

ON DENTAL MUTATION IN ESTONIAN, LATVIAN AND LIVONIAN

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Abstract. The article examines the phenomenon of dental mutation (also: dental umlaut), a historically poorly understood sound change attested in several North Sea Germanic languages, including Frisian, Low German, Dutch, whereby back vowels are fronted in the environment of dental consonants, as it is reflected in Middle Low German loanwords in Estonian, Latvian, and Livonian. Following an overview of the general history of umlaut in the Germanic languages and a survey of existing research on dental mutation, the study investigates whether the three recipient languages preserve traces of dental mutation that was present in their Low German source forms, but often not consistently represented in the written record of Middle Low German itself. While a clear-cut distribution of dental mutation cannot be established for the Low German loanwords in question the investigation reveals notable discrepancies between the Latvian and Livonian correspondences, which point to a potential stratification of Low German loanwords in Livonian into an older layer borrowed directly from Low German and a more recent one mediated through Latvian. Dental mutation is thus proposed as a possible diagnostic criterion for establishing the relative chronology of such loanwords.

Keywords: umlaut, metaphony, loanwords, history of language, language contact, Estonian, Latvian, Livonian, Low German, Germanic languages

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1. Introduction

Anyone who studies the numerous Low German loanwords found in Estonian¹ will quickly and clearly see that, in a whole range of these words, the phonetic form of the Estonian word points to a Low German

1 “Estonian” is used here and throughout this text to refer to the form of the modern written Estonian language, originally based on the central dialects of Northern Estonian. Dialectal forms were not taken into account in this study.

form which, unlike its High German counterpart, features a front rounded vowel. This front vowel, which occurs in Low German in certain words, cannot in many cases be explained by the usual rules governing the occurrence of the palatal umlaut. Long treated only marginally in the research literature, this dental umlaut (also known as dental mutation) was examined in greater detail for the first time by Jarich Hoekstra (Hoekstra 2007), who traced its occurrence primarily in Frisian, but also in other North Sea Germanic² languages, without, however, reaching a definitive conclusion regarding the distribution of the phenomenon.

The dictionary of Low German loanwords in Estonian compiled by Jüri Viikberg (Viikberg 2016) is a valuable contribution to the study of this phenomenon, as it not only lists the Estonian equivalents of the words but also their parallels in Latvian and Livonian, two neighbouring languages that have borrowed Low German words to an equal extent. A comparison of the possible occurrence of dental mutation provides insight into different layers of loanwords and potential dialectal differences in Middle Low German in Estonia, Livonia and Courland.

2. Palatal metaphony: definition and fundamentals

The term *umlaut* (in a more strict sense also *i*-mutation, *i*-umlaut, palatal metaphony) denotes a fundamental historical sound process in the Germanic languages, in which a stressed back or low vowel is shifted forward (fronted) under the influence of a following unstressed front vowel or glide, in particular *i*, *ī*, or *j*. The vowels primarily affected are the back vowels: Germanic **u* becomes *ü*, **o* becomes *ö*, **a* becomes *e* or *ä*. Since *a* cannot be genuinely shifted forward, it is raised instead. The result of this development are the characteristic front vowels of the Germanic languages, known in German as *Umlaute* and manifested synchronically in alternations such as *Buch* : *Bücher* or *Sohn* : *Söhne* (Russ 1996: 501).

Phonologically, umlaut is a combinatory sound change, that is, a context-conditioned assimilation in which the articulatory features of

2 The term “North Sea Germanic” is used here, as is customary in Germanic studies literature, to refer to the Germanic dialect form underlying Anglo-Saxon, Old Frisian and Old Saxon (Old Low German), or to the specific linguistic developments common to these language forms (cf. Euler 2022:30).

the following vowel are anticipated in the stressed syllable nucleus. As the triggering factors gradually disappeared or changed (syncope of final *i* and *ī*, merger of unstressed vowels into *ə*), the former umlaut allophones lost their conditioned status and became independent phonemes; this process is accordingly referred to as the phonemicisation of umlaut. The alternating vowels resulting from this process were retained in inflectional and derivational morphology as morphologically distinctive devices, but in numerous cases were again reduced or completely eliminated by paradigmatic levelling (Russ 1996: 501). Umlaut is one among several phonologically active phenomena, as summarised by Nübling: ‘In Proto-GMC the grammatical endings together with the primary suffix were attached to the lexical base. If there was any phonological interaction it was always from right to left, i.e., the grammatical part affected the lexical one (regressive assimilations such as rising of *e* > *i* before *i*, *u* or *j*, *i*-umlaut, *u*-umlaut, breaking, vowel lengthening, or vowel shortening).’ (Nübling 2020)

3. Palatal metaphony in the individual Germanic languages

The chronology and extent of palatal umlaut are by no means uniform across the Germanic languages: there are considerable differences both with regard to the vowels affected and with regard to the timing of their phonemicisation.

3.1. Old High German and Middle High German

In Old High German, only the umlauting of the short vowel *a* received orthographic representation; this is referred to as ‘primary umlaut’ (OHG *gast* (sg.) : *gesti* (pl.) ‘guests’). The umlauting of the remaining vowels and diphthongs (*o*, *u*, *â*, *ô*, *û*, *ou*, *uo*) most likely took place as well, but was not recorded in writing until Middle High German; this phenomenon is accordingly termed ‘secondary umlaut’. According to the standard theory (following Twaddell 1938), these are not two separate processes but rather two phases of the same phonemicisation (Russ 1996: 505–506). In Middle High German and Modern High German, umlaut is morphologically highly productive and is visible in plural formation, comparative forms, and verbal inflection.

3.2. Old English and Old Frisian

In Old English, phonemicisation took place earlier than in the other Germanic languages, and the umlaut allophones already appear as independent phonemes in the oldest texts. At the same time, Old English shows an early tendency to unround the newly formed rounded front vowels, causing them to merge with their unrounded counterparts (OE *brycg* ‘bridge’, *bryd* ‘bride’). Through paradigmatic levelling, many umlaut alternations were also pushed back; what has been preserved are essentially the plural forms of old consonantal stems (*fōt* : *fēt* ‘foot : feet’, *tōþ* : *tēþ* ‘tooth : teeth’) and some comparative forms (Russ 1996: 507).

Old Frisian shares with Old English both the broad scope of umlaut and the early unrounding of the newly formed rounded front vowels, as well as the far-reaching paradigmatic levelling of umlaut alternations. In Old Frisian, Germanic *o* and *u* merge through umlaut and subsequent lowering with the reflex of *e* (OHG *kuri*, but OFris. *kere* ‘choice’; Russ 1996: 502). The conditioning factors (following *i*, *ī*, and *j*) had already disappeared or been reduced to *ə* in Old Frisian as attested in texts from the thirteenth century onward. Russ (1996: 509–510) emphasises that Frisian thus fits well into the general picture of North West Germanic umlaut development: phonemicisation of the fronted allophones, early unrounding and merger with unrounded vowels, and extensive levelling of the alternating forms.

3.3. Old Norse

For Common Scandinavian, the existence of umlaut allophones before *i*, *ī*, and *j* must be assumed. The triggering *i* was syncopated relatively early in some medial and final syllables (towards the end of the 7th century BC), which led to the phonemicisation of umlaut. Runic inscriptions represent umlaut phonemes only sparsely and unsatisfactorily; the manuscripts of the twelfth century introduce special signs such as ⟨ø⟩ and for this purpose, as also systematically described by the ‘First Grammarian’s Treatise’ (anonymous, ca. 1150). Old Norse shows umlaut alternations in nominal inflection (*maðr* : *menn* ‘man : men’), in comparative forms, and in the subjunctive (Russ 1996: 507–508). The distinction between primary and secondary umlaut characteristic of German is unnecessary in Old Norse.

3.4. Low German

In Low German, too, the *i*-umlaut is first and foremost the fronting of velar vowels by an [i] or [j] in the following syllable, and in this form dates back to the Old Low German (Old Saxon) period; however, only the umlaut of **a* (> *e*) was consistently marked in Old Saxon, whilst the umlaut of **o*, *u*, *ö* and *ü* remained unmarked for a long time, though it can be attested in the language itself through rhymes, loan-words from neighbouring languages and, at times, consistent spellings (*y*, *ø*, overwritten characters) within Middle Low German itself. In the North Albingian-East Elbian region, under Nordic influence, the written forms *y* or *ø* have been commonly used since the 14th century to denote *ü/ö*; however, around 1400, the unmarked spelling (without an umlaut symbol) established itself. Alongside the original *i*-umlaut, there is a more recent analogous umlaut, which is particularly evident in the verbal system. Certain sound combinations either prevent or facilitate the umlaut to varying degrees: combinations of *h* + consonant and those containing *l* allow it, but it is usually absent before stressed or strongly penultimate heavy final syllables (*-lik*, *-inne*, *-nisse*, *-inge*, etc.), leading to double forms (e.g. *degelik* ~ *dagelik* ‘daily’). Finally, *ö/ü* also arise secondarily through the labialisation of *e/i* before certain consonant clusters (e.g. *silver* > *silver* ‘silver’) as well as through analogical formations, so that in Middle Low German several different pathways for the formation of umlauted vowels coexist.

