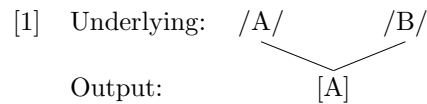


# Analogy as optimization: “exceptions” to Sievers’ Law in Gothic

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## 1. Lexical representations as a site of optimization

Suppose the phonological rules/constraints of the language are such that underlying /A/ and /B/ lead to the same output [A].



Lexical Phonology and Morphology (LPM) dictates that non-alternating [A] is then analyzed

- a. as underlying /A/, other things being equal, but
- b. as underlying /B/, if /B/ conforms better to the constraints on underlying representations.

Case (a) has been familiar for a long time, and is supported by a fair amount of historical evidence (Kiparsky 1968, 1973). It was adopted by NGG (Vennemann 1972, Hooper 1976) and by Natural Phonology (Stampe 1972/1980). Prince & Smolensky 1993 dub it *lexicon optimization*, and show that it is a consequence of basic assumptions of OT.

It is case (b) that is controversial. Although it follows from LPM, where constraints on the phonological inventory or morpheme structure of a language are defined by its lexical phonology and morphology, it does not follow from theories such as those assumed in much current OT phonology, which define optimality only on output representations, and claim that the structure of the lexical input is derivative just from those constraints. Therefore evidence for (b) also calls into question the adequacy of such output-oriented theories.

This paper will contribute such evidence, in the form of analogical changes at the level of lexical (underlying) representations, driven by constraints dominated

at the level of output representations. The most interesting cases show that, under the stated conditions, /B/ is preferred even if it always occurs in a context where it is realized as [A].

Case (b) is of theoretical interest in another respect as well. It implies, as a diachronic corollary, the possibility that lexical constraints may induce reanalysis of [A] from /A/ to /B/. As usual, such reanalyses may be initially covert, and have overt consequences when /B/ is either generalized to new environments where its output is distinct from the output of /A/, or when /B/ triggers contextual effects that were not triggered by /A/. Viewed in terms of the pre-reanalysis underlying form /A/, the overt consequences of the reanalysis to /B/ can appear as phonological complications (exceptions, morphological conditions), or as “Paradigm Uniformity” effects (for which workers in OT have proposed Output/Output or Paradigm Uniformity conditions). In reality, the phonology is unchanged — rather, it is the the morphology that is simplified. Such reanalyses form part of a larger body of evidence demonstrating the insufficiency of proportional and other purely output-based accounts of analogy.

Before embarking on the argument, a word of caution. Material from a dead language obviously has certain limitations. Inevitably, the written documents on which our knowledge of Gothic is based leave out a lot of phonetic detail, and some types of words are accidentally lacking in the corpus. Still, the texts offer a remarkably consistent and largely complete rendering of the language’s contrastive phonological properties. We will not go far astray in inferring the output of the lexical phonology from them. If the details of Gothic pronunciation were accessible to study, we might well find, as in other languages, an overlay of additional postlexical processes.

## 2. The aftermath of Sievers’ Law in Gothic *ja*-stems

The historical changes I will be concerned with here involve the morphological reorganization of allomorphy originally due to the phonological operation of Sievers’ Law in Gothic.

The paradigms in [2] show the inflection of singular *ja*-stem nouns in Gothic:<sup>1</sup>

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<sup>1</sup>The plural endings are *-os*, *-e*, *-am*, *-ans* and work exactly like the Dative Singular in [2]. Except where specifically indicated to the contrary, I cite Gothic forms in phonological transcription, not in transliteration. For the consonants, this makes little difference. For the vowels and diphthongs, the relevant correspondences between the spelling as romanized in the handbooks and my phonological transcription are as follows:

<i>spelling</i>	<i>phonology</i>
ái, áu	ai, au
aí, aú	e, o
ei	ii
o, e	oo, ee
a, i	a, i
u	u (uu)

[2]

	Masculine nouns		Neuter nouns	
	Light	Heavy	Light	Heavy
Nom.	<b>harjis</b>	herdiis	kuni	riiki
Gen.	harjis	herdiis	kunjis	<b>riikjis</b>
Dat.	harja	herdja	kunja	riikja
Acc.	hari	herdi	kuni	riiki
	‘army’	‘shepherd’	‘kin(d)’	‘kingdom’

The alternation in the masculine (*harjis* vs. *herdiis*) is ultimately due to Sievers’ Law, a process that dates back at least to Proto-Germanic, by which glides were vocalized after heavy syllables. The Gothic paradigms in [2] reflect Sievers’ Law only indirectly, however, for they are descended from the reconstructed earlier stage in [3].

