʲ* > +*framʲzʲ* > +*fræmʲzʲ* > *fremr* 'further'. The regressive change would have to affect even phonemes such as /m/ and vibrant /r/, which are in a typological perspective highly resistant to palatalisation due to their articulatory features (Żygis 2004; Kavitskaya et al. 2008). Such a systemic palatalisation of intermediate consonants as a mechanism for front umlaut proper, anomalous in the context of Scandinavian language development, has been widely discussed and commonly rejected in the past in favour of a metaphonic mechanism (Szulc 1964: 37–51).[16] Assuming such a mechanism for *iʀ*-umlaut would thus not constitute a parallel to *ʀ*-mutation, but a separation from it and moreover from Scandinavian metaphonic umlaut phenomena in general.

Further, alternative 2 would also require the reconstruction of an additional phonemic contrast between */z/ and */zʲ/. Otherwise, it would be inexplicable why the suffix *-az* after reduction to *-z* does not cause fronting equivalent to *iʀ*-umlaut, not even as part of the stem, as in *hatr* n. nom. sg. 'hate' < **hataz-* (Hreinn Benediktsson 1982: 36; VAEO: s.v. 'hat'). A phoneme split could admittedly have been caused by the preceding vowel before its syncopation in the mutually contrastive sequences **-az* > **-z* as opposed to +*iz* > +*izʲ* > +*zʲ*, but this would lead to

[15] Consistent occurrences of *ʀ*-mutation are found in the west, and indisputable instances are found in locations in the vicinity of eastern Scandinavian, such as in Dalarna and Gotland (Noreen 1904: §64; 1923 [1884]: §71–§72).

[16] Fairly recent suggestions by Basbøll (1993) and Liberman (2007), who once again are proposing to implicate the intermediate consonants as instrumental for the fronting mechanism, are difficult to evaluate, because they do not aspire to tackle the ill-fitting paradigms as comprehensively as the task would require. For the same reason the suggestions do not amount to true challenges of the mainstream debate on a metaphonic solution.

another complication, namely the following: why (in dialects with *R*-mutation) would *-z-* mutate to *-z^{j}-* between non-palatal vowels after a main stressed syllable, exemplified by **kazaz* → *+kaz^{j}az* > *kerr*, while conversely lack of such palatalisation would need to be assumed for **hataza-* > *hatr*. Surely in a non-palatal context a spontaneous palatalisation that amounts to a new phonological contrast appears manifestly unwarranted.

Thus, the latter two alternatives in Table 4 must be rejected as incompatible with natural sound change and with the distribution of front umlaut in the Old Scandinavian lexicon. Attention should be turned to alternative 1 instead.

3.3 Elements for a Solution to *iR*-umlaut

The first alternative in Table 4 entails that */z/ before syncope would regressively have changed */i/ into becoming a fronting trigger. More precisely, this means that a descendant of PlGmc **i* preceding a tautomorphemic **z* had conditionally resulted in a more fronted vowel, which was also active for front umlaut after a light syllable. This is indeed a main thesis, proposed already by Seip (1919; 87f), re-argued by Widmark (1991: 123–126) and further developed in this paper. This solution, unlike alternative 2, is also truly paralleled by *R*-mutation (see nt 15), as it is based on the fronting influence of */z/ on the preceding vowel.[17]

It is noteworthy that in general coronals need not be palatalised in order to have a fronting effect on adjacent vowels. An anterior (or lamino-denti-alveolar) consonant may have the same influence. Flemming (2003: passim) attributes this to the constraints prescribed by the position of the tongue blade for the posture of the tongue body.[18] In Scandinavian of the early umlaut period the relatively marked fronting

[17] Following from this hypothesis, it may be argued that **s* > **z* under Verner's law fed the laminalising that **z* exercises on the descendant of PlGmc */i/ during, rather than after, the progression of the chain shift, which involved the raising of **ê* > **î* and the acquisition of a dorsal specification for **i* > **i̯*. This probability justifies the practice in this paper of representing PlGmc as if Grimm's and Verner's laws had been completed (cf. Antonsen 1972: 138f).

[18] The examples in Flemming (chapter 5.1) testify to progressive assimilation. The fact that fronting assimilation in Scandinavian is regressive rather than progressive conforms to a language internal parallel to *R*-mutation, and therefore the phonological naturalness of this direction, whatever its specifics may be, is beyond contestation. Parallels quoted by Flemming (ibid.: chapter 5.2) also support the fact that a central or dorso-palatal vowel /i̯/ in the case of *iR*-umlaut was affected differently from non-palatal back vowels [a] and [u], although in the case of Proto-Scandinavian this difference also depended on stress.

feature of the affected vowel seems to have been conditioned on immediately following laminal coronals (*iʀ*-umlaut and *ʀ*-mutation) and seems to have been active metaphonically in a prepalatal glide (*j*-umlaut). Both these fronting phenomena may be encompassed in phonological terms if the contrastive coronal feature involved was manifest by means of laminal articulation, if at the same time this feature is assumed to have been absent in an immediately following apical as in **taliðō* > *talða* 'I told, counted'.

These statements have profound implications for reconstructing the phonological features of so called "palatal r". With reference to an analysis on the subject in Schalin (2016: 253–255), the arguments should be sufficient to establish that "palatal r" indeed was not palatal and hardly vibrant, but rather a lamino-alveolar */z̻/ or */ɹ̻ˠ/, perhaps realised as an anterior lamino-denti-alveolar [z̻] or [ɹ̻ˠ]. This also conforms to a distribution in present-day Övdalian, where the descendants of Ancient Scandinavian **-nz#* > *-nn* are lamino-denti-alveolar and continue to be distinct from descendants of plain */n/, which are apical (Nyström 2000: 25–30). The distinction turns up contrastive where the quantitative contrast becomes neutralised (ibid.: 28–29). Had */z/ been "palatal", it would not be expected to have contributed to this distribution, since the palatum is posterior to the alveolar ridge.

The reconstruction of two contrastively different palatal vowels, one coronal and one dorsal, could also explain the origin of the supposed Old Scandinavian contrast between lamino-denti-alveolar and apico-post-alveolar consonants, as in **salîðō* > *sellda* 'I sold' contrasting with **taliðō* > *talða*. In the first case Old Icelandic double <ll> followed by <d> has been presumed to represent lamino-denti-alveolar articulation, while in the second case, a single <l> followed by <ð> has been presumed to represent apico-post-alveolar articulation (Pipping 1922: 75–76).[19] The sporadic fronting of **i* > **î* between two coronal consonants as in PlGmc **satiðaz* > **satîðaz* > *settr* 'sat' (past participle) and **saliðō* > **salîðō* > *selda* is effectively paralleled by fronting in Cantonese (Flemming 2003: 348–349).[20]

[19] Admittedly, attributing the difference to the syncopated vowel does not solve the ultimate origin of this contrast, but rather displaces the problem to a context where more economical solutions may be sought than a spontaneous phoneme split for liquids, which would be highly unexpected.

[20] Whatever the ultimate reason for this mutation, which in any event was sporadic, an intermediate motivation seems to have been the homorganic articulation of two coronal consonants in successive syllables. Perhaps the latter apical obstruent could have become anterior by dissimilation with ensuing laminalisation of the intermediate vowel.

To date, the case for two synchronously co-existing, phonematically distinct palatal trigger vowels, has been made most clearly by Gun Widmark (1991: 123–126). According to her the "more palatal" of the two caused phonetically salient palatalisation and the "less palatal" caused "weaker" palatalisation. The etymological descendant of */i/ was by default "less palatal"; however, in a morpheme where */z/ followed it, the vowel mutated into the "more palatal" one. The "more palatal" vowel was equal to a */j/ vocalised upon *a*-syncope in previous *ja*-stems such as **baðja-* > **bæðî* > **bɛði* > *beð* 'bed'. In Widmark's account, this neatly accounts for the fact that, while the output of *iR*-umlaut equals that of *j*-umlaut, it differs from the inertia of *i*-umlaut where the trigger had followed a light syllable.

Disregarding Widmark's phonologically vague terminology on scalar palatalisation of vowels as well as other explanatory deficiencies typical for many structuralist accounts of umlaut reversion in general, her assertions are correct, as argued below, insofar as they focus on clear-cut phonological distinctions assumed for the trigger vowel. Moreover, by further generalising the scope of this innovative idea, the unnecessary hypothetical and problematic assumptions concerning umlaut reversion of the target vowel that she invokes may be disposed of. Her ideas for better reconstruction of trigger vowels will be relevant to a truly novel proposal.

4 Interlude on Contrastive Rounding and Coronality

It has been shown in the previous sections that, distracted by Kock's legacy, a configuration like that of Table 1 has led researchers to focus too one-sidedly on the ostensibly direct effect that syllable weight appears to exert on front umlaut. By a process of elimination, it was concluded that two mutually contrastive trigger vowels had to be reconstructed in a second syllable positioned within the main foot, one causing front umlaut and the other not.

The most probable reason that scholars have not proceeded any further down this road in the past has to do with the complications that at first glance this would seem to cause for a fair diachronic reconstruction of phonological contrast in the vowel system. Obviously, it would be methodologically quite inadequate to reconstruct contrast in one specific context only, for the single purpose of solving a recalcitrant problem lim-

ited to that same context. Also the origin of the two distinct palatal vowels urgently calls for an explanation, because phonological contrast does not emerge spontaneously. In this paper, however, we will not shrink from these problems, but rather relate this assumed contrast to other contexts where similar contrast has existed, with a view to obtaining a unified analysis of the origins.

Consider the following: Assuming that coronal */î/ ultimately merged unconditionally with dorso-palatal */ï/, the contrast between these two vowels is recoverable only indirectly, namely by studying conditioned exceptions in which one of the two had developed differently from the other, making it exempt from the merger, or by examining differences before the merger in the influence that these two vowels exercised on other segments.

The view that contrast between etymological PlGmc */i/ and */e/ was upheld in Scandinavian under the main stress is generally accepted (EDPG: XIX). Further, in positions of main stress PlGmc */e/, even when raised to coronal */î/, is here proposed to be contrastively different from etymological PlGmc */i/, which in turn evolved in a chain shift into dorso-palatal */ï/. This distinction can be inferred from the differing alterability of these two proto-vowels in equivalent positions as targets for rounding umlaut and breaking. The former vowel was alterable by rounding umlaut and breaking, as shown, for example, by OSw *siunga* 'to sing' < **sîngwan* < PlGmc **seng^{w}anã*, while the dorso-palatal */ï/ showed no alterability by either rounding umlaut or breaking, exemplified by *siðr* 'custom' < **siðuz* < **siðuz*, a word with the vowel *ï* descending from Pre-Germanic */i/. With regard to breaking of the raised coronal PSc vowel **î*, the traces are primarily recoverable in eastern Scandinavian, as they were effectively obscured by nearly exceptionless monophthongisation in ON, as, for example, in *syngva* 'to sing'. A rare

Table 5. Difference in alterability of coronal and dorsal target vowels.

Fully specified dorsal target vowel		
f. nom./acc. sg. 'new moon'	*nið-*	< **niðu* < **nið(w)ō*
m. nom./acc. sg. 'custom'	*sið-*	< **siðu-* < **siðu-*
Underspecified coronal target vowel		
adj. 'thick'	*þjokk-/ þykk-* < *þjukk-*	< **þêk(k)w-* < **þek(w)u-*
'to sing'	OSw *siunga*	< **sîngwʌn* < **seng^{w}ana-*

exception to this monophthongisation is preserved in ON *þjukkr* (also > *þjokkr* or *þykkr*) 'thick'. With regard to the chronology for the breaking of *-*î*- > -*iu*-, as well as arguments for its trigger being vocalic rather than consonantal (as hitherto assumed), reference is made to Schalin (2017: subsections 4.1 and 4.3), which also addresses ostensible counterexamples. The probativity of rounding umlaut is more accessible, as accomplished rounding of PSc **î* remains transparent in numerous paradigms, exemplified by *w*-umlauted PlGmc **smerwjan*- > **smîrwijan*- > *smyrva* 'smear' ~OSw *smyria*.

