Old Frisian and Old English Gemination in /ja/-stems: Stratal OT Analysis

Jurij Božič
bozic.jurij@gmail.com

1 Introduction

A distinctive feature of old West Germanic languages, which partly distinguishes them from North Germanic and quite drastically from East Germanic, is consonant gemination which occurred systematically whenever the glide /j/ immediately followed a consonant. This process had a profound influence on the creation of specific features in verbal and nominal paradigms, namely the nominal /ja/-stems and /jō/-stems, and the weak verb class 1, all of which were formed by suffixing /j/ as the stem-consonant before any ending. Geminated consonant are, therefore, rampant in these paradigms, which somewhat complicates a purely linear analysis, especially since their trigger can no longer be seen on the 'surface level', cf. Old English *cynn* 'kin' and the Old Frisian cognate *ken.* To further complicate matters, Old Frisian seems to have lost some geminates, as shown above, while early Old English retains them.

While general West Germanic and Old English, specifically, have received thorough descriptive treatment as well as a handful of generative attention, Old Frisian is somehow lagging behind, especially as far as generative grammar is concerned. The present paper, therefore, concentrates on synchronic and diachronic aspects of Old Frisian gemination in /ja/-stems as well as the word-final degemination which is evident in *ken*, while (early) Old English is only briefly touched upon for means of establishing comparison with a typical old West Germanic language.

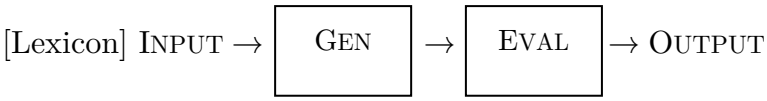
The analysis is performed under the wider generative framework of Optimality Theory (cf. Prince and Smolensky 1993), and, more speficially,

under its extension, viz. Stratal Optimality Theory (cf. Kiparsky 2000; Bermúdez-Otero 1999a), which is tailor made for dealing with situations where the surface state is not directly deducible from its context, i.e. it exhibits 'opacity', and it also serves as a means of explaining phonological change in a straightforward manner. The paper will attempt to show why a 'stratal' approach is well suited for accounting for Old Frisian geminates in a generative fashion in terms of synchrony and diachrony.

Sections 2 and 3 present a brief introduction to classical Optimality Theory and its *stratal* extension, while section 4 deals with the early Germanic phenomenon of germination; 5 presents the Old English and, in greater detail, the Old Frisian state of affairs. Section 6 discusses the theoretical notions presupposed for Input specification, 7 and 8 present the process of generating Old Frisian geminates (including their degemination) in a synchronic and diachronic context. Section 9, in turn, provides a brief contrastive synchronic analysis in terms of geminates and /j/ presence in Old English and Old Frisian.

2 The OT Framework

Differentiating from the 'traditional' generative phonologies, which dealt with simply postulating rules and ranking them according to the specific linguistic phenomenon, a more recent generative approach, viz. Optimality Theory (OT), can actually explain 'why' a certain rule is as 'it is' and also 'why' these rules are ranked 'as they are'. Initiated by Prince and Smolensky (1993), the OT framework is structured as an 'Input-Output device' (Kager 1999: 8):



The Lexicon contains the 'underlying' forms of morphemes and their phonological values, which are said to be specified in the Input, which subsequently feeds into Gen (i.e. Generator), which, in turn, produces an infinite number of possible 'candidate' forms (i.e. permutational varieties of the Input specification); cf. (1).

(1) GEN ⇒ {$Cand_1$, $Cand_2$, $Cand_3$, ..., $Cand_n$} (Kager 1999: 19)

The candidates, then, pass through EVAL (i.e. Evaluator), which chooses only one of the generated candidates – the most 'optimal' one. The process of evaluation is based on two types of 'constraints', viz. (i) Faithfulness and (ii) Markedness constraints: (i) Faithfulness constraints are concerned with 'preserving lexical contrast', i.e. most often the INPUT-OUTPUT correspondence of forms while (ii) Markedness constraints are concerned with striving for the 'unmarked' in structure (Kager 1999: 3–5). The basic premise of OT, however, is the fact that they 'interact' and that they are 'inherently conflicting', which implies that they are 'violable' by definition, as only the most 'optimal' candidate is ultimately chosen and not the perfect one. It is, therefore, posited, that while the constraints themselves are universal, their ranking must be assigned a parameter value (Kager 1999: 6–12).

All this, of course, leads to an important postulate, namely that no constraint ranking applies in the underlying form, which is termed as the 'Richness of the Base' notion (*ibid*: 19).