3.5. Middle and Modern Dutch

Dutch shows palatal umlaut primarily in short vowels; long vowels and diphthongs are not affected except in northern and eastern dialects. The umlaut of Gmc. **a* merges with the reflex of Gmc. **e* (MDu. *bedde* ‘bed’); the umlaut of **u* is visible mainly in secondarily lengthened vowels (Du. *deur* ‘door’, *sleutel* ‘key’). Morphologically conditioned umlaut alternations have largely been eliminated by levelling; only a few isolated forms survive, such as *beter* (‘better’) and *lest* (archaic for *laatst* ‘latest’; Russ 1996: 508–509).

4. Dental mutation

The phenomenon of dental mutation discussed here was initially examined in greater detail in relation to Frisian; for this reason, the development in Frisian is presented here before that in other Germanic languages.

In the dialects of the Frisian language, which has historically been divided into three separate areas, there exists a group of words that apparently show the results of an *i*-umlaut of the Germanic short vowel **u*, although no historical triggering factor (an *i* or *j* in the following syllable) can be demonstrated. This phenomenon, hitherto little studied, was first investigated in detail and systematically described by Jarich Hoekstra (2007). Hoekstra argues that the fronting of the vowel was caused by the presence of a dental consonant in immediate proximity to the mutated vowel, and, following Nörrenberg (1932), refers to this change as ‘dental mutation’ (Hoekstra 2007: 43).

4.1. Terminological history and state of research

Insofar as it has been treated at all, the phenomenon is known in the research literature under various names. Earlier scholars speak of ‘secondary umlaut’ (so Sarauw 1921), of ‘spontaneous umlaut’ or ‘spontaneous palatalisation’³ (so Löfstedt 1928: 153 for North Frisian, cited after Hoekstra 2007). These terms reflect the puzzlement regarding a change for which no immediately obvious phonetic motivation seemed to be present. Sarauw (1921: 295–300) had already noted for Low German that northern dialects in particular show mutated forms in a number of words that are difficult to explain, and assembled extensive documentary evidence for such ‘secondary’ forms: examples include, among others, the lexemes for ‘sun’, ‘son’, ‘sow’, ‘root’, or adverbs such as ‘without’, ‘through’, and ‘around’, where back-vowel forms (with *o*, *u*, *ō*, *ū*) alternate with front-vowel forms (with *ö*, *ü*, *ō̃*, *ū̃*) in other dialects (Sarauw 1921: 295–300). Walter Mitzka, in his study of East Prussian Low German (Mitzka 1920), similarly refers to such umlaut phenomena as *Systemzwang* (‘systemic pressure’) without attempting an explanation.

3 In Germanic and Indo-European linguistics, this type of change has traditionally been referred to as “palatalisation” (in parallel with corresponding changes in consonants). Nowadays, the term “fronting” is generally used.

The term ‘dental mutation’ was coined by Erich Nörrenberg (1932), who demonstrated that in many North German dialects the vowels *u* and *o* are shifted to *ü* and *ö* respectively in a dental environment (Hoekstra 2007: 49). Löfstedt (1928: 153–154) had previously been the first to explicitly highlight the parallelism of the Frisian forms with their Low German counterparts for North Frisian; for West Frisian and the broader Frisian context, the phenomenon remained largely unrecognised.

4.2. Dental mutation in Frisian

Hoekstra identifies essentially two main conditioning environments for dental mutation in Frisian.

Dental mutation before *n* and after *s*. The best-documented context is the position before the nasal dental *n* and the position after *s* (or between *s* and *m*). The core examples in Old Frisian are *sunne* (‘sun’) and *tunne* (‘barrel’): West Frisian has *sinne* and *tûne* respectively, Fering-Öömrang (North Frisian) has *san* and *tan* (with a subsequent lowering *i* > *e* > *a*), whereas Saterland Frisian shows *Sunne* and *Tunne* without any vowel change (Hoekstra 2007: 44–45). In the position after *s*, West Frisian likewise shows dental mutation: OFris. *sumur* (‘summer’) > WFris. *simmer*; Mooring (Mainland North Frisian) correspondingly has *samer* (Hoekstra 2007: 47).

The lack of dialectal homogeneity is striking here: dental mutation before *n* and after *s* is restricted to North and West Frisian and is completely absent in East Frisian (Saterland Frisian); even within North and West Frisian, discrepancies arise, since not all dialects show the mutated vowel in all potentially affected words. This stands in contrast to genuine *i*-umlaut, which operated more consistently throughout. The phenomenon is furthermore limited in the number of lexemes affected; it comprises only isolated words and thus differs from the wider distribution exhibited by dental mutation in Low German or ‘spontaneous palatalisation’ in Dutch (Hoekstra 2007: 56).

Dental mutation before *r*-clusters. As a second, formally distinct context, Hoekstra identifies the position before consonant clusters involving *r*. Words such as OFris. *word* (‘word’) or *forsk* (‘frog’) consistently show forms with reflexes of Gmc. **u* in the other Germanic languages (OE *word*, OHG *wort*), whereas West Frisian *wurd* and Fering-Öömrang *faask* (< OInsNFris. **fersk*) exhibit an *e*-vowel that

can be satisfactorily explained neither by *i*-umlaut nor by any other means (Hoekstra 2007: 47–48). Similarly, the word group for ‘grain, corn’ (OFris. **kerl*) and ‘to curdle’ (**kerlia*) shows forms with *e* in all Frisian dialects, while Dutch and Low German have reflexes of *o* (Hoekstra 2007: 58).

From a phonetic perspective, it should be noted that dental mutation before *r*-clusters has a different starting point from umlaut before *n*: while the latter, analogously to *i*-umlaut, follows the path $u > \ddot{u} > e$, for the forms before *r* a change from *o* via $\ddot{o}$ to *e* must be posited. In all Frisian dialects, $\ddot{o}$ as the result of dental mutation is unrounded to *e*; this process also occurs sporadically in Low German and Dutch (e.g. MLG *derp* or Du. dial. *mergen* ‘morning’; Hoekstra 2007: 59). Since this change is older than that before *n* and *s*, dental mutation before *r* also appears in East Frisian, which otherwise does not exhibit dental mutation (cf. Saterland Frisian *mäiden* ‘morning’, *Tärp* ‘village’ in Hoekstra’s material).

4.3. Dental mutation in the North Sea areal

Frisian is not alone in exhibiting dental mutation. Hoekstra shows that fronting tendencies in the proximity of dental consonants occur in all languages of the North Sea area: alongside Frisian and Low German, also in Dutch, Danish, and possibly English (Hoekstra 2007: 54).

For Low German, Nörrenberg (1932) had already demonstrated, using East Frisian Low German data, that *u* and *o* become $\ddot{u}$ and $\ddot{o}$ respectively before or after dental consonants: e.g. *sünne* (‘sun’), *tünne* (‘barrel’), *sön* (‘son’), *sömmer* (‘summer’), *dörp* (‘village’), and others (Hoekstra 2007: 53). Sarauw (1921: 295–300) had presented corresponding evidence for a large number of Low German dialects, from which it emerges that northern dialects in particular use mutated forms: for ‘sun’, East Frisian⁴ shows *sünne*, Hamburg *sünn*; for ‘son’, *söne* in the Göttingen-Grubenhagen area and *söhn* in Hamburg; West and East Westphalian, on the other hand, retain the unmutated forms *sunne* and *suon(e)* (Sarauw 1921: 295–296). Umlauted variants of adverbs such as

4 This refers to the Low German dialect commonly known as ‘East Frisian’; it should not be confused with the equally named (with the exception of Sater Frisian) extinct variant of the Frisian language in East Frisia.

sünder ('without'), *dör* ('through'), and *ümme* ('around') likewise occur primarily in the northern dialects, while conservative inland dialects retain *u* and *o* (Sarauw 1921: 299–300).

Dental umlaut has also left traces in Danish: Old Danish *o* before *n* and *u* before *nn*, *nd* appears as *ö* after *r*, *s*, or *t* (Dan. *søn* 'son', *tønde* 'barrel', *tynd* 'thin', *tønder* 'tinder' < ON *tundr*; Hoekstra 2007: 53). In Dutch, Van Loon (1986: 66–70) describes a tendency referred to as 'spontaneous palatalisation', in which the product of Gmc. *u* appears in coastal regions as *ö* or *ō*: (e.g. *zeumer* 'summer', *zeune* 'son', *veugel* 'bird'; Hoekstra 2007: 54). Hoekstra here refers to Van Loon's (1986) approach of understanding the phenomenon as a North Sea Germanic (Ingvaeonic) feature, since the context involved is somewhat broader than in Low German dental mutation.

4.4. Explanatory approaches: polygenesis, borrowing, or common source?

The similar geographical distribution and the frequent coincidence of the same word material across different North Sea languages raises the question of the historical relationship between these phenomena. Hoekstra (2007: 54–55) outlines three basic explanatory possibilities.

First, polygenesis cannot be excluded: assimilation phenomena between dental consonants and vowels belong to the more universally common sound developments, so that independent developments in neighbouring languages are entirely conceivable. Second, a concrete influence of one language on the others has been discussed for earlier periods: Janssen (1937) had suspected that dental mutation in Low German derived from a Frisian substrate; conversely, Löfstedt (1933) concluded that Frisian forms could have been borrowed from Low German. Hoekstra himself assumes, for dental mutation before *n* and after *s*, that in Frisian this mostly involves loanwords from Danish or Low German with sound substitution, i.e., Low German or Danish forms with *ü* were replaced at the point of borrowing by the phonologically closer Frisian *i* (Hoekstra 2007: 57).