That the raising of */e/ in some instances predated both breaking and rounding may be supported by comparing OSw f. nom. sg. *sliunga* f. 'slingshot' < **slîngwō* < PlGmc **sleng^{w}ō̄* (cf. cognate ON verb *slyngva* 'to fling, to sling') with the Finnic loanword *linko* 'slingshot', borrowed from this very Germanic original after raising, but before rounding (LägLoS: s.v. 'linko').[21] Undoubtedly, there should have existed a presyncope Scandinavian contrast between a coronal */î/ alterable by rounding and breaking, exemplified by this very word, and a dorso-palatal */ï/ inalterable either by rounding or breaking, as shown by the development in *siðr* 'custom' < **sïðuz* or, for example, in **nïð(w)ō*- > OSw *niþ-/næþ*- ~ON *nið* 'new moon' (EDPG: s.v. '*nidwō-').

The distinction between the vowels **î* and **ï* in their behaviour as targets for rounding umlaut and breaking must be understood as corresponding to a phonologically significant contrast between the two, which in turn is known to correlate with their etymological origin. The alterability by breaking is argued to follow directly from a [coronal] (or more specifically laminal) specification, which originated from PlGmc */e/, raised or not. Conversely, the inalterability by breaking was a direct consequence of the dorsal feature possessed by descendants to PlGmc */i/. The different alterability by rounding was an indirect consequence of how the two vowels contrasted with rounded vowels in the system (Schalin 2017: subsections 3.2, 4.1–4.3, 4.5).

Adding an assumption that vowel systems were different depending on syllable prominence indeed comes at a low cost. It is uncontroversial that vowels and diphthongs in prominent positions began to develop according to different sound laws from those in non-prominent positions during the period between PlGmc and PSc. Those in non-prominent po-

[21] Finnic could well have borrowed *+lünko* or *+liuko* or perhaps *+lunko*, should the original have exposed even post-phonological rounding and/or breaking. It is unlikely that rounding would have been dropped in case it had surfaced in the original.

sitions developed towards a simpler system with fewer distinctions and those in final syllables according to so-called *Auslautsgesetze*.[22]

A bimoraic main stressed foot could in Proto-Scandinavian metrics accommodate a word-initial sequence of two light syllables, both being monomoraic. Such a bisyllabic main foot is said to have enjoyed a special status based on the evidence of syncope (Lahiri et al. 1999: 358). To this it should be added that two light syllables that were paired in such a way within the main foot also behaved metrically as a single long syllable or, in other words, as a bimoraic one. This prosodic condition is evident in the metrics of poetry and was likewise deeply rooted in the prosody of the spoken language itself (Johnsen 2005: 138–140). To begin with, the output of Sievers' law reveals this, because after two light syllables the bisyllabic variant of the suffix, which normally follows heavy syllables, applies. For example, in Scandinavian a representative case such as *øðli/eðli* 'nature, character', owing to its unreduced second syllable, testifies to PreSc *(*aðul*)-*ija*- rather than +(*aðul*)-*ja*- (cf. Schulte 1998: 225–226). As discussed by Sverre Johnsen (2005: 138–140), that observation may be generalised for Germanic: "The evidence is overwhelming that there is a phonetic reality behind the fact that the Sievers-variant **ij* follows ⏑⏑, as this is equivalent to one long syllable –". It is far from clear that these characteristics of a bisyllabic main foot may be compared to "level stress" as attested in Scandinavian balance dialects (Riad 1998: passim; 2000: 389–398); however, framed more broadly, it is by no means inconceivable that a light second syllable following a light main stressed one was prominent. This will be corroborated below by verifying the predictions that this assumption engenders for front umlaut. Assumptions of stress assignment for this position have been commonplace in past umlaut research (Bibire 1975: 199f with references; Braroe 1979: 49f).

With the assumption that a light second syllable within the main foot counted as prominent, it also should have contained vowels that phonologically contrasted with each other in a manner equal to vowels under the main stress. They belonged to the same richer vowel system, as illustrated by the boxes to the left and the middle in Figure 4 and exemplified by reconstructions such as f. nom./ acc. pl. */**a.nǫ̊**‖ðîz/ 'ducks', m. nom. sg. */**ka.tï**‖‖ʌz/ 'kettle' and f. nom. sg. */**ga.ma**‖‖ʊ/ 'old'. This meant that, among short triggers for umlaut and breaking, these second

[22] Representative and illustrative examples are the merger of *ai* and $\bar{e}^1 > \bar{ɜ} > i$ outside the position of stress and conversely the development of $\bar{e}^1 > \bar{a}$ under main stress, separate from retained *ai*. On sound laws for vowels in word-final syllables, see for example Syrett (1994), Boutkan (1995) and Panieri (2013).

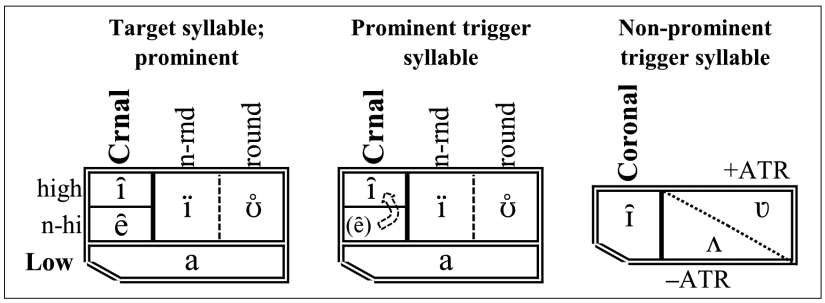

Figure 4†. Western PPSc systems for short oral vowels of differing prominence.

† The symbols *o̊* and *ʊ* are borrowed from Schalin (2017) and used only in this Section 4 to highlight the distinctions between the contrastive features of **u* in the two different vowel systems. For economy of presentation they will not be used further in other sections. Neither will the symbol *ʌ* be used, nor the feature [ATR] "advanced tongue root" be discussed further; that feature is part of the analysis in Schalin 2017 (Figures 3 and 6) to explain phonological contrast between dorsal vowels in non-prominent positions. The illustration using an arrow in the middle box puts in doubt the retention of **ê* in prominent trigger syllables until the umlaut period (Schalin 2017: subsection 5.2.2 nt 47).

syllable vowels behaved differently from most triggers, because other triggers were positioned outside the main foot and hence were typically non-prominent. A trigger-target analysis reveals that, for prominent syllables, vowel contrast must be reconstructed *inter alia* for coronality and rounding, allowing for contrast between */î/ and */ï/, as well as a contrastively rounded */u/ (**o̊*). Given that the motivation for phonological contrast between PSc */î/ and */ï/ in a main stressed syllable relies on etymological origin, it is only reasonable to assume that the origin of contrast between PSc */î/ and */ï/ in a second syllable fitting inside the main foot is similar. For non-prominent syllables only three oral short vowels are reconstructed – */ʌ/, */î/ and */ʊ/ – none of them phonologically specified for rounding. Note that the three do not form a subset of the richer system.

To conclude, during Proto- and Transitional Scandinavian the specifications of etymologically cognate trigger vowels differed, depending on the prominence of the syllables containing them: for example etymological **u* was contrastively [round] only in prominent syllables. This analysis engenders further verifiable predictions for how these vowels are expected to have behaved as triggers for umlaut and breaking. These predictions are put to test in Schalin (2017: Sections 4 and 6) against some of the most difficult cruxes in umlaut research.

5 Scandinavian Front Umlaut Revised

It is *prima facie* quite remarkable and far from irrelevant to finding a solution for the *i*-umlaut problem that the palatal vowel, which notoriously fails to trigger umlaut in acc. sg. **sta.dï*‖, fits just inside the main foot, while the active trigger vowels both in nom. sg. **gas*‖*tîz* 'guest'> *gestr* and f. nom./ acc. pl. **a.nu*‖*ðîz* > *endr* 'ducks' stand in positions similar to one another just outside the main foot. In a hypothesis put forward almost four decades ago, Eva Ejerhed Braroe (1979) suggested that a vowel in a light second syllable after a light first one, as in **sta.ði* or **ta.liː.ðoo*, would have been inert as a trigger for front umlaut due to synchronic assignment of stress on the second mora from the left. A trigger *-i-* in position of the third mora, as in **gas*‖*tîz* or **doo*‖*mî.ðoo* would have triggered front umlaut due to its weak accentuation. Her reliance on weak stress to explain umlaut has a striking similarity to the preconceptions of pioneers such as Kock and Pipping (see subsection 2.2 above). The more indirect similarity to the analysis argued in this article is briefly characterised in Section 6 below.

The assertions to be tested and discussed, which constitute the main theses of this study, are those condensed above in subsection 1.2 in the form of the main findings of the paper. Readers are encouraged to refer back to this subsection, including Figures 2 and 3. The regularities are also shown in Figure 5 and some relevant material will be arranged as in Table 6.

5.1 Discussion

The hypothesis may be tested against the evidence of suffixes, as follows: The suffix **-îþu*, shown in row (j) in Table 2, would be expected to cause front umlaut, because it originates from **-eþō* < PlGmc **-eþā* < Proto-Indo-European **-éteh*$_2$ (Ringe 2006: 124; cf. 294). The effect is confirmed by front umlaut in the data, exemplified by *fremd* < **framîþu* < PlGmc **fram-eþā*, as well as *dygð* ~OSw *dyghþ* 'goodness, virtue' < **dugîþu* < PlGmc **dug-eþā*.[23] This is a valuable piece of evidence because front umlaut in these feminine light stems has until now not been explainable by any phonological generalisation. The umlauting effect of the descendants of PlGmc */e/ is also seen in the nominative and accusative

[23] The rare ostensible counter-examples, such as *hugð* 'affection', are not probative for reasons given in Cathey (1972: 51; cf. erroneous use of the example by Braroe 1979: 44).

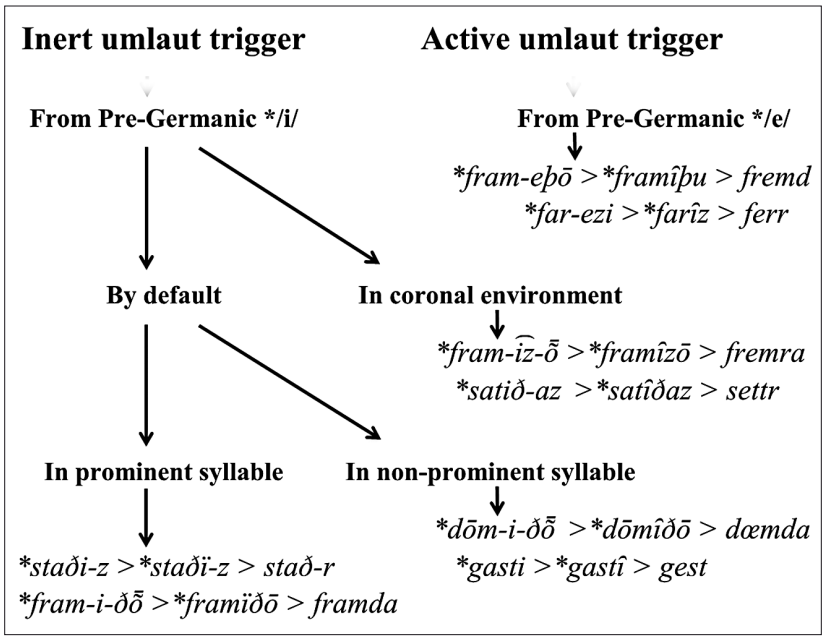

Figure 5. Regular diachronic developments for laminalisation of vowels.

plurals of consonant stems in rows (e) and (i) in Table 2, representing the PreGmc ending **-es* > PlGmc **-ez*. A similar ending is reconstructed in the second person singular in many classes of strong verbs, as verified by front umlaut in PlGmc **farezi* > **farîz* > *ferr* 'depart'. The same umlauting trigger vowel occurs in the third person singular **fareði* > **farîð* → *ferr*, where fronting cannot be explained by the *iR*-umlaut.