Let us now consider a hypothetical example: Let the INPUT specification be *x*, and the two relevant candidates *a* and *b*. The choice between these two candidates shall depend on the ranking of theFaithfulness constraint α and the Markedness constraint β. The process of evaluation and constraint ranking is represented in the so called OT 'tableaux':

/x/	α	β
/a/	*!	
☞ /b/		*

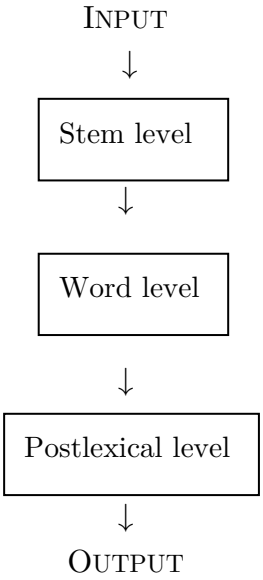
Since /b/ is the most optimal candidate (which is indicated by the 'hand' sign), we therefore state that the Faithfulness constraint *α* is ranked above *β*: α ≫ β. /a/ incurs a fatal violation (*!) since it violates the highest ranking constraint, while /b/ only incurs a violation (*) of a lower ranking constraint, which makes it the most optimal choice; in other words, *α*

dominates *β*. An OUTPUT is, therefore, optimal when 'it incurs the least serious violations of a set of constraints, taking into account their hierarchical ranking' (Kager 1999: 13). This implies that a candidate may violate most constraints except the highest ranking constraint if it is to be the most optimal one.

3 Strata in OT

The classical OT framework stumbled across less than few difficulties when it was presented with problems concerning 'opacity', i.e. the effect when the trigger of a certain OUTPUT situation is not retrievable on the surface level. This led to the proposal of 'Sympathy Theory' by McCarthy (1998, 1999, 2003) still in the classical 'parallel' spirit, but more importantly, for this paper, to the advances of 'Stratal OT' by Kiparsky (2000a, 200b, 2002, 2003a, 2003b) and also by Bermúdez-Otero (1999a) and Koontz-Garboden (2001), which is really an extension of the notions developed by Lexical Phonology (cf. Kiparsky 1982, 1985) as these are incorporated into the OT framework.

Stratal OT, unlike the classical parallel variety, is truly 'stratal', as it proposes three specific strata, or levels, on which structure is generated:



It is vital to note that the output of each level constitutes the input for the higher level and, according to Kiparsky (2003a: 110), constraint rankings may be different on *'n+1'* as compared to *'n'*. Each level is subject to the specific demands of its phonology: Stem affixation processes are generated on the stem level, word processes on the word level (these make up the 'lexical phonology') and postlexical processes on the postlexical level. Each level, therefore, passes through GEN and EVAL.

Affixation as such, as neatly demonstrated by Kiparsky (2003a: 110), can be stem level or word level: English nominal inflection is completely word level (e.g. [ωbəʊt-s], [ωhed-z], etc.), while some suffixation processes in Arabic can be stem level and some word level, e.g. *fhím-na* 'we understood' vs. *fihím-na* 'he understood us' – this immediately makes us wonder why only one of the two surface-identical forms undergoes /i/-reduction, and the answer to this opacity question is simple in Stratal OT: /na/ is suffixed to *fíhim-* on the stem level, due to which stress shifts, with which it forms an INPUT for the ensuing word level, where /i/-reduction applies, but only if the vowel is unstressed, which it is, resulting in *fhím-na*. In *fihím-na*, however, we must assume that the suffixation is word level, which means that the INPUT for this level still contains a stressed /i/, i.e. *fíhim-*, which means that no reduction applies, but stress shifts anyway, since this happens on the stem and the word level with suffixation (cf. Kiparsky 2000a).

The presence of a postlexical stratum in language is, in turn, 'adduced from boundary interaction', and processes that govern it have to be fully 'transparent', as there is no further level to make them opaque, but *they* are the culprit for opacity, or in other words, they obscure the processes that operate on the lower strata (Koontz-Garboden 2001: 14).

A noteworthy remark is also the assumption that diachronic processes, for instance phonological innovations, start out on the postlexical level as non-obligatory processes, but eventually 'percolate' downwards (Kiparsky 1995, to appear; Bermúdez-Otero 1999a, 1999b; Bermúdez-Otero and Trousdale to appear). Furthermore, Stratal OT, meets an important requirement of generative linguistics, namely it reaches and even 'transcends' explanatory adequacy by straightforwardly accounting for language acqusition, especially in terms of opacity (Bermúdez-Otero 2003).

According to Kiparsky (2000), Stratal OT offers an elegant definition of opacity: 'If α is the constraint system of some domain (say stems) and β the constraint system of a larger domain (word level or postlexical), then β's markedness constraints can render α opaque'.

In this manner, Stratal OT does not 'posit an arbitrary number of levels in a language', as the strata proposed are embedded directly in the 'universal prosodic hierarchy', which means they have a secure status in the UG (i.e. Universal Grammar) (Kiparsky 2000).