[3]

	Masculine nouns		Neuter nouns	
	Light	Heavy	Light	Heavy
Nom.	<b>*haris</b>	herdiis	kuni	riiki
Gen.	harjis	herdiis	kunjis	<b>*riikiis</b>
Dat.	harja	herdja	kunja	riikja
Acc.	hari	herdi	kuni	riiki
	‘army’	‘shepherd’	‘kin(d)’	‘kingdom’

[2] developed from [3] by the analogical spread of *-jis* beyond its original phonologically conditioned limits in the two boldfaced forms. [3] represents the direct Gothic reflex of the original weight-conditioned *j/i* alternation. As [2] shows, the alternation was modified in the nominative masculine, and eliminated altogether in the neuter.

An important point is that the ending *-jis* seems to have spread in the light masculines earlier than in the heavy neuters. This relative chronology can be inferred from the fact that no residual forms like *\*haris* are attested in the Gothic texts, whereas a number of heavy neuters forms in *-iis* (such as *andbahtiis*) still occur alongside the new type *riikjis*.

The change *\*riikiis* > *riikjis* has been considered a case of analogy that creates exceptions to Sievers’ Law and complicates the grammatical system.<sup>2</sup> I claim that the contrary is true. No exceptions develop and there is no morphologization. In fact, the change from [3] to [2] is a *simplification* of the system. It consists of a restructuring of nominal stems which brings them into line with a morphological constraint that arose within Gothic through final syncope. This

<sup>2</sup>According to Murray and Vennemann (1983:525), the innovating forms are “analogical violations of Sievers’ Law”, which arise when “. . . gen.sg. *-jis* is restored after long stems, on the analogy of the short stems and the paradigmatically related forms with *-ja(m)* and *-jē*”. Drescher and Lahiri (1983/84:156) state that Sievers’ Law “was morphologized to apply only to the masculine *ja*-nouns”.

sound change largely eliminated stems ending in short vowels. Remaining stems ending in short vowels came increasingly under the sway of the synchronic form of this constraint, and were adjusted to conform to it by analogical changes which changed their lexical form.

My evidence for this interpretation of the change from [3] to [2] is twofold.

First, it unifies the changes with a more widespread pattern of restructuring in the nominal and verbal morphology, including the changes in [4].

- [4]
- a. The introduction of *-w* in the declension of *-wa* stems, e.g. *\*triggws* > *triggws* “faithful”, *\*worstu* > *worstw* “work”,
  - b. the restoration of *-w* in the past tense of strong verbs, e.g. *\*walu* > *walw* “robbed”,
  - c. the lengthening of final *-i* in the 2.Sg. imperative of weak verbs of the first class, e.g. *\*nasi* > *nasii* “save!”, *\*sooki* > *sookii* “seek!”.

Secondly, unlike previous analogical accounts it provides a rationale for the conditions under which the change in the nominal inflection occurred. It explains why precisely the changes *\*riikiis* > *riikjis* and *\*haris* > *harjis* took place, and other similar changes did not. Specifically, it offers answers to the following questions:

- [5]
- a. Why did only masculines change in the Nom.Sg.? Why not neuter *kuni* > *\*kunji*, like masculine *\*haris* > *harjis*?
  - b. If heavy stems analogized to light stems in the Gen.Sg. of neuter nouns (heavy *\*riikiis* > *riikjis* on the model of light *kunjis*), why did heavy stems not analogize to light stems in the Gen.Sg. of masculine nouns? I.e. why not *herdiis* > *\*herdjis*, by analogy with *harjis*?
  - c. Why did heavy stems not analogize to light stems in the weak *-jan* verbs? I.e. why not *sookiis* > *\*sookjis*, by analogy with light *nasjis*? See [6].
  - d. Why did heavy stems not analogize to light stems in the Gen.Sg. of neuter adjectives? I.e. why not *wilpiis* > *\*wilpjis*, by analogy with *midjis*? See [6].