Due to the differentiation of vowel systems PreSc suffixes exemplified by the denominal adjective **-iska-* and the superlative **-ista-* are expected to have developed the allomorphs **-ïska-/ *-îska* and **-ïsta-/ *-îsta-* after light/heavy main stressed syllables respectively; as a consequence, absence of front umlaut in light stems derived by this suffix (as in Table 6, column 1) again conforms to predictions, while occurrence of front umlaut in heavy stems, such as f. nom. sg. *bernska* < **bar‖nîskō* 'the childish' and f. nom. sg. *lengsta* < **lan‖gîstō* 'the longest', is likewise expected.

Yet the umlauting comparative suffix **-îz-*, shown in row (g) in Table 2, undoubtedly goes against the main rule, as it derives from

PreGmc **-is-* rather than *+-es-* and would not *a priori* be expected to cause fronting. As it turns out, this suffix constitutes an exception to the otherwise regular correlation of front umlaut with the etymology of the trigger. Therefore, it deserves the particularising name *iʀ*-umlaut better than the etymological **-ez*. Here the laminal consonant is a critical conditioning factor for the expected dorso-palatal vowel to turn up as a coronal one instead.

Laminalising occurs in the comparatives, because the two sounds belong to the same morpheme, whereas in the nominative of the *i*-stems, as in **staði-z* the nominative case marker *-z* belongs to a separate morpheme added as an ending. It is difficult to determine whether the vowel *i* here was levelled from the accusative **staði* or whether instead the phonological change, which was regular in a tauto-morphemic sequence, was exceptionally inhibited by the morpheme boundary itself, thus resulting in an exception to the main rule.[24] In both scenarios the output should ultimately have been the same. Because of this, the masculine *i*-stems show up with allomorphs precisely as the PlGmc suffixes **-iska-* and **-ista-* discussed above.

To conclude, the material in Table 6 conforms to the hypothesis postulated in this article based primarily on etymological origin of the trigger and only secondarily on conditioning that is dependent upon its consonant environment or its metrical position (Figure 5). As for light stems, particular attention is drawn to the minimal and sub-minimal pairs contrasting with each other in Table 6, columns 1 and 3.

5.2 Further Consequences

It is astonishing that, despite almost two centuries of intensive study, researchers have not ventured to configure the problem this way. Two rather obvious reasons may be acknowledged immediately. Firstly, scholars may have taken for granted the precedence of triangular two-dimensional models for vowel systems, and accordingly, in an axiomatic way, assumed that all instances of PreSc */i/ during all stages of Scandinavian vowel history must have been at least as fronted as all instances of PreSc */e/ (compare discussion in Schulte 1998: 165–173). Such an as-

[24] An argument for levelling from the accusative could be made to account for front umlaut in a handful of light stem mass nouns. Front umlaut in these of course needs no explanation if Hellquist (1891: 25–27) is right in his view that they were *ja*-stems rather than *i*-stems. If on the other hand they indeed were *i*-stems (Iverson & Salmons 2012: 125) the fronting could in them have originated in the nominative case (Kock 1892: 261f).

Table 6. Occurrence of front umlaut in light syllables, according to origin of trigger vowel (columns) and character of intervening consonant (rows).

1. Regular dorso-palatal descendant of PlGmc† */i/ (>*i); no front umlaut	**2. Descendant of PlGmc */i/ >*î in laminalising environment**	**3. Etymologically regular descendant of PlGmc */e/ (>*î)**
**staði(-z) >*staði(-z) >stað(-r)* 'place' **skut-ilaz >*skutïlaz >skutill* 'shuttle' (with instrumental rather than diminutive suffix) **mati(-z) >*matï(-z) >mat(-r)* 'food' **batistaz >*batïstaz >baztr* 'best' **lagiðō̄ >*lagïðō >lagða* 'I placed, put, laid'	**satiðaz →*satîðaz >settr* 'set' past. part. m. nom. sg. **matiðaz →*matîðaz >mettr* 'satisfied' past. part. m. nom. sg. **batizō̄ >*batîzō >betra* 'the better' f. nom. sg.	**glað-elaz >*glaðîlaz >gleðill* 'fun, good cheer' (a byname/nickname, with diminutive rather than instrumental suffix) *hnutez >*hnutîz* >OSw *nyţęr* 'nuts' pl. ~ODa *nytær* ~ON *hnøtr* **dug-eþō >*dugîþu >dygð* 'virtue
**framiðō̄ >*framïðō >framda* 'I promoted, carried out' **daniskaz >*danïskaz >danskr* 'Danish' **spuriðō̄ >*spurïðō >spurða* 'I asked' **mari(-z) >*marï(-z) >marr* 'lake, sea'	**framizō̄ >*framîzō >fremra* 'the anterior' f. nom. sg. **furizō̄ >*furîzō >fyrra* 'the former' f. nom. sg. **saliðō̄ →*salîðō >*selda* 'I sold'	**frameþō >*framîþu >fremd* 'furtherance' **fareði >*farîð →ferr* 'departs' 3.pers sg. (cf. analogical OSw *far*)
**haw-i-ðō̄ >*hawïðō >háða* 'I implemented'	**fawizō̄ >*fawîzō >færra* 'the fewer' f. nom. sg.	**faweþō >*fawîþu >fæð* 'fewness'

† Unmarked entry forms in Table 6 are all PlGmc.

sumption notwithstanding, whether tacit or overt, no such language universal necessarily exists. For example, a vowel system where a more fronted /e/ co-exists with a less fronted /i/ is attested in western (Cheyenne-Arapaho) and eastern Algonquian (Dresher 2015: 165–171; Oxford 2015: 336–350). In Pre-Scandinavian times the two vowels in question may have moved clockwise on the vowel chart when the raising of a contrastively fronted */e/ accompanied the centralising of a contrastively non-round */i/ in the process of a chain shift.

Secondly, some of the data, which for the purpose of the present analysis must be seen as residually ill-fitting, have been brought into the reasoning too early, causing more confusion than clarity. To some extent, this risk could even be illustrated by the pit-falls of *iʀ*-umlaut, which has been extensively used in this paper to refute earlier research, but is itself of dual origin. Thus the comparative *-*îz*-, which undoubtedly derives from PreGmc *-*is*-, is an exception to why a sequence descending from *-*ez* causes front umlaut, rather than being a typical example of its kind.[25] The more frequent reason is that the descendants of PlGmc */e/ regularly work front umlaut; it just happens that, due to early deletion of the word-final PlGmc -*e*#, the vowel has been preserved long enough to do so only when followed by a consonant, which in turn, often for reasons pertaining to the Indo-European morphological inheritance, happens to be *-*z*# from an ending *-*es*. Accordingly, etymological *-*ez* always triggers front umlaut as opposed to hetero-syllabic *-*i*-*z*, which regularly does so only from non-prominent syllables, as in the heavy *i*-stems.

Even more confusion and havoc have been introduced into this field of research by focussing on the deceptive variation in the classic example word already recorded in Table 1, namely m. nom. sg. *ketill* 'kettle' versus nom. pl. *katlar*, a loanword from Latin *catillus*. Firstly, its probativity for a sound historic argument can in general be questioned on methodological grounds because it is a borrowing and in particular because this status deprives it of any PreGmc etymology. Exchanging the example for the inherited equivalent – *lykill/ lukli/ luklar* 'keys' – would not work because it could have undergone so-called "palatal" (or *gi/ki*-) umlaut.[26]

[25] At the end of the day only these comparatives truly justify the discussion in Section 3. Yet examples containing descendants of PlGmc */e/ are likewise used there for the acid test, since all the hypotheses aimed to be refuted share the initial assumption of a single palatal trigger vowel, in which context these counter-examples are probative.

[26] Palatal or *gi/ki*-umlaut, limited to western Scandinavian, is not addressed in this paper, because it is later than front umlaut proper, shown by the fact that it frequently was conditional upon an -*i*- < -*ǯ*- that did not become a front vowel until Ancient Scandinavian and never conditioned on a trigger that was deleted during the early syncope era.

Even more uncertainty for this instrumental/ locative suffix arises from the fact that front umlaut is distributed in a puzzling and ambiguous manner in the lexicon, with paradigmatic levelling resulting in variable reflexes of front umlaut, such as *vaðill/ vaðli/ vaðlar* 'ford, shallow water' and *skutill/ skutli/ skutlar* 'harpoon, trencher, shuttle', but conversely, *hefill/ hefli/ heflar* 'bunt-line' and OSw **skytil* 'shuttle' (SEO: s.v. 'skyttel'). How to recover the regular phonological output is a highly disputed question (Skomedal 1980: 121; Schulte 1998: 237–241; 261; Rasmussen 2000: 152f; Kiparsky 2009: 44; Iverson & Salmons 2012: 121–124). Last but not least, whatever example word with instrumental suffix we might chose, under no circumstances would the word have a place in Table 6, because in the absence of probative comparative evidence outside Germanic, it is impossible without internal reconstruction to determine whether its etymological origin is PlGmc *-*ela*- or *-*ila*-.[27]

No such problem, however, concerns the diminutive suffix *-*îla*- < *-*ela*- as in *gleðill* 'fun, good cheer' (a byname/ nickname), because unlike the instrumental/ locative suffix, this diminutive suffix has ablauting parallels outside Germanic and must therefore contain the Indo-European full grade */e/ (Ringe 2006: 124, 293). Nothing requires the two suffixes to have been originally homonymous. The confused situation regarding words ending in the suffix *-ill* (with an orthographic variant *-ell* and the allomorphs *-all* and *-ull*) may in fact be more easily untangled if we assume that the diminutive suffix *-*îla*- < *-*ela*- during Pre-Scandinavian had not yet become homonymous after light stems with the instrumental/ locative suffix, here supposed to originate from *-*ïla*- < *-*ila*-.[28] As the two suffixes merged after heavy stems, they became gradually mixed up by language learners and, with the inherited regular distinctions now shattered, prone to disparate processes of paradigmatic levelling.

The solution for the paradigmatic alteration in the word *ketill*, which indeed must be seen to be more archaic than the levelled forms, is ultimately not very complicated, given that the main problem is configured as in this paper, illustrated in Table 6. Forms with medial syncope and

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[27] The Greek suffix *-*ιλο*- as in ποικίλος 'motley, variegated, parti-coloured; variable' (Krahe & Meid 1967: 85) obviously does not provide a good parallel, as it forms an adjective.

[28] The argument for Pre-Germanic suffix ablaut, based on parallels outside Germanic, cannot be replicated for the instrumental/ locative suffix, the forms of which vary according to younger Germanic suffix ablaut, where for example ON *-*ull* does not descend directly from any PreGmc ablaut vowel.

without front umlaut, such as dat. sg. *katli* and nom. pl. *katlar*, testify to the fact that the syncopated vowel was originally a dorso-palatal *ï*. From this it follows that forms with front umlaut and unsyncopated trigger vowel, such as nom. sg. *ketill* and gen. sg. *ketils*, must have undergone a secondary alteration in the trigger vowel soon after *a*-syncope, but before phonologisation of front umlaut. It is here proposed that the reason for that alteration is a transfer from the vowel system for prominent syllables to the system for non-prominent syllables, forced upon the vowel by a change in prosodic position following early *a*-syncope. In order to make the presentation on this issue simple and readable, it is opportune to begin by examining front umlaut by long trigger vowels and then describe a prominence system for Proto- and Transitional Scandinavian that correctly predicts both syncope and umlaut.