4 West Germanic Gemination

A well attested phenomenon in West Germanic languages is consonant gemination. It was triggered after light-stem nouns, whenever */j/ followed any consonant except */r/, before which it was systematically retained, while it was often deleted everywhere else (though we may reconstruct it for a hypothetical Proto-West-Germanic language) (Hogg 1992: 71; Ringe 2009: 130). Ignoring the absence of /r/ requirement, Hogg (1979: 68) formulates the following rule:

(1) $\mathrm{C} \rightarrow \mathrm{CC} / \left[\begin{smallmatrix} \mathrm{V} \\ - \ \mathrm{long} \end{smallmatrix} \right] \_\_ /\mathrm{j}/$

This phenomenon is also accountable for the gemination in Germanic weak verbs, /ja/-stem and /jō/-stem declensions, resulting in specific situations across the West Germanic attestations. Of primary concern for this paper is the /ja/-stem declension, particularly in Old English and Old Frisian, which host a reflex of the following Proto-Germanic situation, according to Hogg and Fulk 2011: 20):

(2)

	SG.–PL.	
Nom.	*kunjam	*kunjō
Acc.	*kunjam	*kunjō
Gen.	*kunjas	*kunjōō
Dat.	*kunjāai	*kunjomiz

While traditional reconstructionist literature is abundant on West Germanic gemination, quite some recent generative insight has also been offered on the subject, particularly in connection with syllabification, cf. Kiparsky (1998), Ham (1998), Bermúdez-Otero (1999a, 1999b), Crist (2001). Particularly insightful is Bermúdez-Otero's work; though confined to general Western Germanic, the discussion would be of use to Old English treatments, but since the latter is only employed as a means of establishing contrast with Old Frisian, this discussion is omitted here.

5 Old English and Old Frisian Situation

Since Old English is one of the most widely studied old Germanic languages and since it is attested in an enormous medieval manuscript corpus, it is not surprising that it has received thorough descriptive treatments, cf. Campbell (1959), Hogg (1992), Hogg and Fulk (2011), etc. Though, the latter, particularly Hogg (1992), verge on generative grammar. Also, a fair deal of generative attention as such has been paid to Old English, cf. Kiparsky and O'Neil (1976), Hogg (1976; 1979; 2000), Keyser and O'Neil (1985), Bermúdez Otero and Hogg (2003), Fulk (2010) and also Bermúdez-Otero (2005).

Old English reveals a rather complex state of the /ja/-stems. The reflex of the Proto-Germanic paradigm in (2) is the following, according to Hogg and Fulk (2011: 18) and Campbell (1959: 229):

(3)

	SG.–PL.	
Nom.	cynn	cynn
Acc.	cynn	cynn
Gen.	cynnes	cynna
Dat.	cynne	cynnum

It is of paramount importance to observe that /j/ is actually still underlyingly present in this paradigm in Old English, as first noted by

Kiparsky and O'Neil (1976: 529), as it comes up in derivations and inflections with /r/:

(4)

	SG.–PL.	
Nom.	here	hergas
Acc.	here	hergas
Gen.	herges	herga
Dat.	herge	hergum

This happens also with weak verbs where /r/, again, retains /j/ and blocks gemination; cf. *fremman* 'do, make' vs. *nerian* 'save'. Kiparsky and O'Neil(1976: 529–533) propose that /j/ geminated the consonant, but forget to account for its deletion, which is done by Hogg (1976: 109), though for weak verbs, but virtually the same applies for /ja/-stems:

(5) INPUT -/j/: Gemination → Umlaut[1] → /j/-deletion

According to (5), the underlying /j/ triggered gemination and umlaut, and subsequently deleted. The status of Old English /ja/-stem is, therefore, fraught with opacity, but this is not a concern of the present paper.

Old Frisian, on the other hand, suffers from much poorer and later[2] attestations than Old English and, accordingly, it has received scarcer descriptive treatments (again, aside from the traditional reconstructionist work) and generative treatments: Heuser (1903), Bremmer (2009), Versloot (2004; 2008).

In comparison to Old English, Old Frisian /ja/-stems do appear somewhat different at first glance (cf. Bremmer 2009: 61):

(5)

[1] Kiparsky and O'Neil (1976: 529–533) actually specify the umlauted vowel in the Input, while Hogg (1976: 109) does not, and since this is a virtual possibility due to /j/'s underlying presence, Hogg's analysis is taken up in the present paper.

[2] Aside from a few runic inscriptions, the first Old Frisian attestation is from 1200 (Bremmer 2009: 6), which is really contemporaneous with Middle English in England, but since Old Frisian retains more original 'Germanic' features than Middle English, it is contrasted with Old English as a typical Old Western Germanic representative.