For dental mutation before *r*-clusters, on the other hand, an autonomous development in Proto-Frisian appears more plausible, since the phenomenon is older: it encompasses East Frisian dialects as well and thus cannot be explained by later borrowing relationships. Hoekstra

therefore proposes that it represents an ancient North Sea Germanic tendency to front back vowels in the proximity of a dental consonant, which maintains a degree of continuity in Frisian, Low German, Dutch, and possibly English (Hoekstra 2007: 55, 59–60). Many questions nevertheless remain open.

5. Low German dental mutation in loanwords of Estonian, Livonian, and Latvian

5.1. Occurrence and distribution

The diffuseness and dialectal inconsistency of dental mutation in Low German discussed so far – one and the same word may appear mutated in some dialects and unmutated in others – has a parallel in Latvian, Livonian, and Estonian loanwords from Middle Low German. A survey of the relevant word material suggests that all three languages systematically reflect the phonological value of the Low German source form at the time of borrowing, independently of the Middle Low German writing tradition, which often does not indicate dental mutation orthographically, or does so inconsistently.

The dictionary of Low German loanwords in Estonian (Viikberg 2016) which served as the basis for this study, as it not only lists Estonian loanwords from Low German but also their Latvian and Livonian equivalents, records a total of 316 lexemes in whose Low German source form a labial vowel occurs in immediate proximity to a dental consonant. The total number of Low German loanwords listed in the dictionary amounts to 990; 316 of these, therefore, account for just under 32 per cent of the total number of loanwords recorded. Since the precise conditions for the occurrence of dental mutation are unclear, all lexemes in which dental mutation was theoretically conceivable were included in the investigation. From the list thus compiled, all words not simultaneously attested in all three recipient languages were excluded. Unfortunately, this excludes a large number of lexemes that are well attested in two of the languages under investigation; however, any study involving this type of only partially attested word would first require a closer examination of why these words are attested in only part of the Estonian-Livonian-Latvian language area.

When it comes to the Livonian data, caution is advised in some instances: unlike the majority of the Estonian and Latvian words used here, the Livonian words do not necessarily derive from a more or less standardised written form, but are drawn from all the materials used by Lauri Kettunen for his Livonian dictionary (Kettunen 1938), which, in addition to Courland Livonian forms of the Eastern and Western dialects (which differ particularly in terms of the preservation of rounded front vowels), also contains significantly older evidence from Salis Livonian. Nevertheless, it is assumed here that the presence of a front vowel reflects a common Livonian state. For a more detailed overview of sound changes in Livonian, see Kallio (2016) and O'Rourke (2025).

For a large proportion of words showing *õ* or *ü* in their Estonian form, the vowel is likely the result of regular palatal umlaut in Low German, as indicated primarily by the presence of a mutated vowel (as *ö* or *äu/eu* or *ü*) in the corresponding High German form, meaning that no Low German dental mutation is involved. However, the vocalism of these words also shows fluctuations in the three recipient languages that do not correspond to the expected regular phonological development.

The starting point is the observation that the three languages substitute Middle Low German long vowels in characteristic ways. Low German long *ō* appears in Estonian as *oo*, in Latvian as the diphthong *uõ*,⁵ and in Livonian as *uo* (e.g. MLG *mode* → Est. *mood*, Latv. *muõde*, Liv. *mùõḑ*; MLG *krone* → Est. *kroon*, Latv. *kruõnis*, Liv. *krùḡn*). Low German long *ū* appears in Estonian as *uu*, in Latvian as *ũ*, and in Livonian as *ũ* (e.g. MLG *kruke* → Est. *kruuk*, Latv. *krũka*, Liv. *krũḡ*; MLG *brun* → Est. *pruun*, Latv. *brũns*, Liv. *brũni*). These substitution patterns are highly regular throughout the entire loanword stock and provide the basis for the correspondence groups under 6.4.1 and 6.6.1.

What is crucial is that alongside these, two further, smaller groups exist in which the correspondences in all three recipient languages deviate from this basic pattern: in Estonian, *õõ* appears instead of *oo* and *üü* instead of *uu*; in Latvian, *ie* or *ē* appears instead of the expected *uõ*, and *ī* instead of the expected *ũ*; and Livonian follows suit with

5 In the historical phonological notation of Latvian, the symbol *õ* represents the vowel *o* (either on its own or as part of a diphthong) in the level tone. This should not be confused with the Estonian vowel *õ*, which denotes the vowel [ɤ], or with the notation *õ* used in the Livonian written language to denote the schwa vowel [ə] in unstressed syllables.

corresponding front vowels. Since none of the three languages has an independent phonological motivation for these deviations, they must reflect the phonological value of the Middle Low German source form: the donor form must in these cases have had not $\bar{o}$ or $\bar{u}$, but the corresponding umlaut $\bar{o}$ or $\bar{u}$ respectively. Estonian substitutes MLG $\bar{o}$ with $\ddot{o}$ and MLG $\bar{u}$ with $\ddot{u}$; Latvian substitutes MLG $\bar{o}$ with $ie/\bar{e}$ and MLG $\bar{u}$ with $\bar{i}$, and Livonian behaves in parallel.

For the long vowel $\bar{o}$, this can be illustrated with several examples. In group 5.2.1, words such as MLG *love*, *rore*, and *rover* show $\ddot{o}$ in Estonian (Est. *lööv*, *röör*, *röövel*), *ie* in Latvian (Latv. *liēvenis*, *riēris*, *rieveris*), and *ie* in Livonian: front vowels pointing to a Low German source form with $\bar{o}$. Low German *boninge*, *vorsēle*, and *vormunder* likewise show $\ddot{o}$ in Estonian (Est. *pööning*, *vööslemid*, *vöörmünder*), $\bar{e}$ in Latvian (Latv. *bēniņš*, *vērzeles*, *vērmiņderis*), and $\bar{e}$ in Livonian as well. The Estonian $\ddot{o}$ thus clearly indicates that despite the usual Middle Low German spelling with $\langle o \rangle$, a mutated vowel was present.

For the long vowel $\bar{u}$, the picture is entirely analogous. Words such as MLG *mûr*, *stûrman/stûren*, and *slûse* show $\ddot{u}$ in Estonian (Est. *müür*, *tüürimees/tüürima*, *lüüs*), $\bar{u}$ in Latvian (Latv. *mūris*, *stūrmanis/stūrēt*, *slūžas*), and $\bar{i}$ in Livonian: correspondences pointing to a Low German source form with long $\bar{u}$. For MLG *nuk* and *turcke*, a umlaut $\ddot{u}$ can thus be reconstructed: in Estonian the correspondences are *nüke* and *türgi*, in Latvian *i* appears (Latv. *niķi*, *turks*), and in Livonian correspondingly *i* (Liv. *niķ*, *tirķ*). Estonian thus directly reflects the mutated vowel that underlies the Low German spelling with *u*, while Latvian and Livonian independently confirm this finding through their front vowel correspondences.

The following substitution scheme can be summarised as follows:

MLG $\bar{o}$ → Est. *oo*, Latv. *uõ*, Liv. *uo* | MLG $\bar{o}$ (umlaut) → Est. *öö*, Latv. *ie/ē*, Liv. *ie/ē*

MLG $\bar{u}$ → Est. *uu*, Latv. $\bar{u}$, Liv. $\bar{u}$ | MLG $\bar{u}$ (umlaut) → Est. *üü*, Latv. $\bar{i}$, Liv. $\bar{i}$

This scheme allows the Estonian, Latvian, and Livonian correspondences to be used as complementary and mutually supporting sources for the reconstruction of the Middle Low German phonological state. Estonian reflects dental mutation most directly, preserving $\ddot{o}$

and *ü* as such; Latvian and Livonian (which had front rounded vowels well into the 20th century, unrounding them only in the last decades) confirm the mutated phonological value through their choice of front vowel correspondences, even where the Middle Low German writing tradition uses *o* and *u* instead of *ö* and *ü*. The recipient languages thus attest a phenomenon that in the donor language itself operated only inconsistently, varying dialectally, and was for the most part invisible in the written record. Detailed accounts of the orthographic representation of umlaut in labial vowels can be found in Agathe Lasch (1914: 41–46). For the sake of consistency, in all following instances of Middle Low German words the unmarked graphemes <o> and <u> are used.

A further caveat concerns the Livonian evidence specifically. While Estonian preserves Middle Low German *ö* and *ü* directly as such, the case of Livonian is less straightforward: The shift *ö* > *e* and *ü* > *i* within Livonian itself did not take place until the 20th century (cf. the corresponding lexemes in the dictionaries of Sjögren (1861), Kettunen (1938), on one hand and in Viitso & Ernštreits (2013) on the other hand. Whenever Middle Low German *ö* and *ü* correspond to elder Livonian (i.e. Livonian prior to the 20th century unrounding) *e* and *i* (or to *o* and *u*) such loanwords may therefore be suspected to have entered Livonian via Latvian rather than directly from Middle Low German. Suhonen (1973) indeed claims that most Middle Low German loanwords in Livonian were mediated by Latvian.