6 Long Trigger Vowels, Mora Count and Syllable Prominence

Michael Schulte (1998: 223–226) argues at some length that the long vowel *ī* was a trigger for phonological front umlaut. A similar argument was made by Paul Bibire (1975: 185ff). Both justifiably refute the contradictory opinion of Axel Kock, who had maintained that long *ī* did not trigger fronting. In the examples in (1), which fail to show front umlaut, the trigger is mainly located in suffixes. Bibire (1975: 186–187) claimed that these examples deviate from the phonologically regular:

(1) Non-occurrence of front umlaut by long -ī in PSc non-final syllables

a. *-īna-* (denominative adjectives and nouns, often denoting material, as exemplified by *gullin* 'golden' < **gulþīna-*)

b. *-īga-* (denominative and deverbative adjectives, as exemplified by *máttigr* 'mighty' < **mahtīga-*)

c. *-līka-* (adjectives and adverbs, as exemplified by *dagligr* 'daily' < **daglīka-*)

Bibire's attempts to explain absence of front umlaut by suffix substitutions appear too complex and unnatural to be right, but at the time may still have appeared justified, because a number of endings with long *ī* irrefutably demonstrate front umlaut, to wit:

(2) Front umlaut by ETSc long -$\bar{i}$ in word-final syllables

a. some case endings pertaining to *u*-stems[29], for example dat. sg. *erni* 'eagle' < ASc **ɛrnī* < LTSc **ærnī* < PPSc **arnîu* < PlGmc **arnewi*

b. some case endings pertaining to *in*-stems, for example f. nom. sg. *gleði* 'joy' < ASc **glɛðī* < LTSc **glæðī* < PSc **glaðî* < PlGmc **glaðīn-*

An observation which may have been overlooked until now is that accomplished front umlaut caused by long -$\bar{i}$ appears to be conditioned by triggers that were located in word-final inflectional endings which had long since incorporated their stem formants and lost their status as independent suffixes. Accordingly, they were not in a position to function as prosodic islands or, in other words, to carry "secondary stress". Remarkably, this also applies to front umlaut triggered without exception by a medial *-i-* in the sequence *-ija-*, born from a Pre-Scandinavian insertion of an epenthetic *-i-* as a result of Sievers' law.[30] The trigger vowel was not yet long in Proto-Scandinavian, even if eventually it became long upon syncope of a following *-a-*, as in PlGmc **andjaz* > **andijaz* > ETSc **andīz*. The lengthening is verified by the retained vowel in ON *endir* 'end'. Concurrently with the sequence vocalising into a long vowel, the vowel also came to appear in a word-final syllable and by that development became perfectly equivalent to the cases in (2).

The reason that syllable position is crucial for the activity of long triggers is best explained in a way similar to the justification given above for short triggers: it is plausible that long vowels belonged to two different vowel systems in complementary prosodic distribution, conditional upon the prominence of the syllable. Word-final syllables hosted an impoverished vowel system for non-prominent syllables. Unlike the system for prominent syllables, this vowel system did not employ rounding for contrast. Here, long non-low vowels contrasted with each other by means of coronality, while rounding, rather than being contrastive, was a redundant enhancement of their contrastively non-coronal articulation.

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[29] Syllabification of a light stem would probably have been different (Riad 1992: 76–78) and should have led to a shorter output *+syn* 'son' < LASc **syni* < EASc **synju* < ETSc **sunju* < **sunîwî* < PlGmc **sunewi*. At some point a levelling in favour of the ending of the heavy stems must have occurred. The attested endingless dative of *u*-stems is not probative; it is a follower of the accusative, because it takes rounding mutation (Noreen 1923 [1884]: §395).

[30] The vowel inserted by Sievers' law may be inferred to have been *-i̯-* rather than *-i-* (Schalin 2017: subsection 6.2.4). Even so, it would have become laminalised in all contexts upon loss of prominence and thus without exception would have become a fronting trigger, as reflected in the attested data.

Accordingly, where a vowel had been long and had stood in the word-final syllable in TSc, it either triggered front umlaut or breaking, but never rounding umlaut, even if the vowel was rounded phonetically, i.e. by redundant enhancement, as in the case of *-*ō*-. This is, for example, the reason for the complete lack of eastern Scandinavian rounding umlaut (western rounding umlaut is here of a later date) in the oblique cases of weak feminines like OSw *biællo* 'bell' < **bêllōn*- (Schalin 2017: subsection 6.1).

On the other hand, instances of the long palatal vowel *ī̄*, which occur in penultimate PSc syllables in the suffixes in (1), were vowels specified as non-round, but unspecified for coronality, and therefore were inert as triggers for front umlaut. These suffixes were morpho-phonologically separated from the root. Behaving as prosodic islands (i.e. as if they were parts of compounds), they retained an independent assignment of prominence, even after *a*-syncope.

6.1 Metrical Parsing and Prominence Assignment

A synchronic analysis of PSc, PPSc and TSc prominence patterns that conforms to the present analysis of front umlaut and also correctly predicts syncope entails that the prominence of syllables was derived from the prominence of moras. The contrastive features for each vowel were assigned strictly in conformity with the prominence of the syllable that contained it.[31]

Prominent moras were the two first moras counted from left to right and every even-numbered mora counted from right to left. Thus, in ***á̲.ðú̲.lḯ̲.já̲*** (> *øðli* 'character, nature') prominent moras were ***á̲*** and ***ú̲*** counted from the left and ***ḯ̲*** counted from the right. Acute accents here denote prominent moras and grave accents denote non-prominent ones, while boldface type denotes prominent syllables (the acutes for prominent syllables within the main foot will hereafter be omitted as presentationally redundant).

The prominence of any bimoraic syllable would in PSc, PPSc and TSc have conformed to the prominence of its latter mora. Accordingly, a bimoraic syllable consisting of a first prominent mora and a second non-

[31] The division into different contrastive features for vowels in prominent and non-prominent syllables respectively calls for further theoretical considerations in future studies. A key question is whether the differentiation was still synchronically derived or diachronically restructured into contrastive phonology. Reasons to assume the latter, as illustrated in Figure 5, are given in Schalin (2017: subsection 6.1).

prominent one would have counted as non-prominent, exemplified by the latter syllable in f. nom. sg. **al.þî̂* > *elli* 'oldness'. Such non-prominent bimoraic syllables will hereafter be qualified as "alleviated", probably realised with low pitch as a result of "pitch flattening".[32]

The constraint prohibiting more than two moras in the main stressed foot was not violated when an alleviated syllable followed a light main stressed syllable, as in m. nom. sg. **fa.ðɜ́ɜ̀r||* 'father'. As the second syllable from the left was alleviated it could, for the purpose of this constraint, be counted as light and be included in the main foot after pitch flattening. Bimoraic syllables, which by the above rules should have become prominent, could also in order to satisfy the same constraint be forced to undergo pitch flattening by "resolution" (Hulst 1999: 47, referring to a suggestion of Dresher and Lahiri; Kiparsky 2009: 17). These syllables were not at all common in PPSc because so many potential cases had become alleviated syllables through deletion rules that eliminated the third syllable.

After the PPSc syncope of non-prominent **-à-*, the mora count from the right would reapply starting from the last weight-bearing segment, resulting in reassignment of syllable prominence outside the main foot and consequential re-adjustment of contrastive vowel qualities. For the example word 'character, nature' used above, this meant alleviation of the final syllable, resulting in a long coronal vowel ****á.ðú.lí.jà*** ~> ****á.ðú.lí̋j*** > ETSc ***á.ðú.lî̂***. For suffixes with an underlying */ï/, as in **-ḯs.kà-*, **-ḯs.tà-* and instrumental **-ḯ.là-*, syllable prominence was a prerequisite for sustaining the vowel **ï*, and therefore the *a*-syncope before the operation of front umlaut laminalised these dorsal vowels and created umlauting allomorphs in the event they were positioned outside the main foot, exemplified by ****lan||gḯs.tàz*** > PPSc=ETSc ****lan||gî̂stz*** > ****længstz*** > *lengstr* 'longest' and through alleviation in ****ban||dḯ.làz*** > PPSc=ETSc ****ban||dî̂lz*** > LTSc ****bæn||dî̂lz*** > *bendill* 'band'.

This analysis may engender predictions not only for umlaut, as elaborated further in the next subsection, but also for syncope. The successive rounds of early *a*-, *i*- and *u*-syncope respectively (Schalin 2017: subsection 3.3) were cases of vowel deletion, not mora deletion, and were inhibited either by prominence, as in the case of the light medial syllable f. nom. sg. ****ga.ma||lù*** > EASc **gamolu* > *gǫmul* 'old', or by bimorai-

[32] "Pitch flattening" is the term used by Rischel (2008: 205f, 211); Rischel, however, counted moras from left to right and accordingly assumed pitch flattening for a vowel with low-high rather than high-low pitch.

city, as in the case of the alleviated final syllable in the plural of the example word above **ban‖dì.lóòz* > LTSc **bænd‖lóòz* > ASc **bɛnd.laaz* > *bendlar*. Note that the long vowels in question would have been shortened no earlier than the LASc deletion of short vowels inside the main foot. In the event of an earlier shortening long and short vowels would have coalesced and both become subject to the same later deletion.

As shown by the retained second syllable vowel in ON acc. sg. *bendil* (instead of +*bendl)*, the liquid must have started to carry weight also in word-final position before the syncope of *-i-*. In fact, umlaut and syncope data seem to conform to an assumption that a sonorant after a monomoraic vowel became moraic and caused alleviation already in ETSc, as in m. acc. sg. **ban.dǐ.là* > **ban.dîl*. This is also seen in the infinitive suffix of *ija*-verbs, showing that the second syllable **î* had become an odd-numbered mora counted from the right, making it a target for deletion, as in PPSc **smîr.wǐ.jàn* > ETSc **smîr.wì.jáǹ* > ON **smyr.va* 'to smear'. On the other hand, it is likely that after bimoraic vowels, word-final sonorants did not become moraic this early. The delay could have been due to a constraint against trimoraic syllables outside the main stress. Oblique cases of fem. *īn*-stems confirm this, because their status as alleviated syllables in ETSc is revealed by their activity for front umlaut, as in ETSc **ǽĺ.þíìn* > LTSc **ǽĺ.þíìn* > **æl.þïï* > *elli* 'oldness', instead of +*áĺ.þïǐǹ* > +*alli*.[33]

6.2 The Alteration Exemplified by *ketil/ katlar*

Returning to the case of **katïlaz* > *ketill*, it is clear that when the early round of *a*-syncope eliminated the stem vowel in the third syllable, the sonorant changed prosodic position in the nominative, the genitive and the accusative singular, while it moved up from the onset of the third syllable, as in **ka.tï.laz,* to be included in the rhyme of the second syllable, as in **ka.tîlz* (Grønvik 1998: 53f). Sonorants in the rhyme, unless word-final, were also moraic outside main stressed syllables (Schalin 2017: subsection 3.1 with references). Because of this, the second syllable, after the loss of the third syllable in **ka.tï.làz*, automatically became bimoraic in the nominative **ka.tîlz* and in the genitive **ka.tîls*, where the sonorant

[33] It will be the task of further research to determine whether this analysis could be developed to explain under precisely what conditions syllables containing long vowels could be reduced earlier than expected. Issues of particular interest include occurrences of syncope of long *ī* in OSc nouns (Stausland Johnsen 2012; cf. Riad 1992: 152ff).

was not word-final. The condition that this increase in moraicity inhibited syncope may also be inferred from the fact that the second syllable in precisely these case forms, in *ketil-* and equivalent words with bisyllabic stems, such as *fjǫtur-* 'fetter' and *hamar-* 'hammer', were never deleted.

As soon as the second syllable had become word-final and bimoraic, it underwent pitch flattening and alleviation to ***ka.tîlz**, owing to the prominence pattern of the two moras that it contained. The output of early syncope in the words discussed conformed to prosodic constraints and seems to have been allowed very early. Syllable structures such as m. nom. sg. ***fa.ðɜ̂r**|| 'father' (> OSw *faþir* and ON *faðir*) with a less typical light-heavy foot structure were regularly allowed before syncope and provided a template for a syncopated nominative ***ka.tîlz**. As an automatic consequence of alleviation, the second-syllable vowel would be altered to a phonetically proximate vowel from the vowel system for non-prominent syllables. For cases with a dorso-palatal vowel in the second syllable, that is, a vowel which was not allowed in a non-prominent syllable, a substitution with an active fronting trigger */**ka.tï**.laz/ ~> *[**ka.tï**.lz] > */**ka**.tîlz/ was typically involved.[34]

The analysis of Braroe (1979), introduced in Section 5 above, has some resemblance to the analysis presented in this paper insofar as low prominence of the trigger in both analyses becomes associated with accomplished front umlaut, while assignment of prominence for the trigger correlates with inertia for front umlaut. In Braroe's analysis the cause would have been a hypothetically conditioned characteristic of the umlaut mechanism, while in the present analysis the differing umlaut effect is not proposed to be immediately caused by the prominence of the trigger vowel, but rather by its contrastive features, the transmission of which constitutes the essence of umlaut in the first place (Figure 3). The apparent similarity to Braroe's interpretation comes from the fact that these features in turn depended on the prominence of the syllable containing the trigger vowel.

