Constraints on Syllable Structure in Early Germanic

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I. Introduction*

In his groundbreaking work on Indo-European syllable structure, Hermann (1923: 1) observed that "[es] bedarf keiner großen Gelehrsamkeit, um zu sehen, daß die Silbenbildung in eine ganz ungewöhnlich große Zahl von Fragen der Lautlehre tief eingreift." In this paper, I support Hermann's assertion by demonstrating that three disparate phonological developments found in the early Germanic languages can be accounted for by reference to three constraints on syllable structure. Specifically, I examine Sievers' Law in Gothic, degemination in Old Saxon, and open syllable lengthening in Middle Dutch. These three developments are by no means the only phenomena that are attributable to the interaction of these three constraints; they are, however, appropriate *Paradebeispiele*, as they give the study a reasonably broad base, due to different genetic affiliations within Germanic as well as chronological differences. The theoretical framework employed will be Optimality Theory (hereafter OT), as that particular framework has several discernible advantages over other current phonological theories.

As OT may be unfamiliar to some readers, it is perhaps appropriate to sketch its main tenets. OT is an offshoot of traditional generative phonology; unlike traditional generative phonology, however, which is a rule-based, serial framework, OT is a constraint-based, parallel framework. That is, instead of positing underlying representations, which are then converted into surface representations by means of a series of ordered

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rules, OT posits a set of ranked constraints, which apply at surface structure. The language generator GEN produces a set of possible forms, which are then checked against the set of ranked constraints. The form that best conforms to these constraints is the "winner," i.e. the surface form. Most constraints are violable, indicating that the winning candidate must not conform to all the constraints; it must merely conform better than the other possible forms. Note also that all constraints are universal (at least in the version of OT assumed here), meaning that languages (at least in the phonological component) differ only in constraint ranking.[1]

II. The constraints

We turn now to the constraints that will be employed here. Blevins (1995: 217-219) points out that while all languages permit CV syllables, only some languages allow CVC syllables. There are also languages that require every syllable to have an onset (i.e. begin with a consonant or semivowel). Given this, we can assume that the universal syllable type is CV,[2] and that a sequence of segments CVCV will tend to be syllabified CV.CV. From these observations we can draw a number of conclusions about how languages constrain syllable structure.

The first of these is that syllables with onsets are preferred over syllables without onsets. For instance, in some Northern dialects of German, glottal stops are inserted at the beginning of (underlyingly) onsetless syllables, especially when the syllable is word-initial or stressed, e.g. [ʔalt] *alt* 'old' and [kaʔ'oːtɪʃ] *chaotisch* 'chaotic' (Vennemann 1988: 14). This leads to the conclusion that "the Onset Principle" (Prince and Smolensky 1993: 16) is a highly-ranked constraint on syllable structure.

Another commonly-made observation about syllable structure is that heavy syllables tend to be stressed. For instance, Hayes (1995: 50) points out that "heavy syllables characteristically attract stress, whereas light syllables receive stress only in the absence of an eligible heavy syllable." This observation is sometimes known as the "Weight to Stress

[1]I ignore a number of details about OT here. See Prince and Smolensky (1993) for a detailed presentation of the theory, or Archangeli (1997) for a more introductory discussion.

[2]See also Vennemann (1988: 69fn 3), who argues that "the optimal syllable structure, as is well known, is CV.CV.CV etc., with alternating single consonants and vowels."

Principle" (Prince and Smolensky 1993: 53). The corollary to the Weight to Stress Principle is also true. Not only do heavy syllables tend to be stressed, but stressed syllables tend to be heavy (the "Stress to Weight Principle"). This is not a new observation; Prokosch (1939: 134) pointed out that the Germanic languages show a "general trend towards accented syllables of two morae." I accordingly refer to this constraint as "Prokosch's Law".

The final constraint employed here has to do with syllable codas. As indicated above, some languages absolutely ban syllable codas. Vennemann (1988: 21) accounted for this by means of "the Coda Law," of which only the first clause is necessary for the purposes of this paper: "A syllable coda is the more preferred: (a) the smaller the number of speech sounds in the coda...." Taken to its logical conclusion, as it indeed was, albeit independently, by Prince and Smolensky (1993: 34), an empty syllable coda would be the best possible coda of all. Prince and Smolensky therefore propose a universal constraint banning syllable codas.

The three conditions sketched above can be formalized as OT constraints as follows:

(1) The Onset Constraint (ONS):

Syllables must have onsets (Prince and Smolensky 1993: 16).

(2) Prokosch's Law (PL):
Stressed syllables must be bimoraic (Prokosch 1939: 134).

(3) The Coda Constraint (NO CODA)
Syllable codas are not allowed (Prince and Smolensky 1993: 34).