One further complication remains to be addressed. Besides the primary *ö* and *ü* it inherited from Proto-Finnic, older Livonian also developed secondary *ö* and *ü* of its own, through an internal umlaut process that set in only after the relevant Latvian and Middle Low German loanwords had already entered the language. On this basis, the correspondences found in 6.2.3, 6.4.2, 6.7.3 and 6.8.1 (the discrepancy cases of the second type discussed in 5.2, where a front vowel in Livonian stands opposite a back vowel in Latvian) permit a rather different explanation than direct inheritance from Middle Low German: the Middle Low German *ö/ü* would first have been taken over into Latvian as unmutated *o/u*; Livonian would then have borrowed this same unmutated *o/u* from Latvian, at a stage still prior to its own umlaut; only afterwards did that Livonian *o/u* become *ö/ü* through the language-internal umlaut, before finally arriving at the *e/i* attested in the modern language.

5.2. Discrepancies between Latvian and Livonian

Agreement between Latvian and Livonian is not, however, complete in all cases. Some words show differences that may themselves reflect the dialectal distribution of umlaut in Low German. In such cases it would have to be postulated that the recipient languages did not always have the same Low German dialectal form as their source. The cases in question can be grouped into three types.

In the first type, Latvian shows a front vowel while Livonian shows a back vowel. With *öös* (MLG *öse*), Latvian has *iēzes/ēze* with *ie/ē*, while Livonian has *ōzô/ôz* with *ō/ô*. Similarly with *sült* (MLG *sulte*): Latvian has *ziļte* with *i*, Livonian *zul̃t* with *u*. In these cases Latvian points to a mutated source form with MLG *ũ*, Livonian to an unmutated one with MLG *ū*.

In the more common second type, Livonian shows a front vowel while Latvian shows a back vowel. With *kört* (MLG *schorte*), Latvian has *skuõtele* with back *uõ*, while Livonian has *kīrtān*, *kūrītān* with front vowels. Similarly, *kütt* (MLG *schutte*) shows *u* in Latvian (*šķutas*) but (later unrounded) *ü* in Livonian (*kūt(mīez)*); *tükk* (MLG *stucke*) has Latvian *stuķis* with *u*, Livonian *stik̃* with *i*; and *türgi* (MLG *turcke*) has Latvian *turks* with *u*, Livonian *tīrk̃/tūr̃k̃* with *i/ü*. A similar correspondence appears with *tuur* (MLG *stor*): Latvian *stuõre/stüre*, but Livonian *tīr/tūr*; and with *lood/loodima* (MLG *lode/loden*), where Latvian has *uõ* but Livonian *ē/ō*. In all these cases Livonian points to a mutated source form, Latvian to an unmutated one.

In the third type, neither Latvian nor Livonian shows a front vowel, although Estonian points to a mutated vowel. With *nöör* (MLG *snor*), both Latvian (*snuõre*) and Livonian (*snū̃or*) show back-vocalic diphthongs. Similarly with *lūūs* (MLG *slūse*): Latvian *slūžas* and Livonian *služ/slūžōd* both show back vowels despite Estonian *üü*. In these cases Estonian remains the sole witness to a mutated phonological value in the source form.

Finally, there is a special case within Latvian itself: with *nööp* (MLG *knop*), Latvian preserves both variants side by side, *knuõpe* with back *uõ* and *knēpes* with front *ē*, while Livonian knows only the mutated form *knēp̃*.

6. Survey of word correspondences

The individual vowel correspondences are set out in tables below; each table is accompanied by a brief explanatory text.

6.1. Estonian *ö* (short)

Words with short *ö* in Estonian form two subgroups, depending on the vocalism of their Latvian and Livonian correspondences. The group is small overall.

6.1.1. *Est. ö – Latv. uõ – Liv. ē/ī/ü*

The sole representative of this group is *kört* (MLG *schorte*, MoHG *Schürze* ‘apron’). Latvian has *skuõtele* with back *uõ*, pointing to an unmutated source form; Livonian, on the other hand, shows one back-vocalic variant (*kēŗtān*) and two front-vocalic variants (*kīŗtān*, *kūrītān*), presenting a divergent picture. This is a discrepancy case of the second type (cf. Section 5.2): Livonian points to a mutated source form with MLG *ō*, Latvian does not. The word also shows palatal umlaut in its High German counterpart, so this is not a case of Low German dental mutation.

Table 1. *Est. ö – Latv. uõ – Liv. ē/ī/ü.*

Estonian	MLG	Latvian	Livonian
kört	schorte	skuõtele, skuõrtele; škuotele	kēŗtān, ⁶ kīŗtān, kūrītān

6.1.2. *Est. ö – Latv. e – Liv. e*

Three words show consistently Latvian and Livonian *e*: *köster* (MLG *koster*, MoHG *Küster* ‘verger, sexton’), *mölder* (MLG *moller*, MoHG *Müller* ‘miller’), and *röst* (MLG *roste*, MoHG *Rost* ‘grate’). In all three cases, Estonian *ö* corresponds to an *e*-vowel in both Latvian (*kēsteris*, *mēlderis*, *reste*) and Livonian (*keštār*, *mēldar*, *rest*). In this group, MLG *roste* is the only lexeme for which dental mutation is to be assumed,

6 It should be noted at this point that in Livonian there occurs a sporadic shift from *ō* to *ü*, which has not yet been adequately explained and which could also be assumed to have taken place in this word (cf. Posti 1942: 17–19, O’Rourke 2025: 59–61).

since the other two lexemes also show a mutated vowel in their High German counterpart.

Table 2. Est. *õ* – Latv. *e* – Liv. *e*.

Estonian	MLG	Latvian	Livonian
kõster	koster	ķesteris, šķesteris	keštār, keštār
mõlder	moller	mēlderis	mēldaŗ, mēldar
rõst	roste	reste	rest

6.2. Estonian *õõ* (long)

Words with long *õõ* in Estonian can be traced back to MLG long *ō*, provided their Latvian and Livonian correspondences show front vowels. The group is divided into three subgroups according to the type of vowel correspondence; some words are listed in two subgroups due to dialectal variation.

6.2.1. Est. *õõ* – Latv. *ie* – Liv. *ie/ē/ō*

Three words show *ie* in Latvian: *lõöv* (MLG *love*, MoHG *Laube* ‘arbour, canopy’), *rõör* (MLG *rore*, MoHG *Röhre* ‘tube, pipe’), and *rõövel* (MLG *rover*, MoHG *Räuber* ‘robber’). Note that the first Latvian form of *rõövel* (*ruõvelis*) has a back-vocalic *uõ* diphthong; since only the second form *rieveris* has *ie*, this word could also be placed under 6.2.3 (see there). The Livonian form *rũõr* represents an older phonological stage than the delabialised *rìer*. The back-vocalic variant in Latvian in this group may point either to an umlaut that did not occur or to a later assimilation to other lexemes of the same stem. Here too, palatal umlaut is to be assumed on the basis of the High German counterpart.

Table 3. Est. *õõ* – Latv. *ie* – Liv. *ie/ē/ō*.

Estonian	MLG	Latvian	Livonian
lõöv	love	liēvenis, liēvenes, liēviņš; lieve	lięvõd
rõör	rore	riēris, iēris; riēre	rũõr, rìer
rõövel	rover	ruõvelis; rieveris (see also 2c)	rēviĺ, rōviĺ, riēęviĺ

6.2.2. *Est. öö – Latv. ē – Liv. ē*

Six words show long *ē* in Latvian: *Est. nööp* (MLG *knop*, MoHG *Knopf* ‘button, knob’), *pööning* (MLG *boninge* ‘loft, attic’), *vöörmünder* (MLG *vormunder*, MoHG *Vormund* ‘guardian’), *vööslemid* (MLG *vorsele*, MoHG *Vordersielen* ‘front traces’), *öös* (MLG *ose*, MoHG *Öse* ‘eyelet’), and *nöör* (MLG *snor*, MoHG *Schnur* ‘cord, string’). The first four also show *ē* in Livonian and can thus be unambiguously assigned to this group. *Nööp* and *öös* show both a *ē*-form and a *uõ*-form in Latvian and are therefore listed again under 6.2.3. With *öös*, Livonian (*ōzâ/ōz*) has back vowels, pointing to a discrepancy case of the first type (cf. Section 5.2). With *nöör*, both Latvian (*snuõre*) and Livonian (*snùor*) show back vowels; this word is also listed under 6.2.3. On the classification of *vöörmünder*: the first Livonian form *vārbinder* has a lowered *ā*, while later forms (*vērminder*, *pērmendâr*) show *ē*. Dental umlaut is to be assumed for the MLG lexemes *knop*, *snor*, *vormunder*, and *vorsele*; the remaining ones probably involve regular palatal umlaut. Of the two lexemes for which dental mutation can be assumed (MLG *knop* and *snor*), Latvian shows a fluctuation between front and back vowel, while Livonian shows an unmutated vowel in only one lexeme.

Table 4. *Est. öö – Latv. ē – Liv. ē.*

Estonian	MLG	Latvian	Livonian
nööp	knop	knuõpe; knēpes (see also 2c)	knēp, knõp; knēp
nöör	snor	snuõre (see also 2c)	snùor
pööning	boninge	bēniņš, bēlīngis	bēnig
vöörmünder	vormunder	vērmiñderis, pārmēļderis, pērmiñderis	vārbinder, vērminder, pērmendâr, pērmendâr, piermendâr
vööslemid	vorsēle	vērzeles; virzeles	vērzâld, vīrzâld, vīrzâld
öös	öse	iēzes, ēze (see also 2c)	li'ekk-ōzâ; ōz

6.2.3. *Est. öö – Latv. uõ – Liv. uo/ē*

This subgroup contains words whose primary Latvian form has a back-vocalic *uõ* diphthong, indicating a non-mutated Low German source form, even though Estonian shows *öö*. *Nöör* (MLG *snor*) and *nööp* (MLG *knop*) are also listed under 6.2.2, since their Latvian forms show both *uõ* and *ē*. *Öös* (MLG *ose*) has both *ie* and *ē* in Latvian; but

since the Livonian form (*õzâ/õz*) shows back vowels, double membership is justified here as well. *Röövel* is listed here because its first Latvian form *ruõvelis* contains *uõ*; the second form *rieveris* with *ie* also justifies its classification under **6.2.1**. For MLG *snor* and *knop*, dental mutation is to be assumed; for *ose*, palatal umlaut.