Owing to these common characteristics of the two hypotheses, they both confront the same problem, namely that a palatal vowel, which seems to have undergone relatively early syncope when positioned before a bimoraic syllable, is also assumed to have carried prominence, ex-

[34] The substitution of /î/ rather than */u/ in this suffix may have been catalysed by the fact that the following consonantal sequence *-lz was laminal. An alternative mutation /ï/ → /u/ could perhaps have taken place in certain contexts, as indicated by variants such as ON *drǫsull/ drasill* 'horse'.

emplified by **lu.kï.looz* 'keys'. Braroe (1979: 50) explained that "mid syncope" was "independent of stress" by "the strong tendency to favour syllables of the CVC form".[35] In principle, the view that syncope not only depends on stress, but also on syllable structure has been increasingly entertained, for example recently by Paul Kiparsky (2009: 16f, 19, 21–26). For Braroe, this explanation is a last resort necessary to make the hypothesis work, because loss of stress would with her initial assumptions have caused the activation of the umlaut mechanism. Under the present hypothesis, however, we do not have to assume that syncope in this context was concurrent with medial syncope in non-prominent syllables, as long as de-stressing occurred after the phonologisation of front umlaut. This phonologisation, which occurred when the first non-prominent second syllable coronal triggers were lost, does thus constitute a *terminus post quem*, after which deletion should have happened. The deletion could plausibly have been preceded by loss of prominence in positions immediately before a bimoraic syllable, as in TSc **ka.tï.lóòz* > EASc **ka.ti.laaz* > *katlar* 'kettles'. A *terminus ante quem* is marked by ASc rounding umlaut, because medial *-ï-* seems no longer to be present in the capacity of a blocker vowel when secondary rounding umlaut becomes distinctive in 3. pers. pl. pret. ASc *[tɒlðū̄] <~ **talðū̄* (< TSc **taliðũn*), resulting in ON *tǫlðu* 'they told, counted' (Schalin 2017: subsection 6.5).

In conclusion this explanation satisfactorily predicts the alteration attested in *ketill/ katli/ katlar*, given that the suffix in this Latin loanword was associated with the instrumental/ locative suffix having the allomorph *-ila* after a light syllable rather than being associated with the diminutive one, which had no such allomorph. On that condition the word would thus develop like the inherited equivalent *lykill/ lukli/ luklar* 'keys'. As the process of morpho-phonological mix-up was ongoing in parallel with sound change and word formation, instrumental derivations with disparate paradigmatic levelling gradually began to appear also in light stems. Levelling in favour of the umlauted vowel, exemplified by *hefil(l)/ hefli/ heflar*, could have come about owing to early analogy with the heavy stems, to early contamination with the diminutive

[35] She refers to "an analogous rule in modern Swedish", whereby the plurals of *nýckèl* 'key' and *cýkěl* 'bicycle' both have syncopated plurals despite different accentuation. The analogy is not perfect (because the modern difference is one of contour tone) and with regard to its diachronic dimension even circular, as the historical reason for the syncopated plural of *nýckèl* (OSw *nykil* ← **lykill* < **lukîlz* < **lukïlaz*) is nothing but a special case of the problem she endeavours to explain.

suffix or to late levelling from the umlauted case forms. Levelling in favour of the un-umlauted vowel, as in *skutil(l)/ skutli/ skutlar*, would have come about after the umlaut period based on the un-umlauted case forms. The lateness of paradigmatic levelling in the latter class of words is well supported in this particular example word by the umlauted target vowel in the cognate OSw **skytil*, given the reasonable assumption that it results from levelling in the reverse direction.

This analysis may also show its power by incorporating the explanation of yet another anomaly, albeit with some difficulty, namely why lowering umlaut is attested in the past participles instead of the expected front umlaut, exemplified by m. nom. sg. *opinn* 'open' < **upînaz*. Based on clear-cut runic evidence, through the attestations KJ 60 **faikinaz**, KJ 61 **haitinaz** and KJ 99 **slaginaz** (Schulte 1998: 202), the medial vowel in Proto-Scandinavian reflects a generalised descendant of the PlGmc ablaut grade **-ena-*, rather than **-ana-*, notwithstanding the latter was undoubtedly generalised in West Germanic. An indication that lack of umlaut is indeed connected with prosodic change is found in a comparison with the umlauted Icelandic f. nom. sg. *byðna* 'wooden container' < **buðînō.* (LägLoS: s.v. 'putina'), with its originally equal triggering vowel, and with *mylna* (*mølna*) 'mill' < **mulînō* < Latin *molinā* (Iverson & Salmons 2012: 124). The participles with lowering instead of front umlaut were levelled from case forms in the singular where a coronal **î* became phonetically nasalised by following *-n-* on becoming tautosyllabic after the *a*-syncope. Apparently, what happened could be described as follows: nasalisation had come about through a synchronic rule ordered after a synchronic syncope rule as in m. nom. sg. *****u.pî.***naz* ~> [***u.pĩ́nz***]. When restructuring of syncope occurred and this vowel upon syllable alleviation had to adapt to the vowel system for non-prominent syllables, this nasalisation was perceptually so salient that the vowel was substituted, even at the cost of losing its contrastive coronality, by a contrastively nasalised vowel **ĩ/ẽ*.[36] This occurred in a development *****u.pî.***naz ~> [***u.pĩ́nz***] > ***u.pẽnz***. Many other, although less frequent, case

[36] There is little continuity in the vowel system from PreSc word-final nasalised short vowels, which were deleted during the early syncope era, and new long word-final nasalised vowels, which emerged later, in LTSc. Yet it is possible that short word-final nasals still existed in acc. sg. of strong nouns during the development discussed and moreover a nasalised vowel seems to have been contrastive in PPSc wherever the word-final syllable had been double-closed by a coronal (as opposed to velar) sequence **-VnC#*, for example in the accusative plurals of *i*-stems PPSc **staðẽn* < PlGmc **staðinz*. Nasalisation was seemingly not salient enough to become distinctive in suffixes containing a velar PreSc sequence **-engV-* or **-engjV-*, which contained a coronal fronting trigger.

forms preserved an oral, coronal trigger, as in f. nom. sg. ***u.pî.nù*** 'open'. Paradigms with retained umlauted target vowel, as in OSw *ypin/øpin*, reflect levelling from those.

7 On Umlaut Reversion and on Morphological Generalisations

In this section, typical deficiencies of solutions that have aspired to explain front umlaut by invoking some variant of umlaut reversion will be highlighted.[37] Alongside some considerations on the hypothesis of Michael Schulte (1998), the most recent and theoretically elaborated hypothesis of this kind, by Gregory K. Iverson and Joseph C. Salmons, will be scrutinised. Another category of explanations that do not involve a transitory stage of fronting and its subsequent reversion was effectively refuted in Section 3 by the acid test of *iR*-umlaut. Moreover, some explanations rely so heavily on analogical change and resulting synchronic morphological generalisations that they are atypical for these two main categories and deserve some comments at the end of this section.

In terms of scientific reasoning the predicament of the explanations based on umlaut reversion is very disquieting, as this initial assumption complicates the ensuing analysis and generally requires postulates that on closer inspection are *ad hoc*. A problematic common denominator and logical prerequisite for these explanations is that post-phonologically fronted +[stæði] or +[stäði], with structurally non-significant front umlaut derived synchronically from the lexical base form */staði/, would have existed synchronously with a restructured lexical form */gæst/, which contained a contrastively fronted vowel (Table 7). This stage would have prevailed during an interval where syncope of *-i* had already taken place "after heavy syllables", but not yet "after light syllables". Whatever the reason may have been that accompanied syncope "after heavy syllables" and caused *[gæsti] <~ */gasti/ to restructure into

[37] "Umlaut reversion" is here treated as distinct from "reverse umlaut", allegedly motivated by an active backing trigger (see subsection 2.2). To the latter category of explanations, originally associated with Penzl (1951; 1984), belongs some considerations of light stem trisyllables by Elmevik (1993: 82). It is very telling that he needs another explanation for bisyllables, which typically are not well explained by reverse umlaut. An attempt to address this deficiency was made by Reid (1990), who hypothesised a merger of */i/ and */a/ into a secondary backing trigger */a/ when retained in a syllable following a light main stressed one. It goes without saying that postulating a vowel system in this position consisting of two non-palatal vowels (**u* and **a*) and no palatal one is hardly tenable, and in any event would be *ad hoc*.

*/gæst/, it would not have been applicable or no longer relevant when syncope occurred "after light syllables", because the outcome was not equivalently +/stæð/ but full reversion into */stað/.[38]

Any cause proposed for such umlaut reversion cannot be attributed exclusively to a lesser weight of the target, because reversion does not happen for equally light targets when followed by a metrically non-equivalent palatal trigger (Table 2 block 3 rows d. and e.). Thus, when for example Skomedal (1980: 123f; evaluated in Hreinn Benediktsson 1982: 33–35) proposes that the fronted allophones in light stems were perhaps not identical to those in heavy stems, he limits the explanation to a context before a short syllabic trigger *-*i*. Thus he implies that fronting would have been unambiguously clear before glides as in *[tæljið] and in other heavy syllables as in *[gæsti], while it would have been ambiguously halfway in light ones as in +[stäði] and *[täliðo:]. This *ad hoc* postulate is further developed by an assumption that the less fronted allophone upon trigger loss would have become perceptually associated with the source phoneme */a/. Hence, Skomedal not only operates with scalar phonetic values in a way which from a phonological standpoint makes the explanation inherently vague (cf. similar criticism of Widmark in subsection 3.3), he also encumbers the explanatory economy with a double burden of assumptions; the analysis requires both an explanation for why fronting in a light syllable relapsed and another one for why a target in light stems would have been "less fronted" to begin with. The latter explanation entails all the insurmountable complications from the other main category of solutions (subsection 2.2. and 3.1) based on prosody and differently operating mechanisms.

7.1 On the Phonologisation of Positionally Predictable Targets

For other explanations of umlaut reversion, which do not invoke an assumption of scalar fronting, another basic idea may be identified, which is their least common denominator and logical prerequisite. This entails that at a certain point in time vowels with a fronted phonetic quality would have been phonologically interpreted in two different ways by language learners, depending on whether or not their fronting was positionally predictable by a phonological rule. Thus, at the same time as

[38] These explanations have disregarded across the board the fact that syncope in **taliðō* > **talðā* was almost two centuries earlier than in **staðï* > **stað* (Voyles 1982: 275; Riad 1992: 116–151) and at most marginally, if indeed at all, later than in **dōmîðō* > **dōmdā* (Kiparsky 2009: 16f, 21–26; Schalin forthcoming).

language learners would have inferred that *[æ] ~ /æ/ in LTSc m. acc. sg. **gæst* was both distinctively and contrastively different from *[a] ~ /a/ in LTSc m. acc. sg. **bast* 'bast, raffia', they would still have interpreted *[æ] as a positional variant of underlying */a/ in acc. sg. +[stæði], derived synchronically from underlying */staði/.