One final constraint, having to do with main stress, will be required. In early Germanic, main stress generally fell on the initial syllable of the word, as in the following Gothic forms: *bárna* 'child' (nom.pl.), *ídreigo* 'I regret', and *baúrgs-waddjus* 'city wall' (nom.sg.). In some cases, however, prefixes were unstressed, as in the following Gothic examples: *andhúleins* 'revelation', *bi-máitan* 'circumcise', and so on. This is generally accounted for by assuming that it was not the initial syllable of

the word that was relevant for main stress assignment, but rather the initial syllable of the root (c.f. Prokosch 1939: 119, among others). I account for this by means of an ALIGNMENT constraint (McCarthy and Prince 1993), taking the following form:

(4) ALIGN (H(PrWd), L, Root, L)

The left edge of the head of the prosodic word must coincide with the left edge of the root.

As long as these prefixes were not perceived by speakers as part of the root, they were not stressed, since stressing them would have violated this ALIGNMENT constraint. This constraint is inviolable, and will hence be omitted from further discussion, although it will be assumed for the remainder of the paper.

III. Sievers' Law in Gothic

One of the most familiar problems of early Germanic phonology is a vowel/glide alternation found in Gothic, known as Sievers' Law. Sievers (1878: 129) argued that in Gothic, "unbetontes...*i* oder *u* ist consonant nach kurzer, vokal nach langer silbe ohne rücksicht auf die sonstige accentlage des wortes." Although Sievers' Law actually refers to both *i~j* and *u~w* alternations, here I only discuss the *i~j* alternation, as that is better preserved in Gothic.[3] The *i~j* alternation is found in certain morphological classes, namely in Class 1 weak verbs, masculine *ja* stem nouns, and *ja* stem adjectives. In these contexts, we find an alternation between *-ji* and *-ei*. (Gothic <ei> represents [i¯]).

The relevant alternation can be seen in the following forms; forms that exhibit the Sievers' Law alternation are in bold. Although only the indicative forms of the Class 1 weak verbs are given here, the analysis developed here also accounts for the *ja* stem nouns and adjectives. I follow Dresher and Lahiri (1991) in classifying the relevant forms as light, heavy, and polysyllabic stems, respectively. Glosses for the examples given are 'choose', 'seek', and 'praise', respectively.

[3]See Pierce (in preparation) for a fuller treatment of many of the issues discussed in this section, including the *u~w* alternation and the correct underlying representation of the relevant segment.

(5) Sievers' Law in Gothic: Class 1 weak verbs

	Light stems	*Heavy stems*	*Polysyllabic stems*
Sg. 1	walja	sôkja	mikilja
2	**waljis**	**sôkeis**	**mikileis**
3	**waljiþ**	**sôkeiþ**	**mikileiþ**
Du. 1	waljos	sôkjos	mikiljos
2	waljats	sôkjats	mikiljats
Pl. 1	waljam	sôkjam	mikiljam
2	**waljiþ**	**sôkeiþ**	**mikileiþ**
3	waljand	sôkjand	mikiljand

We begin our analysis by establishing the correct ranking of the three relevant constraints. First, ONS outranks PL, as can be seen from the polysyllabic stems. For instance, *mikileis* syllabifies as mi.ki.leis, not *mik.i.leis, indicating that it is more important for syllables to have onsets than for stressed syllables to be bimoraic. That is, it is theoretically possible to satisfy PL by incorporating the relevant consonant into the coda of the initial stressed syllable, as that would make the stressed syllable bimoraic. Doing so, however, would incur a violation of ONS. The following tableau illustrates this point:

(6) Tableau 1: ONS>>PL[4]

Candidates	ONS	PL
☞mi.ki.leis	√	*!
mik.i.leis	*!	√

Furthermore, PL outranks NO CODA. Consider the form *waljis*, which syllabifies as wal.jis. If NO CODA outranked PL, then we would expect to find **waleis*, as incorporating the relevant consonant into the coda of the stressed syllable, and thereby satisfying PL, incurs a violation of NO CODA. Since this does occur, however, PL must outrank NO CODA, as shown in the tableau below.

[4]OT tableaux are to be read as follows: the constraints are listed horizontally; the higher-ranked the constraint, the further to the left it is placed. The winning candidate (i.e. the surface form) is indicated by ☞. Constraints obeyed by the various forms are indicated with a √, while constraints violated by the various forms are indicated with a *. Fatal violations are indicated with an !, and squares that are irrelevant (because the form was previously eliminated) are shaded.