Table 5. Est. *õõ* – Latv. *uõ* – Liv. *uo/ē*

Estonian	MLG	Latvian	Livonian
nõör	snor	snuõre (see also 2b)	snùqr
nõöp	knop	knuõpe; knēpes (see also 2b)	knēp̃, knõp̃; knēp
õös	ose	iēzes, ēze (see also 2b)	li'ekk-õzâ; õz
röövel	rover	ruõvelis; rieveris (see also 2a)	rēviī, rõviī, riēgviī

6.3. Estonian *o* (short)

Words with short *o* in Estonian show no fronting and derive from MLG *o* or *u*. The subgroups reflect different phonological developments in the recipient languages; group **6.3.5** contains words with inconsistent or ambiguous correspondences.

6.3.1. Est. *o* – Latv. *a* – Liv. *o*

Five words show Latvian *a* and Livonian *o* as correspondences to Estonian *o*: *kloppima* (MLG *kloppen*), *kross* (MLG *grosse*, MoHG *Groschen* ‘groat’), *lont* (MLG *lunte*, MoHG *Lunte* ‘fuse, match’), *rott* (MLG *rotte*, MoHG *Ratte* ‘rat’), and *volt* (MLG *volde*, MoHG *Falte* ‘fold, pleat’). The Latvian *a* in these words is likely a regular correspondence to MLG *o*. None of these lexemes shows umlaut.

Table 6. Est. *o* – Latv. *a* – Liv. *o*.

Estonian	MLG	Latvian	Livonian
kloppima	kloppen	klapēt	globāttâ, kloppâ
kross	grosse	grasis	groš
lont	lunte	luñte	loñt
rott	rotte	rate	roĩ; roĩ
volt	volde	palte; polds	faĩ

6.3.2. *Est. o – Latv. u – Liv. u/uo*

Six words show Latvian *u* and Livonian *u* or *uo*: *korsten* (MLG *schorsten*, MoHG *Schornstein* ‘chimney’), *korv* (MLG *korf*, MoHG *Korb* ‘basket’), *mold* (MLG *molde*, MoHG *Mulde* ‘trough’), *polt* (MLG *bolte*, MoHG *Bolzen* ‘bolt’), *polvärk* (MLG *bolwerk*, MoHG *Bollwerk* ‘bulwark’), and *toll* (MLG *tol*, MoHG *Zoll* ‘toll, inch’). The Latvian *u* here derives from MLG *o*; Livonian shows the typical *uo* diphthong as the correspondence to MLG *ō/o*. None of the lexemes shows umlaut.

Table 7. *Est. o – Latv. u – Liv. u/uo.*

Estonian	MLG	Latvian	Livonian
korsten	schorsten	skuŗstenis	kùqřššōn; kuorššōn; kūoršnig, kūoršōn
korv	korf	kuŗvis	kuŗv
mold	molde	muļda	moļb
polt	bolte	buļta, buļte	boļt
polvärk	bolwerk	† buļverkis	bulā-, buļdrik-pūb
toll	tol	tuļlis, tuļle; coļlis	toļ

6.3.3. *Est. o – Latv. uō – Liv. uo*

Two words show the standard correspondence for MLG *ō*: Latvian *uō* and Livonian *uo*. *Kortel* (MLG *quorter*, MoHG *Quartier* ‘quarter, billet’) and *torn* (MLG *torn*, MoHG *Turm* ‘tower’) thus show the pattern typical of group (4a), but have a short *o* in Estonian.

Table 8. *Est. o – Latv. uō – Liv. uo.*

Estonian	MLG	Latvian	Livonian
kortel	quorter	kuōrtēlis	kùqřtīl
torn	torn	tuōrnis	toŗn, tūqŗn

6.3.4. *Est. o – Latv. o/u – Liv. o*

Nine words show Latvian *o* or *u* and Livonian *o*. These include *oldermann*, *porss*, *post*, *pott*, *rosin*, *tokk*, *tropp*, *tross*, and *vorm*. These are direct borrowings of MLG words without any special vowel change.

Table 9. Est. *o* – Latv. *o/u* – Liv. *o*.

Estonian	MLG	Latvian	Livonian
oldermann	oldermann	† aīlđermanis	ōldār, ōldar
porss	pors	† puraši	pōrssa, poṛs
post	post	poste	postōn
pott	pot	puods	poṭṭā
rosin	rosin	† razīnes; rozīn	roziń
tokk	stok	stoķs	stoķ
tropp	drope	drapes	troṗ, droṗ
tross	trosse	† trasa	droš, drošk
vorm	forme	porme; vormis	pūorm; foṛm

6.3.5. Inconsistent correspondences

Nine words show inconsistent vowel correspondences; some are internationalisms for which umlaut cannot be assumed, or cannot be assumed unambiguously: *orel*, *plokk*, *prohvet*, *skorpion*, *soldat*, *tohter*, *topsel*, *tosin*, and *trompet*. Noteworthy in this group are the two Livonian lexemes that show an umlaut result (MLG *orgel* and *block*).

Table 10. Inconsistent correspondences.

Estonian	MLG	Latvian	Livonian
orel	orgel	ērgēles	ērgiló
plokk	block	bluķis	bleķ, blōķ, bloķ
prohvet	prophete	praviēts	praviēṭ, praviēš
skorpion	scorpion	skarpijs; skorpions	skorpion skorpion/skorpions
soldat	soldat	zaīdāts	zōldat
tohter	docter	dakteris	doķtār
topsel	toppseil	† stopzēģelis, tōpzēģelis	toppūraz
tosin	dos	ducis	duṭš
trompet	trumpit	strumpis; trumete; trumpe; trompete	truṁṗpēt

6.4. Estonian *oo* (long)

Words with long *oo* in Estonian derive from MLG long *ō*. By far the largest group 6.4.1 shows the regular substitution pattern; the smaller groups 6.4.2 and 6.4.3 deviate from it and point to dialectal variants in the Low German source.

6.4.1. *Est. oo – Latv. uõ – Liv. uo*

This is the largest group, with 27 words showing the regular substitution pattern MLG *ō* → Est. *oo*, Latv. *uõ*, Liv. *uo*. It includes, among others, *kool* (MLG *schole*, MoHG *Schule* ‘school’), *kroon* (MLG *krone*, MoHG *Krone* ‘crown’), *loor* (MLG *flor*, MoHG *Flor* ‘gauze, crepe’), *mood* (MLG *mode*, MoHG *Mode* ‘fashion’), *pood* (MLG *bode*, MoHG *Bude* ‘booth, stall’), *roos* (MLG *rose*, MoHG *Rose* ‘rose’), and *voor* (MLG *vore*, MoHG *Fuhre* ‘cartload’). The uniformity of this group confirms the regularity of the sound substitution. None of the lexemes shows umlaut.

Table 11. Est. *oo* – Latv. *uõ* – Liv. *uo*.

Estonian	MLG	Latvian	Livonian
klooster	kloster	kluõsteris	klüostər; klügstār
kool	schole	skuõla	skùql
koolmeister	schol(e)mester	† skuõlmeīsteris	skùqlmeīstār
kooner	schonen	skuõnēt	skùõñõ
koor	kor	kuõris	kùqr
krooge	kroke	kruõka; kruõķis	krùõķik
kroon	krone	kruõnis; kruona	krùõn; krüonõ
kroonima	kronen	kruõnēt	krùõñõ
loor	flor	pluore; flõrs	plùqr; plõr
loorber	lorbere	† luõzbēres; luorbēres	lùõzbār, lùqrbõr
loots	lotsman	luotis	lùqtĩs
mood	mode	muõde	mùõp
moorima	smoren	smuorēt; šmuõrēt	šmüorõ
moos	mos	† muõze	kuñķkiĩ-mùõz
pood	bode	buõde	bùõp
pool	spole	spuõle	spùql

Estonian	MLG	Latvian	Livonian
poort	borde	† burde	bùq̃r; bort
pootima	poten	puõtēt, puõrtēt	pùq̃ttā; proppō
pootshaak	boshake	buõstaks; buosāks	bùq̃ts-õik
roos	rose	ruõze; ruõdze	rùq̃ž; rōza
tooder	stoder	stuõdere	stu'odār
toop	stop	stuõps	tùq̃p, stùq̃p
toos	dose	duõze	dùq̃ž
toot	stot	† stuõte	stùq̃t
troon	tron	truonis	trūonō
vooder	voder	vuoders, uõdere	ùq̃dār
voor	vore	uõre; uõrmanis; vuormans	fūrmañ; ùq̃fā

6.4.2. Est. oo – Latv. uõ – Liv. ē

With *lood* (MLG *lode*, MoHG *Lot* ‘plumb bob’) and *loodima* (MLG *loden*, MoHG *loten* ‘to plumb’), Latvian shows regular *uõ* while Livonian shows *ē* (Liv. *lēp*’, *lēttā*). This is a discrepancy case of the second type: Livonian points to a mutated source form with MLG *ō*, while Latvian shows the regular back vowel correspondence. At least for the source of the Livonian correspondences, dental mutation may be assumed.