On condition that the pertinent assumption of the proponents concerning the chronology of syncope is accepted (see nt 38), it may admittedly be true that *[æ] and *[a] would not in a narrow sense have been contrastively distributed, if only contexts such as in +[stæði] (derived from underlying */staði/) are considered where the phone was standing before an unreduced fronting trigger. Even so the learnability of this sort of vowel system is quite questionable without any morphological generalisation to support it, which is also understood in proposals that invoke such grammatical markers (e.g. Cathey 1972: passim; see nt 51 below). Moreover, it is not even enough to concede to the significance of this limited lack of contrastive distribution in order to sustain a hypothesis of umlaut reversion. One must also be able to explain the differing behaviour of otherwise equivalent target vowels in heavy and light syllables respectively in their response to trigger loss: when syncope hit *[gæsti], it led to a restructuring into an underlying */gæst/ not +/gast/, yet when later syncope would have hit +[stæði] and +[tæliðo:], no restructuring is said to have taken place, but rather full reversion to the underived base forms */stað/ and */talða:/. The explanations of what could possibly have happened between rows 2 and 4 in Table 7 are quite disparate and none of them is convincing; the proponents of umlaut reversion have not agreed among themselves on what the critical factor could have been to

Table 7. Typical sequencing of events, if umlaut reversion is assumed.

1. phonetic fronting in all contexts	/basta/ ~> [basta]	/gasti/ ~> [gæsti]	/staði/ ~> [stæði]	/taliðo:/ ~> [tæliðo:]
2. phoneme split upon loss of a trigger after a heavy syllable	[bast] > /bɑst/ ~> [bɑst]	[gæst] > /gæst/ ~> [gæst]	/staði/ ~> [stæði]	/taliðo:/ ~> [tæliðo:]
3. something is hypothesised to occur, making the target vowel inapt for phonologisation	/bɑst/ ~> [bɑst]	/gæst/ ~> [gæst]	/staðʔ/ ~> [stʔðʔ]	/talʔðo:/ ~> [tʔlʔðo:]
4. syncope after light syllable	/bast/ ~> [bast]	/gɛst/ ~> [gɛst]	> /stað/ ~> [stað]	> /talða:/ ~> [talða:]

account for relapsed fronting in some light syllables, while fronting had only some time before been phonologised in all heavy ones. In the words of Hreinn Benediktsson (1982: 15–16, in response to Cathey 1972: 43, 50): "there is no answer to the question why, if restructuring back to the un-umlauted vowel is assumed to have taken place in **tæmiðō^{n}* → **tamðō^{n}*, it did not also take place in **dømiðō^{n}* → ***dōmðō^{n}*." Serious attempts to answer the question of why have not elicited convincing support for the idea behind reversion of *i*-umlaut; rather the contrary has been the case (Kiparsky 2009: 43–45).

According to Paul Kiparsky (2009: 27–37), who is not a proponent of Scandinavian umlaut reversion, a positionally predictable phone that reverts upon trigger loss (as allegedly occurred as illustrated in Table 7 row 4) would have to lack perceptual "salience", while conversely, a phone that becomes restructured upon trigger loss (Table 7 row 2) would be "distinctive", hence "quasi-phonemic". Accepting this theoretical basis leads to a revealing conclusion, namely, that should umlaut reversion be accepted, a positionally predictable fronted vowel which had already become a distinctive quasi-phoneme by the time of syncope after heavy syllables would for entirely hypothetical reasons happen to lose that distinctiveness in the perception of language learners precisely in the interval before syncope after light syllables. Such an unprompted loss of distinctiveness would have been rather astonishing in light of the fact that the very same vowel qualities were kept contrastively apart elsewhere in the lexicon and must therefore have been perceptible as saliently distinct. Here, in fact, the judgement of Hreinn Benediktsson (1982: 1ff) seems to be once more verified; even after revisions of the theoretical framework chosen, the much criticised arbitrary on-and-off character of Kock's explanation seems to reappear in one guise or another.

All these complications are further aggravated by the fact that any answer formulated to the question of umlaut reversion would also need to cover why phonologisation was not reversed or aborted while all conditions otherwise seem to have been equivalent, for example in previous *ja*-stems like TSc **bæðî* > *beð* 'bed' (< **baðja-*); at a critical point in time these stems should (unless proven otherwise) have been equivalent to *i*-stems after re-syllabification and vocalisation of */j/ to */î/. To this category indeed belongs the present indicative singular of the very same weak verbs that lack front umlaut in the preterite tense, exemplified by *frem-* 'carrie(s) out, perform(s)' < **fræmi-* .. < **framj-*.

Finally, any explanation based on umlaut reversion through relapsed or aborted phonologisation would need to address why reversion did

not happen, while all conditions otherwise seem to have been equivalent, in comparatives exemplified by **framîzō* > *fremra*, in consonant stems exemplified by **hnut-îz* > OSw *nyţer*, in the present indicative of most classes of strong verbs exemplified by **farîz* > *ferr*, or indeed in feminine abstracts exemplified by **framîþu* > *fremd*. These latter stumbling blocks, which have attracted too little attention in past research, seem just as fatal here as they were for the explanations discussed in subsection 3.1.

7.2 The Influence on the Target by Changes in the Trigger

It is evident in the data in Table 2 block 3 that no explanation of umlaut reversion in the target is possible without considering differences in the triggers. This has from the outset been acknowledged by mainstream research. Hesselman (1945) and Taylor (1953–57) assumed that the original trigger catalysed, by means of becoming weakened or centralised, rebacking of the target through a dependent co-articulatory relationship. Hesselman called this depalatalisation in tandem (in Swedish) *omljudsväxling*. A waning fronting of the target has been attributed to a weakening trigger as late as by Elmevik (1993: 81f). Adding a consideration of phonological theory spells trouble for this idea, as one would *a priori* expect the change in the target to occur as a result of a structurally significant change in the trigger, rather than being motivated by a non-contrastive phonetic shading of it. Moreover, a weakening of the trigger, if structurally significant, could plausibly be expected to cause the phonologisation of a distinctive fronting of the target, rather than its fading.

The latter view, which has long since been recognised as valid (Widmark 1991: 119 with references), is dominating the explanations on front umlaut in a monography by Michael Schulte (1998: 63ff with references), along with interpretations of runic evidence. However, the explanations based on "weakening" triggers are by him stretched to a point where both clarity and plausibility are lost. It is easy to follow Schulte (1998: 237f) in that centralisation of a short trigger *-*i* > *-*ə* could have caused front umlaut in the target, namely on the key condition that the trigger in the process lost a fronting feature that was contrastive. Similarly, it may be expected that an alleged merger of a fronted long *-*ī* with an unfronted *-*ɜ̄* could have caused front umlaut in forms where the former vowel was positioned as a trigger (ibid.: 229f). Significant lack of clarity is however caused by Schulte's use of the German word for lowering, "*Senkung*", because the loss of a raising feature pertaining to the trigger *-*ī* should not result in phonologisation of the target's fronting, but of its raising.

The analysis steers further into dire straits in its explanation of *i/j*-umlaut. At the most critical juncture Schulte postulates two sound changes that must have been simultaneous, even if one of them is explained to be caused by the other. He appears to describe a chain shift, which is neither a push chain or a drag chain but an instant causally dependent double shift in tandem: the vocalisation of a sequence **-jV-* > **-i-* following syncope of the following vowel is stated to be the cause for phonemicisation of the fronting in /baðja/ ~> [bæðja] > /bæði/, a phonemicisation which in turn is supposed to be the cause for the umlaut reversion in /staði/ ~> [stæði] > [staði] (ibid.: 180, 184–189). This umlaut reversion must have been precisely simultaneous with the phonemicisation for the hypothesis to work. Of course it could not have occurred in anticipation of the very motivation that caused it, while it could not have been later either, since this would have led to counterfactual phoneme merger; the surface form [stæði] <~ /staði/ would still have been unaltered at a time when a new identical surface form [stæði] of the corresponding *ja*-stem (reflected in OSw *stæþ* 'anvil') emerged. The minimal pair in Table 8 shows that whatever intermediate stages are added, as tried out in rows 1b and 2, merger of the allophonic surface forms of the two stem-classes would result if the development of /stadja/ into [stæði] in the *ja*-stem is assumed to anticipate the umlaut reversion [stæði] > [staði] in the *i*-stem. After this phonetic coalescence, a phonological merger of the underlying forms in the grammar of the next generation of language learners could not have been avoided; yet this expectation does not match the attested data, which testify to the fact that *ja*-stems and *i*-stems were kept separate throughout the umlaut process in terms of their fronting status.

Table 8. The development of *i*-stems with umlaut reversion and *ja*-stems, as inferred from Schulte (1998) and further interpreted.

	OSw *stæþ* 'anvil'	OSw *staþ* ~ON *stað* 'place'
1. phonetic fronting in all contexts	/staðja/ ~> [stæðja]	/staði/ ~> [stæði]
1b. a missing link? *a*-syncope by synchronic rule?	~> [stæðj] (or ~> [stæði])	~> [stæði] (or ~> [staði])
2. a missing link? restructured *a*-syncope?	/staðj/ ~> [stæðj] or ~> [stæði]	/staði/ ~> [stæði] or ~> [staði]
3. restructured fronting and vocalisation of the glide	> /stæði/ ~> [stæði]	> /staði/ ~> [staði]

Schulte's (1998) relatively abstract description charges the reader with the responsibility for assessing whether the two causally dependent changes are understood to have been truly simultaneous or not, as illustrated by the following translated quotes; according to him umlaut reversion would have been "a phenomenon of interference between *i*- and *j*-umlaut" (ibid.: 186) and after a "structurally motivated reinterpretation" (ibid.: 184) the trigger vowel would have been phonologically interpreted as one in which the umlaut impact "had already expired" (ibid.: 185).[39] Kiparsky (2009: 44–45; cf. Liberman 2001: 86f) perhaps exposes a disinclination to recognize the possibility of an instant but causally dependent tandem shift when he calls the conditions under which the reversion happens, and the principles behind it "obscure, and therefore difficult to assess". Rasmussen (2000: 150) clearly disregards even the possibility of non-sequenced causality when he deems "implausible in the extreme" that an accomplished merger would be reversed following "the lines of an older and forgotten stage" and continues "This touch of mysticism is as close to a falsification of a real-world theory as one can get". Yet all alternatives considered, the conclusion can hardly be avoided, however unpalatable and even if it is difficult to find the precise quote, that the two restructurings are by Schulte (1998: 184–186) meant to have been simultaneous.

Even if this non-sequenced causality or chain shift in tandem would be tentatively accepted, justified by a need of the language learner to uphold contrast, there is a further even more serious problem pertaining to the explanation. Schulte (1998: 165–173) explicitly argues for scalar degrees of the palatalising effect possessed by triggers. The analysis requires that a vocalisation of a sequence **-jV-* > **-i-* (following syncope of the following vowel) amounts to a phonologically significant "weakening" of the trigger, which sets off the phonemicisation of the fronting in the target as in */baðja/ ~> *[bæðja] > */bæði/. Yet the alleged "weakness" of this trigger **-i-* is confusingly ambiguous, as it is assumed by Schulte to have caused, up until then, an allophonic fronting of the target of exactly equal "strength" to the fronting caused by **-j-*, as in **staði* ~> *[stæði]. It is therefore quite obscure how this phonetically explained "weakening" should be understood in terms of contrastive phonology; only the merger of an active fronting trigger with an inert trigger would be expected to cause phonemicisation, as opposed to the merger of a "strong"

[39] "Die Umlautswirkung von *i* (< **j*) ist also bereits erloschen"

trigger with a "weaker" trigger under conditions where the strength is defined as having had no consequence for the degree of the fronting exercised on the target.

7.3 Synchronic Fronting and Parasitic Rule Loss

The most sophisticated proposals for umlaut reversion merely assume changes in the synchronic dependence governing the relation of the trigger to the target, changes which killed the fronting rule within the critical interval. The first to propose something of this kind was Robert D. King (1971; 1973) in the framework of transformational grammar, along with Helge Dyvik (1973) in the tradition of structuralist phonology. Within the latter tradition concepts of "suspended phonemicisation" (Hreinn Benediktsson 1963, 1966) and "phonemic indeterminacy" (Haugen 1969) had already been developed for rounding umlaut. In all these rules-based explanations of umlaut reversion the critical rhetorical question put in this very context by Robert D. King (1971: 4) and echoed by Anatoly Liberman (1991: 127) – "why do allophones sometimes remain and other times revert?" – again lingers without a satisfactory answer, while the same crux is simply transposed to a more abstract level of analysis.