	SG.−PL.	
Nom.	ken	ken
Acc.	ken	ken
Gen.	kennes	kenna
Dat.	kenne	kennum

According to Heuser (1903: 24, 33), the only remnant of /ja/-stems in Old Frisian is the /e/-ending in nominative and accusative singular of the noun *here* 'army' (cf. Old English *here* ~ *herges*, etc.), as /j/ no longer shows up in derivations and inflections with /r/, which is also the case with weak verbs: the equivalent of Old English *nerian* in Old Frisian is simply *nera*.

These paradigms, viz. /ja/-stems, /jō/-stems and weak verbs, are, however, still marked by gemination (Bremmer 2009: 62−63). Gemination in Old Frisian, though, is only retained before inflected endings (*ibid*: 23); cf. nom. sg. *ken* 'kin' vs. dat. sg. *kenne*.

There have been attempts to argue for the existance of word-final geminates in Western Old Frisian (cf. Boutkan 1996) on the basis of vowels that preceded geminates in the *Riustringen MS*[3] as they often underwent lengthening, but this seems to have been nothing more than a 'tendency', according to Versloot (2008: 91). We can safely assume that at least sporadically, Old Frisian was undergoing word-final degemination in the early 14th century. Furthermore, by examining the spelling practices in use in mediaeval Frisia, it is possible to determine how degemination soon widened its scope. Versloot (2008: 86−91) indicates that, at around 1400, intervocalic geminates started to disappear and had completely gone out of the language by the Middle Frisian period (i.e. 16th century); see also Versloot (2004). It is possible to date these changes due to the Latin spelling practice, which was initially in use until the early 15th century, demanding that all geminates be spelt out (i.e. <CC> and not <C> was used) (Versloot 2008: 86−91).

Accordingly, we can speak of two major periods of degemination in Old Frisian: first (i) word-final degemination and (ii) the late intervocalic

[3] The *Riustringen MS* is dated to 1300 (Bremmer 2009: 6).

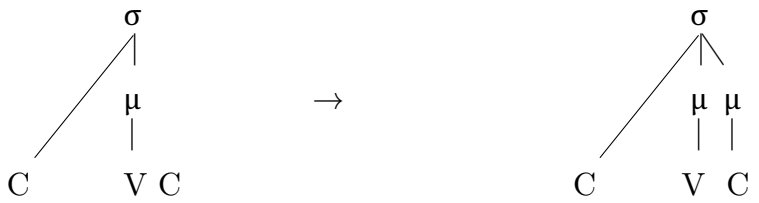
degemination, after which contrastive geminates disappear from the language.

In light of what has been said in the present chapter, I will argue that /j/ is no longer present underlyingly in Old Frisian, which implies that the geminates are specified in the Lexicon (i.e. present in the INPUT), and also that Old Frisian /ja/-stems (at least) are stratified in that affixation takes place on the word level, while (word final) degemination, an initially non-obligatory and transparent process, is a postlexical phenomenon. The arguments and formalisation appear in §7.

6 Specifying the INPUT

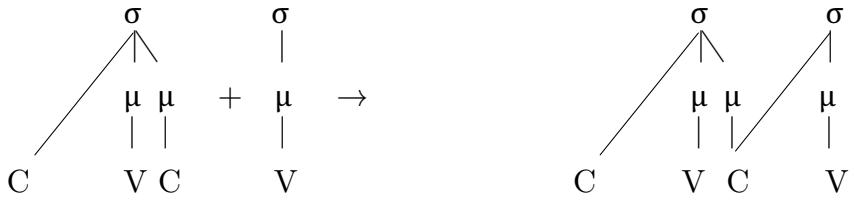
Before we may proceed to the stage of formalisation of the advances made above within Stratal OT, an incredibly simple, but easily misleading aspect of INPUT specification must be discussed. As has been noted in §1, no constraint ranking applies at the level of the Lexicon (i.e. the Richness of the Base). In a somewhat similar manner, Hayes (1989), within Moraic Phonology, postulates that coda consonants are not underlyingly moraic, but are licensed a mora during the process of generation (*ibid*: 258), as demonstrated below:

(6)



This is referred to as the 'Weight by Position' parameter. With geminates, however, the situation is different, as they are already dominated by a mora underlyingly and when syllabification takes place (provided that we have more than two syllables to deal with), the geminate undergoes 'flopping' – its 'consonantal melody is "flopped" onto a following vowel initial syllable' (Hayes 1989: 267–258):

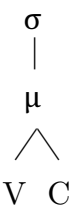
(7)



This has implications for *moraic faithfulness* in OT: Bermúdez-Otero (1999a: 36–50) argues and proves that licensing moras by means of Weight by Position should be assigned a specific status and that it should, therefore, not incur any violations in moraic faithfulness constraints, while already underlyingly moraic geminates simply retain their mora as it is. And this does not change as we progress to a *n+1* level in Stratal OT, as 'at the word level, moras assigned at the stem-level have the same status as underlying moras with respect to Faithfulness constraints', according to Kiparsky (2010). But we need not be concerned with the stem level at any rate, since our analysis shall pertain to the word and postlexical levels.