Table 12. Est. *oo* – Latv. *uõ* – Liv. *ē*.

Estonian	MLG	Latvian	Livonian
lood	lode	luõde	lēp; lēb, lēb
loodima	loden	luõdēt	lēttā, lēttā; lùq̃dā

6.4.3. Est. oo – Latv. u/o – Liv. ō

Four words show Latvian *u* or *o* and Livonian *ō* with Estonian *oo*: *knoop* (MLG *knop*, MoHG *Knopf* ‘button, knob’), *pootsman* (MLG *botsman*, MoHG *Bootsmann* ‘boatswain’), *proov* (MLG *prove*, MoHG *Probe* ‘test, sample’), and the derivative *proovima*. The back-vocalic correspondences in Latvian and Livonian point to a Low German source without umlaut.

Table 13. Est. *oo* – Latv. *u/o* – Liv. *õ*

Estonian	MLG	Latvian	Livonian
knoop	knop	† knupis	knoṗ
pootsman	botsman	bocmanis	bōtsmaṇ
proov	prove	pruõve; prauve	prōv
proovima	proven	pruõvêt; prauvêt	prōvâ

6.5. Estonian *u* (short)

Words with short *u* in Estonian derive from MLG *u*. The large group 6.5.1 shows the regular pattern; group 6.5.2 deviates from it in that Livonian shows *o* instead of *u*.

6.5.1. Est. *u* – Latv. *u* – Liv. *u/ũ*

25 words show consistently Latvian and Livonian *u* as the correspondence to Estonian *u*. These include, among others, *junkur* (MLG *junker*), *munk* (MLG *monk*), *pruun*, etc. (see table). The uniformity of this group confirms the regular substitution pattern for MLG *u*. None of these lexemes shows umlaut.

Table 14. Est. *u* – Latv. *u* – Liv. *u/ũ*.

Estonian	MLG	Latvian	Livonian
junkur	junker	juņkurs	jũṅkkar, juṅkkâr
kunst	kunst	skuņste; kuņstība	kuṅšt, skuṅšt
lust	lust	luste	luṣt
lustima	lusten	lustêt	luṣtâ
munk	monk	mũks	mũk
munster	munster	muļsturs, muņsturs	muṅstigr
munsterdama	munster	muļsturêt, muļsterêt, musterêt	muṅstiertâ
nukk	nok(ke)	niķi	niḱ
nunn	nunne	† nuņne	non
pulber	pulver	puļveris	puļviḡr
pull	bulle	buļlis	buḷ
pung	punge	punga	pũṅga
punn	spunt	spuņde; spuṅdêt	puṅ

Estonian	MLG	Latvian	Livonian
punt	bunt	buñte	buñt̃
puss	busse	† bikse; buksis	buš, buš̃
rull	rulle	rullis, ruļle	ruļ; ruļ̃
rullima	rullen	ruļlēt	ruļlā
rumm	trumme	rumba	rūmba
rung	runge	ruņga	rūnga
suhkur	sucker	sukurs; cukurs	tsukkâr
summa	summa	zuņma, summa	summa
trump	trump	truņpis, truņps, truņpa	truņp̃, struņp̃
tull	dulle	duļļi	toļ; toļ̃, duļ̃
tund	stunde	stuņda	stuņd̃
tuvi	duve	dūja, dūve	dūi, dūji

6.5.2. Est. u – Latv. u – Liv. o

Three words show Latvian *u* but Livonian *o*: *kruvi* (MLG *schruve*, MoHG *Schraube* ‘screw’), *pudel* (MLG *Buddel* ‘bottle’), and *tuhvel* (MLG *tuffele*, MoHG *Pantoffel* ‘slipper’). The Livonian correspondences in this group show greater irregularity.

Table 15. Est. *u* – Latv. *u* – Liv. *o*.

Estonian	MLG	Latvian	Livonian
kruvi	schruve	skrūve	skreūv, skriūv
pudel	buddel	budele	poitiļ, pottiļ̃
tuhvel	tuffele	tupele	toppiļ̃

6.6. Estonian *uu* (long)

Words with long *uu* in Estonian derive from MLG long *ū*. The large group 6.6.1 shows the regular substitution pattern; groups 6.6.2 and 6.6.3 deviate from it.

6.6.1. Est. *uu* – Latv. *ū* – Liv. *ū*

20 words show the regular pattern MLG *ū* → Est. *uu*, Latv. *ū*, Liv. *ū*. These include, among others, *kruuk* (MLG *kruke*, MoHG *Krug* ‘jug, mug’), *pruun* (MLG *brun*, MoHG *braun* ‘brown’), *ruun* (MLG *rüne* ‘gelding’), and *tuut* (MLG *tute*, MoHG *Tüte* ‘paper cone, bag’), etc.

Table 16. Est. *uu* – Latv. *ū* – Liv. *ū*.

Estonian	MLG	Latvian	Livonian
kruuk	kruke	† krūka	kruķ, krūk
kruup	gruup	† grūbas	gruṗ; grūbōd, grūpōd
kruus	krus	krūze; kruoze, krūza	krūz
kruusemint	kruse	krūzaminta, krūzementē; krūzmētra	krūz-māītār
kuur	schur	skūra, skūre; šķūre, šķūris; kūre, kūris	kūr
luuk	luke	lūka	lūk; lūk
luurama	luren	† lūrēt	lūrā, lūrā
pruuk	bruk	brūķe	brūķ
pruukima	bruken	brūķēt	brūķkō
pruul	bru	brūveris, brūvelis	brēvā
pruulima	bruwen	brūvēt	brēvā
pruulis	bruwelse	brūzis, brūvūzis	brūz
pruun	brun	brūns	brūni
pruut	brut	brūte	brūt
puuslak	buk	būslags, būslaks, būslaks	pūslak
ruum	rum	rūme	rūim, rūim, rūm
ruun	rune	† rūnis	rūna; ru’inā; rūnō
tuurima	duren	† dūrēt	dūrā
tuut	tute	tūte	tūt
tuutu	tute	tūta; tūte	tūt

**6.6.2. Est. uu – Latv. uõ/ũ – Liv. uo/õ/ü
(with Livonian discrepancy)**

The two words in this group show back vowels in Latvian, but one of them shows front vowels in Livonian, corresponding to a discrepancy case of the second type (cf. Section 5.2). *Pruukost* (MLG *vrokost* ‘breakfast’) has Latvian *bruõkasts* with *uo* and Livonian *brùõkst/brõkst*. *Tuur* (MLG *stor*, MoHG *Stör* ‘sturgeon’) has Latvian *stuõre/stüre* (back vowels) but Livonian *tīr/tūr* (front vowels), pointing to a mutated MLG source form with *ũ*.

Table 17. Est. *uu* – Latv. *uõ/ũ* – Liv. *uo/õ/ü*.

Estonian	MLG	Latvian	Livonian
pruukost	vrokost	bruõkasts, bruõkastis	brùõkst; brõkst
tuur	stor	stuõre; stüre; stora	tīr, tūr, tīrkala

6.6.3. Est. uu – Latv. ũ/ũ – Liv. õu

The two words borrowed from the same stem show Latvian *ũ* and Livonian *õu*: *kruupink* (MLG *schruuvbenk*, MoHG *Schraubbank* ‘vice, screw bench’) and *kruustangid* (MLG *schruwstangen*, MoHG *Schraubstangen* ‘screw rods’). The Livonian vocalism is irregular here and might point to a borrowing from an earlier form High German rather than from Low German.

Table 18. Est. *uu* – Latv. *ũ/ũ* – Liv. *õu*.

Estonian	MLG	Latvian	Livonian
kruupink	schruuvbenk	skrũvbeņķis	skrõubenk
kruustangid	schruwstangen	skrũve	skrõustik

6.7. Estonian ü (short)

Words with short *ü* in Estonian derive from MLG *ü*. The subgroups differ according to whether Latvian and Livonian reflect the front-vocalic character of the source form. Some words are listed in two groups due to discrepant correspondences.

6.7.1. Est. *ü* – Latv. *i* – Liv. *i/ü*

Ten words show *i* in Latvian as the front vowel correspondence to MLG *ü*. Livonian mostly follows with *i* or *ü*: *müts* (MLG *mütze*), *nüke* (MLG *nuk*), *nüppel* (MLG *knüppel*), *prügi* (MLG *brügge*), *prügitama* (MLG *brüggen*), *sült* (MLG *sulte*), *trükk* (MLG *druck*), *trükkima* (MLG *drücken*), *türgi* (MLG *turcke*), and *tükk* (MLG *stucke*). On *sült*: Livonian here shows *u* (*zuļt*) instead of the expected front vowel; this word is accordingly a discrepancy case of the first type (cf. Section 6.2) and does not fit group 6.7.2 either. On *tükk*: Latvian has *stuķis* with *u*, Livonian *stiķ* with *i*; the word is therefore also listed under 6.7.3. On *türgi*: both Latvian (*turks*) and Livonian (*tīrk/türk*) show mixed forms; the word is correspondingly also listed under 6.7.3.

Table 19. Est. *ü* – Latv. *i* – Liv. *i/ü*.