One of the most recent attempts to explain the dynamics of umlaut reversion calls for considered comment. Gregory K. Iverson and Joseph C. Salmons (2012) go to great lengths to explain key aspects of the most often-discussed paradigms. They account for some of those by purported umlaut reversion through "parasitic rule loss" after different stages of paradigm resolution. The authors argue that morphological generalisations, rather than merely simplifying the final output of phonological sound change, may interact or intervene while the life-cycle of sound change is still going on, even to the point that morphological "crazy rules" ([*sic*] Iverson & Salmons 2012: 114, 117, 126) may be fed into the grammar. "Parasitic rule loss" refers to a process whereby phonological and morphological restructurings reduce the scope of application of a synchronic phonetic rule in the lexicon step by step, during which the rule becomes increasingly unlearnable and as a result loses its vitality. Ultimately, with the rule fading, there would be residual paradigms, which up to that point had remained unaffected by any one of the restructurings that had contributed to the rule's demise. In these items the phonetic output of the rule would relapse and return to the *status quo ante*. In the case of Scandinavian front umlaut this last explanation would

account for umlaut reversion in situations with late, Ancient Scandinavian trigger loss in light stems, such as */stað+iR/ ~> *[steð+iR] > *staðr* (Iverson & Salmons 2012: 110, 112–113). For the sake of our argument, let us call this diachronic development the "second reversion" (R2). In order to account for other paradigms, the authors amass various explanations. Presentationally, the synchronic rules which are their focus are demonstrated in greater visual clarity than the diachronic transitions between them, which are described in relatively elaborate, free formulations. Problems which erode and undermine these explanations in varying degrees include inconsistencies in analysing the data used, an imperfect use of the established description of preliterary Scandinavian, as well as a remarkably poor economy of diachronic assumptions. Moreover, some predictions that logically flow from the analysis may be falsified against further data.

The following sequence of events may be concluded from Iverson and Salmons' presentation: Firstly, the initial phonetic sound change materialised as a regressive synchronic fronting rule, which affected heavy and light syllables alike. Secondly, when prosodically regular syncope deleted the trigger after a heavy syllable, as in */gast+iR/ ~> *[gest+iR] ~> *[gest+R] > */gestR/, the transparent fronting rule turned opaque in the paradigms concerned, language learners generalised the surface quality of the target vowel across these paradigms and the fronting feature was restructured into a morphological rule or, in other words, "relexification" occurred (ibid.: 108f, 111, 118, 119). This restructuring would have been supported both in the class 1 weak verbs and in nominal *i*-stems by paradigmatic levelling to phonetically umlauted forms elsewhere in the paradigm with retained trigger.[40] Here, it is taken for granted that phonetics prevailed over the old rule, i.e. a new generation of language learners inferred a new fronted vowel quality by working backwards from the surface form that they perceived in older speakers. Thus,

[40] "Maintaining an allomorphy-free paradigm by sticking with the stem representation /gast-/ would not do, since umlaut still changes /gast-/ into /gest-/ in the nominative plural and other words in the paradigm which still have an [i] in the suffix, and to preserve transparency of umlaut as a purely phonetic process meant that the umlauted vowel in the nominative singular had to have come about by some other means" (Iverson & Salmons 2012: 108f). "Thus, the syncope of medial /i/ in long stems like /dōm+iða/ happened after otherwise phonetically transparent umlaut to result in *dœmda*. This, in turn, led speakers to adduce a morphologically triggered version of umlaut operating in the long stems because, though still generally based on the occurrence of a following /i/ or /j/, umlaut in the long stem paradigms could no longer be phonetically predicted everywhere, just as was the case in the development of long stem nouns" (ibid.: 115).

Table 9. The sequencing of umlaut reversion as inferred from Iverson & Salmons (2012) and further interpreted diachronically.

1. phonetic fronting uniformly; synchronic syncope in heavy stems	/gasti/ ~> [gesti] ~> [gest]	/taliðo:/ ~> [teliðo:]	/staði/ ~> [steði]	/katilaz/ ~> [ketilaz]
2. phonologisation after a heavy syllable upon trigger loss (F1)	[gest] > /gest/ ~> [gest]	/taliðo:/ ~> [teliðo:]	/staði/ ~> [steði]	/katilz/ ~> [ketilz]
3. synchronic syncope after light syllable	/gest/	/taliðo:/ ~> [teliðo:] ~> [telðo:]	/staði/ ~> [steði] ~> [steð]	/katilz/ ~> [ketilz]
4. trigger loss by suffix analogy, resulting in reversion (R1)	/gest/	/tal+iðo:/ ~> [tel+ðo:] > /tal+ðo:/	/staði/ ~> [steði] ~> [steð]	/katilz/ ~> [ketiɭɭ]
5. loss of vitality of fronting rule, unless trigger is stem-internal (F2 & R2)	/gest/	/talðo:/	/staði/ (~> [staði]) ~> [stað]	/katiɭɭ/ ~> [ketiɭɭ] ~> [ketiɭɭ]
6. syncope after light syllable restructured	/gest/	/talða:/	/staði/ ~> [stað] > /stað/	/ketiɭɭ/ ~> [ketiɭɭ]

the new generation replaced the fronting rule, which in some instances had lost its critical trigger, with a morphological rule prescribing a front vowel in the heavy stem paradigms concerned.[41] Let us call this diachronic development the "first fronting" (F1).

Very soon thereafter a synchronic syncope rule would have been generalised to medial syllables in trisyllabic light stems /tal+iða/ ~> [tel+iða] ~> [tel+ða]. As the trigger would thereby have disappeared from the perceptible phonetic surface form, the new generation of language learners would have reinterpreted the suffix as being identical with the allomorph occurring after heavy syllables, resulting in a relexification /tal+iða/ (~> [tel+iða] ~> [tel+ða]) → /tal+ða/.[42] For this latter development the

[41] "At this stage, learners seeking to match the output of speakers who continued to derive *gestr* from /gast+iR/ through sequenced interaction of umlaut and syncope, chose instead to arrive at *gestr* directly from /gest+R/, there being no longer reason for positing underlying /i/ in the increasingly invariable, syncopated form of the nominative singular suffix, /*R*/" (ibid.: 112).

[42] Note that due to the preceding restructuring, the allomorph after heavy syllables already lacked the fronting trigger in its underlying representation and could therefore no longer set off a fronting rule; accordingly, no restructuring of the vowel would have oc-

authors claim that maintaining the synchronic rule prevailed over the phonetic perception, i.e. a new generation of language learners was not reliant on the surface form, but continued to derive the vowel quality from the existing underlying base form, with trigger loss therefore bringing about umlaut reversion. Let us call this diachronic development the "first reversion" (R1).

The mutually opposed developments, (F1) and (R1), one following closely after the other and both caused by trigger loss, are in both cases said to relate to the fact that the synchronic fronting rule would still have been transparent. Also other key conditions were equal on the eve of these developments: the quality of the target vowel was fronted on the surface; young language learners hardly perceived the trigger, which was underlying only for an older generation;[43] and the umlauted vowel occurred elsewhere in the paradigm, constituting a potential support for a morphological generalisation to account for the fronted vowel.[44] All things considered, we are left with a highly unsatisfactory observation, suggesting – viewed through diachronic logic – that even though in both cases each of the conditions A, B, C and D were valid, an equal input X could lead arbitrarily either to (F1) or to (R1).[45] A similar dilemma arises

curred, but rather a reversal in a manner quite opposite that in the previous fronting (F1). Iverson and Salmons owe the idea of suffix analogy to Pipping (1922: 74f), but have transferred his original idea to a very different theoretical framework. For Pipping, trigger loss by suffix analogy would have happened before the activation of the umlaut mechanism in light stems, the delay of which would have been attributable to a later weakening of the accent.

[43] "For instance, as long stem umlaut triggers weaken, children do not hear them enough to build an active umlaut rule there, but they do hear the front rounded vowels and build lexical representations that contain those vowels as underlying" (Iverson & Salmons 2012: 127f).

[44] In the case of the class 1 weak verbs, such forms would be the present indicatives, which upon early syncope after a heavy syllable must be reconstructed as **tælî / *tælî-* (< **talja/*taljî-*). Iverson and Salmons do not account for the intermediate forms that must have existed between early syncope and ninth-century vowel reduction, even if these forms would be of key importance to understanding the authors' postulates of morphological generalisations.

[45] It takes quite an effort to extract a hint of what further difference the authors may implicitly postulate, because nowhere in their text are the two developments contrasted with each other in this manner. As for (F1), they do state: "In paradigms where a phonological innovation has been rendered opaque by the operation of other sound changes, restructuring of the base form incorporates rather continues to derive the results of the innovation as it dies out" (Iverson & Salmons 2012: 112). The contrast they make is not, however, with the removal of the underlying trigger in (R1), which might be understood to be covered by the expression "operation of other sound changes" (i.e. synchronic syncope), but with the reversion by the extinction of a transparent rule, namely (R2). The challenge of completing the explanation must therefore be returned to the authors for clarification.

if the observation is compared to expectations ensuing from the theory of phonologisation accounted for in subsection 7.1: if the relexification in heavy stems (F1) is understood to rely primarily on the perceptual salience of the distinctly fronted target vowel, then such relexification would also be expected – with an equally distinctive target vowel – as a result of trigger loss catalysed in part by suffix analogy. Yet this is not what the authors argue, but rather quite the opposite: umlaut reversion (R1).

The same explanation of suffix analogy would also, according to Iverson and Salmons (2012: 119f), account for lack of front umlaut in suffixed adjectives, such as m. nom. sg. **dan-isk-az* > *danskr* 'Danish'. This paradigm, however, would in that case have to be addressed diachronically by yet another explanation, which we might call (R2b), because second syllable **-i-* would in the nominative and accusative singular (cases that normally are pivotally dominant as a platform for paradigmatic levelling) have gone through deletion nearly two centuries later than **talidō*, notably at the time of (R2) when the fronting rule was losing transparency.[46] Quite unlike TSc **dą.nįskz*||, which was protected from early sixth-/seventh-century *i*-syncope by metrical constraints, **tali*||*dō* had a bimoraic vowel in the third syllable, making it a target for such early syncope (see Section 6 above and Schalin forthcoming).[47]

In contrast to the diachronic sequencing of (F1) and (R1), which becomes very clear, Iverson and Salmons' (2012: 114) account is not as clear on the time and manner in which the "crazy rule" came about, a diachronic event that we shall call the "revision of the first fronting rule" (F1rev). The rule would have extended the applicability of the morphological generalisation resulting from (F1) to some forms of the class 1

[46] The preterite is represented by Iverson and Salmons as /tal+iða/ with an anachronistic ON short *-a*, even though it is beyond doubt that the vowel in the word-final syllable remained bimoraic during the early syncope period, without reduction into *-a#* (see nt 38). Another imprecision in representation, which is quite significant for sustaining the authors' argument, is that definitions of *terminus ante quem* for syncope in different contexts by Tomas Riad (1992: 108–109; 113–114) have unfortunately been quoted (Iverson & Salmons 2012: 110–111) as if they were approximations of absolute chronologies. With the correction of this error, Riad's runic chronology turns out mute and of no use as an argument against Paul Kiparsky's chronology of syncope.