As a side note it should also be emphasised that, as stipulated by Moraic Phonology (Hayes 1989), word final geminates have the representation as shown in (7) (cf. the first tree) and do not contain the highest (syllable) projection of the following syllable with an empty head-node, as demonstrated by Ham (2001: 14–15). The status of such word final geminates is still discussed, especially since Moraic Phonology does not fare well with distinguishing simple word final geminates from degeminated consonants. Since we are really dealing with demorafication, the present paper presupposes that word final geminates are demorified and are then immediately dominated by the head mora, much like weightless codas are analysed by Broselow *et al.* (1997: 50):

(8)



7 Old Frisian Geminates in *ja*-stems

As noted in §5, Old Frisian geminates are assumed to be underlyingly present here, as /j/ cannot be recovered from any derivational or inflectional process where we still find it in Old English (cf. Old English *herges* vs. Old Frisian *heres*). Furthermore, Old Frisian /ja/-stem nouns are stratified, which presumes that affixation takes place word level, while word final degemination postlexically. This must be the case since: (i) word final geminates are a word-boundary phenomenon and are thus subject to postlexical innovations; (ii) word-final degemination is transparent itself, but in turn renders the paradigm opaque (see below); (iii) word-final degemination was subject to variation in mediaeval Frisia, i.e. it was a non-obligatory process (an innovation).

As noted under (ii). the postlexical degemination deletes the stem-environment for consonant flopping, or, in other words, word-final degemination counterbleeds consonant flopping:

(9) Input:	*stem*		[stem level]
	stem + suffix/∅	*flopping*	[word level]
	stem-suffix/∅	*degemination*	[postlexical l.]

The flopping, of course, applies to the suffixed cases, while degemination for those with a zero ending, which means that we are merely dealing with paradigm opacity, but nevertheless this indicates that word-final degemination is a transparent phenomenon which, from a *n+1* level, obscures the operations of processes on a *n* level, from the level of the paradigm, though.

Before proceeding with Stratal OT formalisation, it is necessary to present the Markedness and Faithfulness constraints that govern the generation process of Old Frisian /ja/-stems. As expected, Faithfulness constraints will be concerned with preserving moraic structure, while Markedness constraints will inhibit geminates and marked syllabic structure:

PK-PROM: Peak(x) $\succ$ Peak(y) if |x| > |y|
(Prince and Smolensky 1993: 39)

The above constraint is read as 'the element x is a better peak than y if the [intrinsic] prominence of x is greater than that of y' (Prince and Smolensky 1993: 39), which can be somewhat more clearly restated as:

> 'Stress ⊃ syllable heaviness (≡ syllable lightness ⊃ no stress)
> i.e. Foot heads may only be constructed on heavy syllables'.
> (Roca and Al-Ageli 1999: 135)

This basically promotes that syllable structure should be bimoric if it is stressed.

> NoSharedMora: 'Moras should be linked to single segments'.
> (Broselow *et al.* 1997: 65)

This constraint forbids demorafied (or rather 'degeminated') structures such as (8).

> NoCMora: 'The head of a mora must be a vowel'.
> (Broselow *et al.* 1997: 65)

NoCMora constraint forbids geminate consonants of any kind since they are by definition, as stipulated by Moraic Phonology, underlyingly moraic.

> *Gem#: 'Gemiates are disallowed in word final-position'.
> (Davis 2003: 28)

*Gem# is the Markedness constraint mentioned in the first paragraph of this chapter; it will play an important role in the degemination of word final geminates on the postlexical level.

> Ident$^{\mu}$: 'Let α be a segment in the input. Let β be a correspondent of α in the output. Let α be linked to n morae.
> Ident$^{\mu}$ = (a) ∧ (b)
> (a) β is linked to n morae.; (b) β is positionally μ-licensed.'
> (Bermúdez-Otero 1999a: 49)

Ident$^{\mu}$ is a 'macro constraint' consisting of of two 'micro constraints' (Crowhurst and Hewitt 1997), which are the result of a 'local conjunction'

(Smolensky 1993) (in this case they are (a) and (b)). Bermúdez-Otero (1999a: 50) defines Smolensky's 'local conjunction' in the following manner: ' a candidate *c* violates the micro constraint (a) ∧ (b), if, and only if *c* violates both micro constraint (a) and micro constraint (b)'. This implies that a segment present in the OUTPUT must be either (i) attached to the same number of moras as in its INPUT, (ii) or it is attached to no moras in the INPUT because it is licensed by Weight by Position. This constraint will be easily violated in our case since we are dealing with underlying geminates, which implies that the micro constraint (b) will have little effect on the analysis.