Estonian	MLG	Latvian	Livonian
müts	mutze	mice	miš
nüke	nuk	niķi	niķ
nüppel	knuppel	knipele; † knipelēt	kniippiļ
prügi	brugge	bruģis, bruģe	bri'g
prügitama	bruggen	bruģēt	bri'ggâ, bri'ktâ
sült	sulte	† ziļte	zuļt (see note; see also 7b)
trükk	druck	driķe	druk
trükkima	drucken	driķēt, drukāt	drukâ
tükk	stucke	† stuķis (see also 7c)	stiķ
türgi	turcke	turks (see also 7c)	tīrk, türk

6.7.2. Est. *ü* – Latv. *u* – Liv. *u/ü*

Three words show Latvian *u* and Livonian *u/ü*, which points to a Low German source without umlaut or to a borrowing from an unmutated dialectal form: *lühter* (MLG *luchter*, MoHG *Leuchter* ‘candlestick, lantern’), *rünt* (MLG *gründel*, MoHG *Gründling* ‘gudgeon’), and *sült* (MLG *sulte*, MoHG *Sülze* ‘brawn, head cheese’). On *sült*: Latvian has *ziļte* with *i*, not *u*; since the front vowel is preserved in Latvian, *sült* is primarily classified under 6.7.1. It appears here because Livonian shows *u*, which corresponds to the pattern of 6.7.2.

Table 20. Est. *ü* – Latv. *u* – Liv. *u/ü*.

Estonian	MLG	Latvian	Livonian
lühter	lüchter	lukturis	luḱtār, luḱtār
rünt	gründel	† gruṇdulis	grūndil̃
sült	sulte	† ziļte (see also 7a)	zuļt̃

6.7.3. Est. *ü* – Latv. *u* – Liv. *i/ü*

Four words show Latvian *u* (back vowel) and Livonian *i* or *ü* (front vowels), corresponding to a discrepancy case of the second type (cf. Section 5.2): Livonian reflects the front-vocalic character of the MLG source, Latvian does not. *Kütt* (MLG *schutte*, MoHG *Schütze* ‘marksman, huntsman’) has Latvian *šḱutas* with *u*, but Livonian *küt* (*mīez*) with *ü*. *Püss* (MLG *busse*, MoHG *Büchse* ‘rifle, tin’) has as a Latvian parallel form *bise* with *i*, i.e., a front vowel, which would suggest classification under 6.7.1; the Livonian form *biš* confirms this. *Pütt* (MLG *bütte*, MoHG *Bütte* ‘tub, vat’) has Latvian *bute* with *u*, Livonian *piṭ* with *i*. *Tükk* and *türgi* can also be classified under 6.7.1; see there.

Table 21. Est. *ü* – Latv. *u* – Liv. *i/ü*.

Estonian	MLG	Latvian	Livonian
kütt	schutte	šḱutas	küt mīez; küṭ miēz; kitmīez
püss	busse	bise; busa	biš
pütt	bütte	bute	piṭ
tükk	stucke	† stuḱis (see also 7a)	stiḱ
türgi	turcke	turks (see also 7a)	tiṛḱ, türḱ

6.8. Estonian *üü* (long)

Words with long *üü* in Estonian derive from MLG long *ü*. The subgroups differ according to the type of vowel correspondence in Latvian and Livonian and show varying degrees of reflection of the MLG umlaut.

6.8.1. Est. *üü* – Latv. *ū/ũ* – Liv. *ĩ*

Five words show Latvian *ū* and Livonian *ĩ*: *müür* (MLG *mur*, MoHG *Mauer* ‘wall’), *müürima* (MLG *muren*, MoHG *mauern* ‘to build a wall’), *tüürimees/tüürman* (MLG *sturman*, MoHG *Steuermann* ‘helmsman’), *tüürima* (MLG *sturen*, MoHG *steuern* ‘to steer’), and *küün* (MLG *schüne*, MoHG *Scheune* ‘barn’). On *küün*: Latvian has *šķūnis* with *ū*, Livonian *kĩh/skĩh* with *ĩ*.

Table 22. Est. *üü* – Latv. *ū/ũ* – Liv. *ĩ*.

Estonian	MLG	Latvian	Livonian
müür	mûr	mûris	mĩr
müürima	mûren	mûrēt	mĩrtĩtā; mĩrtō
tüürimees, tüürman	stûrman	stûrmanis	tĩrmanĩ, tĩrmanĩ
tüürima	stûren	stûrēt; stūrēt; štūrēt	tĩrā, tĩrō
küün	schüne	šķūnis	kĩh, skĩh

6.8.2. Est. *üü* – Latv. *ĩĩ* – Liv. *ĩ*

Five words show both Latvian and Livonian *ĩ*, pointing to a MLG source with *ũ* that was substituted in both recipient languages by a high front vowel: *klüüs* (MLG *klüse*, MoHG *Klüse* ‘hawsehole’), *klüüver* (MLG *klûver*, MoHG *Klûver* ‘jib sail’), *püül* (MLG *bûdelen*, MoHG *beuteln* ‘to bolt, sift’), *üür* (MLG *hure*, MoHG *Heuer* ‘hire’), and the derivative *üürima* (MLG *hûren*, MoHG *heuern* ‘to hire’). Of these lexemes, MLG *kluse* and *kluver* are borrowings from Dutch; the others show palatal umlaut.

Table 23. Est. *üü* – Latv. *ĩĩ* – Liv. *ĩ*.

Estonian	MLG	Latvian	Livonian
klüüs	kluse	klīze	klĩz
klüüver	kluver	klīveris; klīvers	klĩvār
püül	budelen	† bīdele	bĩlĩtā; bilt
üür	hure	ĩre; eire	ĩr
üürima	huren	ĩrēt	ĩrō

6.8.3. Est. *üü* – Latv. *ũ/ū* – Liv. *u/ū*

Only *lüüs* (MLG *sluse*, MoHG *Schleuse* ‘sluice, lock’) belongs to this group. Both Latvian (*slūžas*) and Livonian (*služ/slūžōd*) show back vowels, even though Estonian has front-vocalic *üü*. This word thus belongs to the third discrepancy type (cf. Section 5.2): Estonian is the sole witness to a mutated phonological value in the source form. The diphthong of the High German counterpart points to an originally mutated form.

Table 24. Est. *üü* – Latv. *ũ/ū* – Liv. *u/ū*.

Estonian	MLG	Latvian	Livonian
lüüs	sluse	slūžas	služ; slūžōd

6.8.4. Est. *üü* – Latv. *ie* – Liv. *ē*

The sole word in this group is *müüser* (MLG *möser*, MoHG *Mörser* ‘mortar’). Latvian has *miēzeris* with *ie*, Livonian *mīezâr/mīzôr* with *ie* or *ī*. The High German *ö* in *Mörser* shows that this involves not dental mutation but regular palatal umlaut; the vowel correspondences in Latvian and Livonian follow the pattern for MLG *ō*.

Table 25. Est. *üü* – Latv. *ie* – Liv. *ē*.

Estonian	MLG	Latvian	Livonian
müüser	möser	miēzeris	mīezâr, mīzôr

7. Sorting occurrences: dental vs. palatal umlaut

Not every occurrence of *ö/öö* or *ü/üü* in Estonian, and of the corresponding front vowels in Latvian and Livonian, derives from Low German dental mutation. In a considerable proportion of the material, regular palatal umlaut is involved, recognisable by the fact that the corresponding High German form also shows a mutated vowel or its further development (e.g. MLG *lūchter* to MoHG *Leuchter*, MLG *hure* to MoHG *Heuer*). In these cases the front vowels in the three borrowing languages derive from an already mutated Low German source, without any specifically dental context being required.

Dental umlaut, on the other hand, may be assumed where the High German counterpart shows no umlaut (e.g. MLG *roste* to MoHG *Rost*, MLG *mur* to MoHG *Mauer*), the dental context is present in the MLG form, and Latvian, Livonian, or Estonian nevertheless show front vowels.

7.1. Substitution scheme and basic patterns

Without umlaut, the three languages substitute MLG long vowels as follows:

Table 26. Substitution of MLG long vowels without umlaut.

MLG vowel	Estonian	Latvian	Livonian
ō (long)	oo	uõ	uo
ū (long)	uu	ũ	ũ
o (short)	o	a, u, or o	o
u (short)	u	u	u/ũ

Where the recipient languages instead show front vowels, this points to a clearly mutated vowel in the Low German source:

Table 27. Substitution of MLG long vowels with umlaut.

MLG vowel (mutated)	Estonian	Latvian	Livonian
ō̄ (umlaut of ō)	öö	ie or ē	ie or ē
ū̄ (umlaut of ū)	üü	ī	ī
ö (umlaut of o)	ö	e	e
ü (umlaut of u)	ü	i	i

7.2. Cases of dental umlaut: survey by congruence

7.2.1. All three languages show congruent front vowels

This is the case in which dental mutation is most clearly recoverable: Estonian, Latvian, and Livonian agree and all point to a mutated MLG source form.

Table 28. Front vowels in all three languages.

Group	Estonian	MLG	HG (no umlaut)	Est.	Latv.	Liv.
5.1.2	röst	roste	Rost	ö	e	e
5.2.2	vööslomid	vorsele	Vordersielen	öö	ē	ē
5.7.1	nüke	nuk	Nock(e)	ü	i	i

With *vöörmünder* (MLG *vormunder*, MoHG *Vormund*), Latvian and Livonian likewise agree.