[47] Tinkering further with chronology could open up a fix for this part of Iverson and Salmons' explanation: if suffix analogy for both the paradigms had operated even earlier, i.e. targeting a form with no synchronic syncope rule (not unlike the understanding of Pipping), then the trigger would still have been perceptible for the language learner and the conditions genuinely different from (F1). In this case she/he could have consciously removed a fully audible trigger, along with its phonetic influence, in order to regularise the grammar.

weak verbs with light stems, namely, forms other than the preterites.[48] On page 116 of Iverson and Salmons (2012) the references in the examples indicate that the "crazy rule" would have been in place at the time (R1) occurred, but on page 118, umlaut is understood to be fully morphologised "in the broader manner" of the crazy rule after the operation of (R1). Only the latter alternative would seem to permit an explanation for how (F1) came to be extended to precisely the forms affected by (F1rev), namely operating on a residue of forms not already affected by (R1). Even if this was the case, the reader is not told whether this occurred soon after (R1) or whether this was one of the events connected with the fading of the post-phonological fronting rule, which occured much later, in the ninth century.[49] Nor is the reader informed of the basis that was pivotal for the extension of a morphological fronting rule to the present tense and the subjunctives.

According to Iverson and Salmons (2012: 112f), the trigger still being present in /stað+iR/ ~> [steðiR] and the fronting rule still operating transparently, "umlaut loses its derivational vitality", because the phonetic rule was replaced by restructuring in long stems (F1) as well as through generalisation of syncope to short stems (R1). The loss of vitality "leads to the rule's demise generally" and "to automatic reversion to the base form: /stað+iR/ (> *⁺steð+iR* > *⁺steð+R*) > *staðr*". Umlaut reversion in *staðr*, which we have coined (R2), would thus have operated by a very different mechanism from (R1) in a process of parasitic rule loss in the run-up to the LASc period of vowel reduction, which occurred as late as in the ninth century. As for the retained fronting in *ketill* (< **katilaz*), we are asked to believe (in a parenthesis on page 113) that the different outcome is "residually" attributable to the fact that the trigger in /katil+R/ > *ketill* is "stem-internal". We shall call this relexification of "stem-internal" front umlaut the "second fronting" (F2). It seems implicit, yet not clearly stated, that being "stem-internal" is meant to be a morpho-phonological condition instead of a genuinely phonological one (i.e. dependent merely on the trigger not being deleted). In either case it would be challenging indeed to argue why /katil+R/ ~> [ketil+R] should come out differently from /danisk+R/ ~> [danisk+R], given the corrected chronology of syncope discussed in connection with (R2b) immedi-

[48] The wording of their rule reads, "Weak verbs of the first conjugation have umlauted stem vowels in the present tense and in subjunctives, and, for long stems, also in the past tense."

[49] Evaluated also more generally, the sixth-/seventh-century and ninth-century events, which were diachronically quite separate, are not easily discerned in the authors' description (see, for example, nts 44 and 46 cf. nt 38).

ately above. In both stem classes the underlying trigger was still present at the time when the fronting rule allegedly faded.[50]

All explanations considered, Iverson and Salmons present us with a complex of diachronic developments: The two cases of light stems in Table 1 (masculine *i*-stems and preterites of class 1 weak verbs), where front umlaut fails to occur, are given two very different explanations (R1 and R2); the two cases of completed front umlaut in Table 1 (heavy stems and instrumental light stem derivations in *-ill/ -ell*) likewise receive two quite disparate explanations (F1 and F2), one of which is exhaustively captured by a sub-clause in parentheses. In addition we are given a different and additional explanation (F1rev) for the subjunctives and presents of the class 1 weak verbs. While the type **daniskaz* 'Danish', as shown above, cannot be covered by (R1) in the manner argued by the authors, the remnants of explanatory economy could be considered saved by capturing it under (R2), which is governed by the same chronology and vowel reduction. Even if this fix is accepted, the reader is required to accept the explanatory load of a total of five essentially different explanations for two terminal outcomes. Yet nothing in these explanations seems to be of much help in formulating an explanation for accomplished phonological restructuring in other cases where a syncopated trigger had followed a light syllable. Why, for example, would the nominative plurals of monosyllabic stems exemplified by **hnut-îz* > OSw *nytęr* 'nuts' not have undergone the same relapse of fronting as did **staði-z*, as both should have been subjected to an equally relevant demise of the fronting rule in the ninth century? And why would the feminine abstracts exemplified by **fram+îþu* > *fremd* not have undergone the same loss of fronting as allegedly happened in **dan+isk-az* > *dansk*r 'Danish' due to suffix analogy? Furthermore, no elements in the authors' five explanations seem to be of much help in explaining the non-occurrence of front umlaut in the past passive participles exemplified by **upînaz* > *opinn*, with the trigger equally "stem-internal" as **katilaz* > *ketill*.

[50] Section 7 of Iverson & Salmons (2012: 121–124), the entirety of which is devoted to the issue of the "*ketill/katlar* type", in effect does not bring clarity to this question nor does it otherwise give further reasons why the demise of the fronting rule due to parasitic rule loss should not have affected nom. sg. *ketill* in precisely the same way as other equivalent words. The argument made in their Section 7 is also in great part spoilt by another anachronism: there, Iverson & Salmons assume that the OIc suffix *-ell* would be different from OIc *-ill*, with relation to its inertia as a fronting trigger for front umlaut. In reality the variants arose well after the umlaut period. The distinction between the two never carried any structural significance outside main stress in the early history of Old Icelandic (Hreinn Benediktsson 1962).

In sum, Iverson and Salmons' analysis (2012) puts great emphasis on naturalness of sound change, but the accrual of explanations is uneconomical, while in critical places the presentation is vague with regard to causal diachronic regularities, obscuring the fact that the authors crucially fail to accommodate in a consistent way the data that are accounted for as well as in any way at all the data that are not.

7.4 On the Explanatory Power of Analogical Change and Morphological Generalisations

Iverson and Salmons' explanation has one feature in common with the accounts of James E. Cathey (1972), Joseph B. Voyles (1982, 2005) and David Fertig (2013: 12–21) in that all rely on the potential role of analogical change and resulting synchronic morphological generalisations to a remarkable extent.[51] In a pursuit to exploit analogical change and morphological generalisations to address the puzzles and cruxes of Scandinavian umlaut, there is in fact a mismatch from the outset between the problem and the toolkit. The main problem is not that the phonologically conditioned generalisations would escape the eye, given that a comparison of PGmc departure forms and attested OSc terminal forms often allows for relatively neat atomistic sound laws. The starting point for the argument of Iverson and Salmons (2012) is very revealing for an unfruitful and more often tacit tendency that may be observed for many umlaut researchers with an experience in West Germanic historical phonology, but more seldom for umlaut researchers with a primary background in Scandinavian philology. Their words (ibid.: 107) speak for themselves:

> In terms of ultimate outcome, then, Norse stands squarely between its West Germanic cousins English and German. In the former, *i*-umlaut is overwhelmingly ousted from the grammar; in the latter, it has seeped into every morphological nook and cranny. Norse has kept it, but in a contained way, deeply embedded in the inflectional morphology but not spread across it as far as in German.

[51] Cathey (1972: 34ff; similarly Rischel 2008: 219) presents some ill-fitting data in the form of sub-minimal pairs and argues that any phonological explanation is insufficient to solve the whole problem. Among his examples the ablaut grade for *berr* 'carries' is wrong, and the reconstruction and decomposition into morphemes of *alri* 'alder tree' is debatable (cf. AEW: s.v. 'elri'; SEO: s.v. 'al'). Even so he deserves credit for being among the few to put forward the main elements of the acid test in this article (cf. Tables 3 and 6). Yet his own attempt to solve the umlaut problem is based on arbitrary morphological generalisations and is quite susceptible to the same type of criticism as put forward in subsection 7.3.

What this quotation fails to recognise is that Scandinavian umlaut is different from both English and German umlaut in as much as it across the board tends far more often to preserve rather than obscure the traces of the original phonological generalisations, in the process of replacing them by morphological ones. In recovering the original Scandinavian sound laws the most critical problems are neither that they would be ousted from the grammar nor be obscured by it, but instead that the most obviously observable sound laws are unconnected with each other, and some of the conditioning factors seem causally extraneous to the change they are supposed to have brought about. Given that "the descriptive facts" in this sense seem "basically clear" (Rasmussen 2000: 143; see nt 12 above), any analysis that emulates these *prima facie* phonological regularities by means of accruing additional assumptions of analogical change and morphological generalisations, one on top of the other, for each paradigm, is at a disadvantage from the outset in terms of explanatory power. Experience also shows that in this approach some of the problematic paradigms have often been neglected. Moreover, the reasoning has shown a tendency to become *ad hoc*, while valid criteria for what sort of generalisations may be expected have not been pursued (Rischel 2008: 196f).

In Voyles' hypothesis (1982, 2005), to take one example, *i*-stems had, already before *i*-umlaut became productive, purportedly been reformed with innovative semivocalic *j*-stem formatives **-ij-/ *-j-*. At this stage only vocalic **-i-* would have been an active fronting trigger. In heavy syllables *i*-umlaut would have been triggered in more numerous case forms than in light syllables, because according to Sievers' law a sequence **-ij-* would have occurred in a triggering position instead of a plain consonantal non-umlauting **-j-*, which occurred after light stems. Therefore, heavy stems largely underwent paradigmatic levelling in favour of mutated forms, while light stems did so in favour of unmutated forms. Subsequently, according to Voyles, consonantal *j*-umlaut became active too late to affect this essentially morphological levelling process. In Voyles' hypothesis several *ad hoc* assumptions regarding chronology and productivity periods complicate the account, assumptions for which there is no independent evidence. This is especially evident in the key assumption, namely that *i*-stems would have passed into *ja*-stems at a critical juncture.

8 Concluding Remarks

The conclusions in terms of main findings need not be repeated, as they are contained in Section 1. It may, however, be useful to conclude by putting the strengths and weaknesses of the resulting analysis in perspective and placing the main findings in a wider context. It may be objected that reconstructing a new contrast between the proto-vowels */i̯/ and */ï/ requires more direct evidence than simply the influence that the latter vowel has failed to exercise on other phonemes. The responses to this are the following: Firstly, assuming a contrast between the two PSc proto-vowels is by no means novel. As far as the main stressed syllables are concerned, the fact that contrast between etymological PlGmc */i/ and */e/ was upheld in Scandinavian is indeed not even controversial (see Section 4). This solution merely re-analyses the essence of this contrast (coronality) and shows that in addition to the main stressed syllable, it was upheld longer than has so far been supposed in other syllables in prominent position.

Secondly, the issue of what exactly would constitute more direct evidence is not at all clear, as it is hardly ever possible to claim that a descendant of a proto-vowel is equal to its ancestor, the reason being that similarities are typically trivial and superficial, given that phonological contrast in vowel systems may have changed repeatedly. Accordingly, it is problematic, even under the standard procedure of the comparative method, to say that an ON /i/ or Runic <i> testifies more directly to a PGmc */i/ than to some other superficially proximate vowel, a question which is readily illustrated by the notorious developments in word-finality (Panieri 2013). Any reconstruction of any preliterary phoneme system therefore involves a critical element of abductive reasoning, i.e. hypotheses and reconstructions are iteratively refined in order to eliminate counter-examples and accommodate the maximum of the known attested data, as well as to allow for a minimum of damage to the economy and phonological naturalness of the resulting explanations. In the present hypothesis the cost of postulating a redefinition of a vocalic contrast and its extension into one additional phonological context must be measured against the rather obvious success on other accounts.

Thirdly, it has been shown in this paper that building on this hypothesis, it is possible to unify the solution for short trigger vowels with that for long trigger vowels and with the issue of deriving syncope from a prominence pattern. In Schalin (2017), a unified explanation has been achieved for rounding umlaut and breaking.

As for the developmental stages that are defined in Figure 1 as "Pre-Scandinavian", notably Proto-Germanic and Northwest Germanic, the main findings of this study have at least one important implication: Given that a contrast inherited from Paleo-Germanic has been established for PSc outside positions of main stress between */ĭ/ and */ĭ/, it inevitably follows that a corresponding contrast applying to the ancestor vowels must have also existed in PGmc and NwGmc. At some earlier point in the chain shift the ancestor of */ĭ/ must be assumed to have held a position in the feature hierarchy of vowels similar to the contrastively fronted /ɛ/ in western and eastern Algonquian (cf. reference in Section 5 above). This issue presents a fascinating field for further study. Another field with renewed potential for future study is the development of the Scandinavian suffix ablaut.

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