(7) Tableau 2: PL>>NO CODA

Candidates	PL	NO CODA
☞wal.jis	√	*!
wa.leis	*!	√

By transitivity, then, we obtain the following more complete constraint ranking:

(8) ONS>>PL>>NO CODA

We now consider one example from each paradigm, in order to illustrate the complete constraint ranking:

(9) Tableau 3: *waljis*

Candidates	ONS	PL	NO CODA
☞wal.jis	√	√	*!
wal.eis	*!	√	*!
wa.ljis	√	*!	√

(10) Tableau 4: *sôkeis*

Candidates	ONS	PL	NO CODA
☞sô.keis	√	√	√
sôk.eis	*!	√	*
sôk.jis	√	√	*!

(11) Tableau 5: *mikileis*[5]

Candidates	ONS	PL	NO CODA
☞mi.ki.leis	√	*	√
mi.kil.jis	√	*	*!

IV. Degemination in Old Saxon

We turn now to the question of degemination in Old Saxon. Underlying geminate consonants are shortened in the following contexts: (1) word-finally, (2) medially preceding a

[5]Note that the possible alternative candidate *mi.ki.ljis is blocked by a family of constraints banning complex onsets. See Pierce (in preparation) for further discussion.

consonant, (3) medially following a consonant, (4) following long vowels and diphthongs, and (5) in unstressed syllables. Examples of these developments include the following (Holthausen 1921: 85):[6]

(12) Examples of degemination in Old Saxon

Environment	Forms without geminates	Forms with geminates
Word-finally	*skat* 'treasure'	*skattes* (gen.sg.)
Medially before a consonant	*kusta* 'kissed'	*kussian* (inf.)
Medially following a consonant	*swerdrago* 'sword-bearer'	**swerd-drago*
Following long vowels or diphthongs	*lêda* 'lead'	**lêdda*
In unstressed syllables	*blindumu* 'blind'	Gothic *blindamma*

Old Saxon exhibits the same constraint ranking as Gothic, i.e. ONS>>PL>>NO CODA.

We begin by considering word-final degemination. Forms with singleton consonants will always be preferred over forms with geminate consonants in this context, since PL is satisfied by the presence of a single consonant. Although such forms do violate NO CODA, they do so in order to satisfy the higher-ranked constraint PL. Forms with geminate consonants, on the other hand, incur two violations of NO CODA and are hence less optimal. The following tableau illustrates this point:

(13) Tableau 6: Old Saxon *skat* 'treasure'

Candidates	ONS	PL	NO CODA
☞skat	√	√	*
skatt	√	√	**!

Here the possible surface forms tie on both ONS and PL, leaving the deciding role to NO CODA. Note also that the geminate is maintained word-medially, as that retention enables the satisfaction of both ONS and PL.

[6]Degemination is not completely regular in contexts (4) and (5), as evidenced by the existence of forms like *thînna* 'thy' and *te faranne* 'to travel'.

Degemination can also take place word-medially, assuming that ONS and PL are both satisfied. This can again be attributed to NO CODA, as forms with geminates would incur two violations of NO CODA, as opposed to forms with singleton consonants, which only violate NO CODA once. Consider the following tableau:

(14) Tableau 7: Old Saxon *kusta* 'kissed'

Candidates	ONS	PL	NO CODA
☞kus.ta	√	√	*
kust.ta	√	√	**!

This analysis accounts for both of Holthausen's proposed types of medial degemination.

Following long vowels, degemination helps avoid violations of both NO CODA and ONS, as the singleton consonant that remains forms the onset of the following syllable.[7] I also assume that another possible alternative, **lêdda* (syllabified as lê.dda) is excluded by means of an undominated constraint banning geminate consonants in syllable onsets. Support for this constraint, which I leave unformalized, comes from the fact that geminates never occur word-initially, which can be subsumed under the proposed constraint.

(15) Tableau 8: Old Saxon *lêda* 'lead'

Candidates	ONS	PL	NO CODA
☞lê.da	√	√	√
lêd.da	√	√	*!

The final context to be considered is in unstressed syllables. Here there is no need to satisfy PL, once again leaving NO CODA to play the deciding role.

[7]I assume that another possible alternative, **lêdda* (syllabified as lê.dda) is excluded by an undominated constraint banning geminate consonants in syllable onsets. Support for this constraint, which I leave unformalized, comes from the fact that geminates never occur word-initially.

(16) Tableau 9: Old Saxon *blindumu* 'blind'

Candidates	ONS	PL	NO CODA
☞blin.du.mu	√	√	√
blin.dum.mu	√	√	*!