The ranking of the constraints suggested above, can account for the generation of Old Frisian /ja/-stem nouns. The following tableau illustrates the *word level*:

INPUT /ken$^{\mu}$ / or /ken$^{\mu}$ / + V... Candidates[4]	IDENT$^{\mu}$	PK-PROM	NOSHAREDMORA	NOCMORA	*GEM#
Nom. sg. ☞ken$^{\mu}$				*!	*
ken	*!	*	*		
Gen. sg. ☞ken$^{\mu}$.nes				*!	
ke.nes	*!	*			
keː.nes	**!				
keːn$^{\mu}$.nes	*!	*		*	
Dat. sg. ☞ken$^{\mu}$.ne				*!	
ke.ne	*!	*			
keː.ne	**!				
keːn$^{\mu}$.ne	*!	*		*	

[4] With the superscript <$^{\mu}$> I mark the relevant moraic consonants.

Drawing 'dotted lines' to represent equally ranked constraints, which is normally employed in OT analysis, is avoided here and in the following tableau, as only the crucial ranking is exposed, viz. IDENT$^{\mu}$, PK-PROM, NOSHAREDMORA outrank NOCMORA[5] along with *GEM# (note that the latter is completely inactive in the process of generating Gen. sg. and Dat. sg., but it must be posited to account for postlexical activity), cf. (9).

(9) IDENT$^{\mu}$, PK-PROM, NOSHAREDMORA ≫ NOCMORA, *GEM#

This, of course, implies that moraic faithfulness, foot binarity and specific node domination in the moraic tree play a promnent role in generating Old Frisian /ja/-stems on the world level. On the *postlexical level*, however, a distinct change of ranking occurs to license degemination in nom. sg.:

INPUT /ken$^{\mu}$/	Candidates	*GEM#	IDENT$^{\mu}$	PK-PROM	NOSHAREDMORA	NOCMORA
Nom. sg.	ken$^{\mu}$	!*				*
	☞ken		*	*	*	

The postlexical level sees a change in constraint ranking: *GEM# is promoted over IDENT$^{\mu}$, PK-PROM, NOSHAREDMORA and NOCMORA to make way for degemination (i.e. demorafication) of **kenn* to *ken*; cf. (10):

(10) *GEM# ≫ IDENT$^{\mu}$, PK-PROM, NOSHAREDMORA, NOCMORA

The markedness constraint *GEM# is still blind to any of the suffixed cases, i.e. dat. and gen. sg., — it cannot apply, since no word final geminates occur. This non-obligatory postlexical process can, therefore,

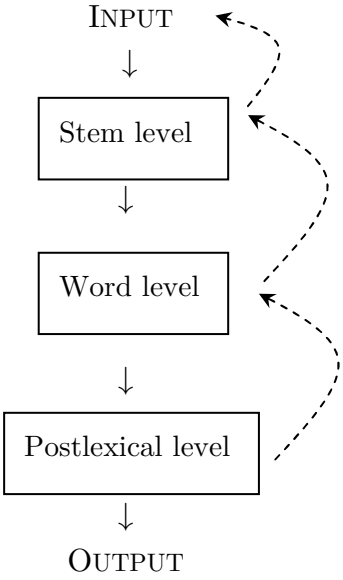
[5] Whether the word final consonant. i.e. that of the suffix, in the genitive case violates this constraint or not is debatable, but this is, at the same time, of no consequence for the present analysis.

account for the word final degemination in Old Frisian, which, as discussed in §5, seems to have been distributed sporadically throughout the language until systematic gemination occurred in the 15th century. It is needless to say that what applies to nom. sg. also applies to acc. sg and also nom. and acc. pl.; the same goes for the other cases in plural, the ranking of which is isomorphic with the singular.

8 Why Strata?

As is obvious from the tableaux above, positing strata may at first seem redundant since we could simply posit *GEM# ≫ ... on the world level, as the dominating constraint would be blind to the generation of the dative and genitive case forms, and this is not a problem for paradigm opacity. However, with a stratified approach, we can straightforwardly account for the diachronic state of geminates in Old and Middle Frisian.

As noted in §3, stratification offers us the ability to single out the 'innovatory' features in language, which are manifested as a re-ranking of faithfulness constraints on the postlexical level, which may trigger re-ranking on the lower levels due to restoration of 'ranking uniformity throughout the grammar' (Bermúdez-Otero 1999a: 99; Kiparsky 1995). We may therefore speak of 'domain narrowing': a postlexical innovation may percolate to the Word level, eventually to the stem level and finally enter the Lexicon (Bermúdez-Otero and Trousdale (to appear)):



Thus, all we have to posit is *Gem# as the dominating faithfulness constraint on:

(i) The Word Level to account for a unified lack of geminates word-finally;

(ii) The Stem Level to account for regular degemination of intervocalic segments in the 15th century (though, they are degeminated as word-final on the Stem level).