With *nööp* (MLG *knop*, MoHG *Knopf*), Livonian consistently shows *ē*, while Latvian fluctuates between *uō* (back diphthong) and *ẽ* (= long *ē*), so that Livonian points more clearly to possible dental mutation.

7.2.2. Only Estonian shows a front vowel

In these cases Estonian is the sole witness to a mutated vowel in the Low German source. Latvian and Livonian show the back vowel correspondence, as if no umlaut had taken place.

Table 29. Front vowel only in Estonian.

Group	Estonian	MLG	HG (no umlaut)	Est.	Latv.	Liv.
5.2.2	nöör	snor	Schnur	öö	uō	uo
5.8.3	lүүs	sluse	Schleuse	üü	ũ	u/ũ

With *nöör*, both neighbouring languages show regular back vowels; Estonian may either have had a different, mutated dialectal form as its source. With *lүүs* (HG *Schleuse*, with a diphthong as the umlaut result), the High German counterpart also supports the assumption of an originally mutated vowel.

7.2.3. Latvian shows front vowel, Livonian back vowel

In this rare type (discrepancy type 1 in Section 5.2), Latvian shows a front vowel as a sign of umlaut, while Livonian shows a back vowel.

Table 30. Front vowel in Latvian, back vowel in Livonian.

Group	Estonian	MLG	HG	Est.	Latv.	Liv.
5.7.1	sült	sulte	Sülze	ü	i	u

Latvian (*zīlte*) clearly shows the front vowel *i*; Livonian (*zul̥t̥*) has *u*. Estonian *ü* and Latvian *i* point to a mutated MLG source form *ǖ* (as does the High German counterpart); Livonian appears to have been borrowed from an unmutated variant.

7.2.4. Livonian shows front vowel, Latvian back vowel

7.2.4.1. Short vowel (*ü* → Latv. *u*, Liv. *i/ü*)

This is the most common discrepancy type (type **2** in Section **5.2**): Livonian points to umlaut, while Latvian shows the regular back vowel. With *tükk* and *türgi*, the dental mutation is also attested in the High German counterparts (*Stück*, *Türke*), supporting the assumption. With *kütt* (HG *Schütze*), High German also shows umlaut; here palatal umlaut is involved, preserved in Livonian but not in Latvian.

Table 31. Short vowel (*ü* → Latv. *u*, Liv. *i/ü*).

Group	Estonian	MLG	HG	Est.	Latv.	Liv.
5.7.3	kütt	schutte	Schütze	ü	u	ü
5.7.1/3	tükk	stucke	Stück	ü	u	i
5.7.1/3	türgi	turcke	Türke	ü	u	i/ü

7.2.4.2. Long vowel (*ū* → Latv. *ū*, Liv. *ī*)

This is the largest and most consistent subgroup. Five words consistently show long *ū* in Latvian and *ī* in Livonian. Estonian has *üü* in all cases. This group appears to point to a different source of borrowing for Estonian and Livonian on the one hand and Latvian on the other, since a substitution of Middle Low German long *ū̄* by a back-vocalic *ū* is not what would be expected in Latvian.

Table 32. Long vowel (*ū̄* → Latv. *ū*, Liv. *ī*).

Group	Estonian	MLG	HG (no umlaut)	Est.	Latv.	Liv.
5.8.1	müür	mur	Mauer	üü	ū	ī
5.8.1	müürima	muren	mauern	üü	ū	ī
5.8.1	tüürimees/tüürman	sturman	Steuermann	üü	ū	ī
5.8.1	tüürima	sturen	steuern	üü	ū	ī
5.8.1	küün	schune	Scheune	üü	ū	ī

7.2.4.3. Long vowel ($\bar{o} \rightarrow$ Latv. $u\bar{o}$, Liv. $\bar{e}$)

With *lood/loodima*, it is exclusively Livonian that shows $\bar{e}$ as a front vowel correspondence to an assumed MLG $\bar{o}$, while Latvian has $u\bar{o}$ as the regular correspondence to MLG $\bar{o}$. Estonian *oo* likewise corresponds to the unmutated form. The Livonian forms would thus be the only witnesses to a possible dental mutation.

Table 33. Long vowel ($\bar{o} \rightarrow$ Latv. $u\bar{o}$, Liv. $\bar{e}$).

Group	Estonian	MLG	HG	Est.	Latv.	Liv.
5.4.2	lood	lode	Lot	oo	$u\bar{o}$	$\bar{e}$
5.4.2	loodima	loden	loten	oo	$u\bar{o}$	$\bar{e}$
5.6.2	tuur	stor	Stör	uu	$u\bar{o}/\bar{u}$	$\bar{i}/\bar{u}$

7.3. Consonantal environments

The following tendency can be derived from the material with regard to which dental consonants favour umlaut:

Umlaut before or after *r*: Most strongly represented. *Müür* (*mur*), *tüür-* (*stur-*), *vööslemid* (*vorsele*), *röst* (*roste*), *vöörmünder* (*vor-*), *nöör* (*snor*). This corresponds to Nörrenberg’s (1932) observation that *r* was the strongest trigger of dental mutation.

Umlaut after *n*: *nüke* (*nuk*), *nööp* (*knop*).

Umlaut before *s*: *lüüs* (*shuse*).

8. Conclusion

A clear distribution of dental mutation cannot be demonstrated for the Low German loanwords in Estonian, Latvian, and Livonian. This is partly because the vocabulary documented in all three languages, based on the current state of research, is relatively limited. A noteworthy result of the investigation is, however, that there appear to be a number of cases in which the developments in Livonian differ from those in Latvian. This could potentially indicate that the Low German variety from which the respective lexemes were borrowed differed with regard to the distribution of dental mutation, which in turn might suggest that different Low German dialects (or dialects in which dental mutation was

unevenly represented) were spoken in Courland and Livonia. However, another possibility that should be considered is that of a later borrowing from Estonian into Livonian, as was particularly common during the period when the Livonian language was being developed into a literary language. This possibility has not been taken into account here. The number of such words in the material is likely to be very small, though.

A further observation concerns those cases in which Latvian shows no dental mutation for a given lexeme, while Livonian attests two parallel forms, one with and one without dental mutation. In such instances, the Livonian form without dental mutation may plausibly be interpreted as a later re-borrowing of the Low German word via Latvian, rather than as an independent borrowing directly from Low German.

This in turn points to a broader potential of the dental mutation criterion as a diagnostic tool: the presence or absence of dental mutation could in principle serve to distinguish an older stratum of Low German loanwords in Livonian – those borrowed directly from Low German – from a more recent stratum of words that entered Livonian via Latvian or were re-borrowed through it at a later stage. Establishing such a chronological stratification of Low German loanwords remains a While a clear-cut distribution of dental mutation cannot be established for the Low German loanwords in question (not least due to the limited size of the available material) the investigation reveals notable discrepancies between the Latvian and Livonian correspondences, which point to a potential stratification of Low German loanwords in Livonian into an older layer borrowed directly from Low German and a more recent one mediated through Latvian. Dental mutation is thus proposed as a possible diagnostic criterion for establishing the relative chronology of such loanwords. Importantly, this approach would also be applicable to loanwords that have no Estonian counterpart and have therefore fallen outside the scope of the present investigation.

The present study can thus only be a beginning. It is limited both by the size of the available lexical material and by its restriction to words attested in all three languages under consideration. Nevertheless, it may offer a methodological starting point for the broader investigation of the role of dental mutation in tracing the origins and chronology of Low German loanwords in Livonian.

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Kokkuvõte. Axel Jagau: Dentaalmutatsioonist eesti, läti ja liivi keeles.

Artikkel käsitleb nn dentaalmutatsiooni (ehk dentaalmetafoonia) nähtust, keeleajalooliselt siiani puudulikult mõistetud häälikumuutust, mida on täheldatud mitmes põhja(mere)germaani keeles, sealhulgas friisi, alamsaksa, hollandi ja taani keeles. Selle protsessi käigus tagavokaalid dentaalsete konsonantide mõjupiirkonnas muutuvad eesvokaalideks. Muutus kajastub ka keskalamsaksa laensõnades eesti, läti ja liivi keeles. Pärast ülevaadet metafoonia üldisest arenguloost germaani keeltes ning senisest uurimistööst dentaalmutatsiooni kohta uurib artikkel, kas kolmes laenavas keeles leidub jälgi dentaalmutatsioonist, mis oli olemas nende alamsaksa lähtevormides, kuid mida keskalamsaksa kirjallikus allikmaterjalis endas ei ole sageli järjekindlalt kajastatud. Kuigi käsitletavate alamsaksa laensõnade puhul ei õnnestu tuvastada dentaalmutatsiooni selget levikumustrit, ilmnevad uurimuse käigus märkimisväärsed erinevused läti ja liivi vastete vahel, mis viitavad võimalusele, et alamsaksa laenud liivi keeles jagunevad mitmeks kihiks: vanem kiht, mis on laenatud otse alamsaksa keelest, ning uuem kiht, mis on vahendatud läti keele kaudu. Sellest lähtuvalt pakutakse dentaalmutatsiooni välja võimaliku diagnostilise kriteeriumina seliste laensõnade suhtelise kronoloogia kindlaksmääramiseks.

Märksõnad: metafoonia, laensõnad, keeleajalugu, keelekontaktid, eesti keel, läti keel, liivi keel, alamsaksa keel, germaani keeled