V. Open syllable lengthening in Middle Dutch

The final issue to be addressed here is open syllable lengthening (hereafter OSL) in Middle Dutch, by which short vowels were lengthened in open (i.e. light) stressed syllables, while remaining short in closed (i.e. heavy) stressed syllables. This process was not confined to Middle Dutch, but was part of what Prokosch (1939: 140) described as "a standardization of the quantity of accented syllables that took place in all Germanic languages." The following forms illustrate open syllable lengthening in Middle Dutch (data from Lahiri and Dresher 1999: 681):[8]

(17) Open syllable lengthening in Middle Dutch

Old English	***Middle Dutch***	***Gloss***
fugel	vôgel	'bird'
hamor	hâmer	'hammer'
nacod	nâket	'naked'
fiðere	vêdere	'feather'
hunig	hônich	'honey'
widewe	wêduwe	'widow'
cyning	côninc	'king'

Open syllable lengthening in Germanic has often been analyzed as a compensatory lengthening process, i.e. as the result of the weakening or loss of a vowel in the following syllable. For instance, Minkova (1982: 42) defends this viewpoint for Middle English OSL, arguing that it "depends crucially on the type of syllable following the stressed short syllable. The change operates unfailingly *only* when there is syllabic restructuring in Middle English, i.e. when the second syllable of the original form is lost due to final schwa deletion in Middle English" (emphasis in original). In terms of Middle

[8]Due to the somewhat unsettled history of Dutch (i.e. the lack of a direct ancestor we can call "Old Dutch"), Lahiri and Dresher give Old English forms for contrastive purposes. It is in any event uncontroversial that these forms had short vowels in older stages of Dutch.

Dutch, Quak (1995: 153) argues that "die Dehnung in offener Silbe fällt im Niederländischen chronologisch mit dem Prozess der Abschwächung voller Vokale in unbetonten Silben zusammen. Dies suggeriert einen Zusammenhang zwischen beiden Erscheinungen."

This proposal, however, does not account for all of the Dutch evidence. Seynnaeve (1996: 22) points out that there are a number of Modern Dutch words that underwent OSL in Middle Dutch, yet retain [ə] in the following syllable, e.g. *geven* 'give' and *loven* 'praise', among others.[9] This counterargument is not especially compelling, however, as Quak (1995) links OSL to vowel reduction, not to vowel loss. It does, however, suggest that the compensatory lengthening account may not have a monopoly on explanatory adequacy. More compelling counter-evidence comes from cases where the following vowel is lost (and compensatory lengthening would therefore be expected), but lengthening does not occur, e.g. forms like *gel* 'yellow' and *mel* 'flour' (Standard Dutch *geel* and *meel*), which are found in some northern Dutch dialects (Seynnaeve 1996: 22, who cites Weijnen 1991: 63). Clearly the claim that Middle Dutch OSL is a compensatory lengthening process misses some significant generalizations.[10]

If, however, we evaluate OSL as the result of the interaction of our three constraints, the difficulties inherent in the compensatory lengthening hypothesis are nullified. Consider the following: Without some adjustment being made to the sound structure of the relevant words, there was no way to satisfy both PL and ONS; any attempt to satisfy one of the constraints involved violation of the other. The following tableau, for a hypothetical Middle Dutch form **neman*, illustrates this point.

(18) Tableau 10: Middle Dutch without OSL

Candidates	ONS	PL
*nem.an	*!	√
*ne.man	√	*!

[9]Analogical leveling has obscured most of the OSL alternations in Modern Dutch, although a handful of words retain the original alternations. See Dresher (forthcoming) for details.

[10]See Dresher (forthcoming) and Lahiri and Dresher (1999) for more extensive rebuttals of the compensatory lengthening hypothesis.

OSL resolved this dilemma, as demonstrated in (19).[11]

(19) Tableau 11: Middle Dutch with OSL

Candidates	ONS	PL
→nê.man	√	√
*nem.an	*!	√
*ne.man	√	*!

Furthermore, the presence of NO CODA accounts for the particular strategy employed in satisfying ONS and PL. If, for instance, the following consonant had been geminated, that would have incurred a violation of NO CODA. Since OSL involves only the nucleus of the syllable, no violation of NO CODA occurred, as can be seen from the following tableau.

(20) Tableau 12: Middle Dutch OSL

Candidates	ONS	PL	NO CODA
☞nê.man	√	√	√
nem.en	*!	√	*
ne.men	√	*!	√
nem.men	√	√	*!

VI. Conclusion

In this paper, it was demonstrated that three disparate phonological developments in early Germanic can be linked to the interaction of three constraints on syllable structure, ONS, PL, and NO CODA. These are, as mentioned above, not the only developments found in early Germanic that can be accounted for as a result of this interaction. For instance, Davis and Iverson (1995) attribute the initial stages of the High German Consonant Shift to ONS and PL. Other possible examples of phenomena triggered by these constraints include epenthesis in Old Swedish and syncope in Old Norse, among others. The solution presented here also demonstrates the value of OT as a phonological theory, and suggests that it would be profitable to employ OT in analyzing other problems of historical phonology.

[11]The ranking of ONS and PL is slightly different in Middle Dutch, as they are equally ranked. This is indicated by a dotted line in the tableau.

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