The ensuing step (iii) is, of course, Lexicalisation whereupon degeminated forms enter the Lexicon and *ken-* already comes specified in the Input, giving rise to the late Old Frisian and Middle Frisian state of affairs concerning geminate consonants.

This shows that Stratal OT can account for all degemination processes in Old Frisian by simply promoting a single markedness constraint, viz. *Gem# , to dominance status, which is permitted if the three strata are posited, as with this stem forms can be separated from the fully inflected values. Such an approach should also work for other instances of gemination-degemination in Old Frisian other than *ja*-stems, i.e. *jō*-stems and weak class 1 verbs, all of which are based on diachronic /j/-suffixation.

9 Old Frisian vs. Old English

According to the analysed data, we may now provide a brief contrastive analysis of the Old English and Old Frisian situation as far as /ja/-stems are concerned:

Input	*Old English*	*Old Frisian*
/j/	+	−
Geminates	−	+
Umlaut	−	+

While Old English specified the glide /j/ in the Lexicon, it thus productively generated (i) geminate consonants and (ii) umlauted vowels. Old Frisian, on the other hand, no longer contained /j/ in the Lexicon, but due to this, it specified (i) geminate consonants and (ii) umlauted vowels (e.g. the /e/ in *ken* is a reflex of */u/). Both languages, however, provide a valid example of opaque processes, which, by transparent operations on a *n+1* level, obscure those on a *n* level.

10 Conclusion

The Old Frisian examples of gemination and degemination have shown that they are accountable under the framework of Stratal OT in a straightforward fashion. The paradigm of *ja*-stems is analysed for its status of geminate consonants, the degemination of which in final position triggers paradigm opacity. Though this is not an issue for parallel OT, it is argued that by positing INPUT specified geminates with word level suffixation and postlexical degemination, we can account for the status of this innovatory phenomenon and consider it as the culprit for further developments on the lower strata.

11 Bibliography

Bremmer, R. H. 2009. *An Introduction to Old Frisian: History, Grammar, Reader, Glossary.* Amsterdam: John Benjamin's Publishing Company.

Bermúdez-Otero, R. 1999a. *Constraint interaction in language change: quantity in English and Germanic.* PhD Thesis. Manchester: University of Manchester.

Bermúdez, Otero, R. 1999b. *Opacity: Evidence from West Germanic Gemination.* Handout: Spring Meeting of the Linguistics Association of Great Britain, Manchester, 10 April 1999. Available at: http://www.bermudez-otero.com/lagb.pdf

Bermúdez-Otero, R. 2003. The acquisition of phonological opacity. In J. Spenader, A. Eriksson & Ö. Dahl (eds), *Variation within Optimality*

Theory: Proceedings of the Stockholm Workshop on 'Variation within Optimality Theory', 25−36. Stockholm: Department of Linguistics, Stockholm University.

Bermúdez-Otero, R. 2005. *A-stems in West Saxon: Synchrony.* MS University of New Castle upon Tyne. February 2005. Available at: http://www.bermudez-otero.com/lifecycle_chapter4.pdf

Bermudez-Otero R. and Hogg R. M. 2003. 'The actuation problem in Optimality Theory: phonologization, rule inversion, and rule loss', in D. Eric Holt (ed.), *OptimalityTheory and language change.* Dordrecht: Kluwer. 91−119.

Bermúdez-Otero, R. and Trousdale, G. (to appear). 'Cycles and Continua: On Unidirectionality and Gradualness in Language Change'. In T. Nevalainen and E. C. Traugott (eds), *Handbook on the History of English: rethinking and extending approaches and methods.* Oxford: Oxford University Press.

Boutkan, D. 1996. *A concise grammar of the Old Frisian dialect of the First Riustring Manuscript.* Odense: Odense University Press.

Broselow, E., Chen. S. and Huffman M. 1997. 'Syllable Weight: convergence of phonology and phonetics'. *Phonology* 14. 47−81.

Campbell, A. 1959. *Old English Grammar.* Oxford: Clarendon Press.

Crowhurst, M. and Hewitt, M. 1997. 'Boolean Operations and Constraint Interactions in Optimality Theory'. MS ROA 229, Rutgers Optimality Archive.

Davis, S. 2003. 'The Controversy over Geminates and Syllable Weight'. In Caroline Féry and Ruben van de Vijver (eds.), *The Syllable in Optimality Theory.* Cambridge: Cambridge University Press. 77−99.

Kager, R. 1999. *Optimality Theory.* Cambridge: Cambridge University Press.

Ham, W. H. 1998. 'A new approach to an old problem: Gemination and constraint reranking in West Germanic'. *The Journal of Comparative Germanic Linguistics* 1. 225−262

Ham, W. H. 2001. *Phonetic and phonological aspects of geminate timing.* Routledge: New York.

Hayes, B. 1989. 'Compensatory Lengthening in Moraic Phonology'. *Linguistic Inquiry*, vol. 20 (2). 253−306.

Heuser, W. 1903. *Altfriesiches Lesebuch: Mit Grammatik und Glossar.*

Heidelberg: Carl Winter's Universitätsbuchhandlung.

Crist, S. J. 2001. *Conspiracy in Historical Phonology*. PhD Thesis. Philadelphia: University of Pennsylvania.

Hogg, R. M. 1976. 'The Status of Rule Reordering'. *Journal of Linguistics*, vol. 12 (1). 103−123.

Hogg, R. M. 1979. 'Analogy and Phonology'. *Journal of Linguistics*, vol. 15(1). 55−85.

Hogg, R. M. 2000. 'On the (non-)existence of High Vowel Deletion', In Aditi Lahiri (ed.), *Analogy, levelling, markedness: principles of change in phonology and morphology*. Berlin: Mouton de Gruyter. 353−76.

Hogg, Richard M. 1992. *A Grammar of Old English: Volume 1:Phonology*. Chichester: Wiley-Blackwell.

Hogg, Richard M. and Fulk, R. D. 2011. *A Grammar of Old English: Volume II: Morphology*. Chichester: Wiley-Blackwell.

Fulk, R. D. 2010. 'The Roles of Phonology and Analogy in Old English High Vowel Deletion'. *Transactions of the Philological Society*, vol. 108(2). 126−144.

Keyser, S. J. and O'Neil, W. 1985. *Rule Generalization and Optionality in Language Change*. Dordrecht: Foris.

Kiparsky, P. and O'Neil, W. 1976. 'The Phonology of Old English Inflections. *Linguistic Inquiry*, vol. 7 (4). 527−557.

Kiparsky, Paul. 1982. 'From cyclic phonology to Lexical Phonology'. In H. van der Hulst and N. Smith (eds.), *The structure of phonological representations*, part 2. Dordrecht: 131–76.

Kiparsky, Paul. 1985. Some consequences of Lexical Phonology. In C. Ewen and E. Kaisse (eds.) *Phonology Yearbook* 2. Cambridge University Press. 85–138

Kiparsky, Paul. 1995. 'The Phonological Basis of Sound Change'. In J. A. Goldsmith (ed.), *The Handbook of Phonological Theory*. Cambridge, MA: Blackwell Publishers. 640−670.

Kiparsky, Paul. (to appear). *Paradigm Effects and Opacity*. CSLI monograph.

Kiparsky, Paul. 2000a. 'Opacity and Cyclicity'. *The Linguistic Review*, 17. 351–367.

Kiparsky, Paul. 2000b. 'Analogy as Optimization: "exceptions" to Sievers'

Law'. In Aditi Lahiri (ed.), *Analogy, levelling, markedness: Principles of Change in Phonology and Morphology*. Trends in Linguistics. Studies and Monographs 127. Berlin: Mouton de Gruyter. 15–47.

Kiparsky, Paul. 2003a. 'Finnish Noun Inflection'. In Diane Nelson and Satu Manninen (eds.), *Generative Approaches to Finnic and Saami Linguistics*. CSLI Publications.

Kiparsky, Paul. 2003b. 'Syllables and Moras in Arabic'. In Caroline Féry and Ruben van de Vijver (eds.), *The Syllable in Optimality Theory*. Cambridge: Cambridge University Press. 147–183.

Koontz-Garboden, Andrew. 2001. *Tiberian Hebrew spirantization and related phenomena in stratal OT*. MS Stanford University. ROA-607, Rutgers Optimality Archive.

Prince, Alan and Smolensky, Paul. 1993. *Optimality Theory: Constraint Interaction in Generative Grammar*. MS Rutgers University and University of Colorado.

Roca, I. and Al-Ageli, H. M. 1999. 'Optimal metrics'. In S. J. Hannahs and Mike Davenport (eds.), *Issues in Phonological Structure: papers from an Internation Workshop*. Amsterdam: John Benjamins. 129–150

Smolensky, P. 1993. *Harmony, markedness, and phonological activity*. Handout of keynote address, Rutgers Optimality Workshop — 23 October 1993. ROA 87, Rutgers Optimality Archive.

Versloot, A. P. 2004. 'Why Old Frisian is Still Quite Old'. *Folia Linguistica Historica*, XXV/1–2. 257–302.

Versloot, A. P. 2008. *Mechanisms of Language Change: Vowel Reduction in 15th Century West Frisian*. University of Groningen: LOT.