[6]

	Neuter adjectives			Weak <i>-jan</i> verbs	
	Light	Heavy		Light	Heavy
Gen.Sg.	midjis	wilpiis	2.Sg.	nasjis	sookiis
Nom.Pl.	midja	wilpja	1Sg.	nasja	sookja
	‘mid’	‘wild’		‘save’	‘seek’

In order to relate the changes from [3] to [2] to the other changes in [4], and to explain why the the hypothetical changes in [5] did not occur, we must

first understand the phonology and morphology behind the pre-Gothic system [3]. Its inflectional paradigms are determined both by phonological constraints which govern the realization of morpheme combinations, and by morphological constraints which govern the underlying shapes of stems and affixes. Spelling out these constraints and their interaction in a precise way is a nontrivial task, but once that is accomplished, the relationship to the changes in [4] will be obvious and the questions in [5] will practically answer themselves.

In what follows I first outline and justify the assumptions I make about Gothic phonology (section 3) and morphology (sections 4 and 5). I then show how these assumptions explain the morphological innovations in the nouns (section 6) and in the verbs (section 7). In section 8 I state the constraints explicitly and provide constraint tables for the relevant forms. Section 9 restates the changes with a view to showing their structural affinity.

### 3. Gothic syllabification

On the phonological side, the main question is what lies behind the effects of syllable weight on the shape of *ja*-stems. Here I follow up a proposal introduced in Kiparsky (1998), which (like those of Dresher & Lahiri 1991, Riad 1992, and Calabrese 1994) treats Sievers' Law as a process of syllabification governed by metrical structure, but (unlike theirs) derives it as a direct result of the optimal parsing of words into left-headed bimoraic feet (moraic trochees). The main idea is that syllabification avoids sequences which cannot be so parsed, given that the word-initial syllable must be stressed. Specifically, syllabification avoids initial light-heavy (LH) sequences, and syllables which contain more than two moras. A special dispensation holds at the end of a word, where a final mora may be extrametrical, thereby escaping the foot maximum constraint.

On these assumptions, the contrast between heavy and light stems in the genitive singular is derived by optimization of syllable and foot structure as follows:

- [7] a. Gen.Sg. /hari+is/ → [har].[jis] (not \**ha.riis* because an LH sequence cannot be exhaustively parsed into moraic trochees: parsed as [L][H], the first foot is too short, parsed as [LH], it is too long)
- b. Gen.Sg. /herdi+is/ → [her].[diis] (\**herd.jis* has a non-final three-mora syllable)
- c. Gen.Sg. /ragini+is/ → [ra.gi].[nii]s (\**ra.gin.jis* cannot be exhaustively parsed into moraic trochees)

The metrical constraints are complemented by constraints on syllable margins, namely ONSET (a syllable must have an onset), \*COMPLEX (no consonant clusters), and \*Cj (no consonant clusters containing *j*), of which the last is

undominated and hence unviolated, while the other two are dominated by the major metrical constraints.

The existence of an undominated  $*Cj$  constraint means that  $Cj$  clusters are categorically excluded, while other clusters are merely disfavored. There are several pieces of independent evidence for this special status of  $Cj$ . First, in initial position Gothic allows  $CR$ -clusters, including  $Cw$ -clusters, but rigorously excludes all  $Cj$ -clusters. For example, there are words like *twai* “two”, *þwahan* “wash”, *swikns* “pure”, *dwals* “foolish”,<sup>3</sup> but there are no words beginning with  $*tj$ -,  $*þj$ -,  $*sj$ -,  $*dj$ -. Secondly, scribal practice indicates that medial  $VCjV$  was always syllabified as  $VC.jV$ , whereas other medial  $CR$  clusters were syllabified as  $VC.RV$  or  $V.CR$  depending on syllable weight and foot structure:

- [8] a.  $\bar{V}.CRV$  ( $\bar{V}C.RV$  would have an initial three-mora syllable)  
 b.  $VC.CRV$  ( $VCC.RV$  would have an initial three-mora syllable)  
 c.  $\check{V}C.RV$  ( $\check{V}.CRV$  has a complex onset)

This pattern is observed in the word divisions of two major Gothic manuscripts (see Kiparsky 1998 and references cited there for fuller discussion).

The claim that Gothic foot structure is based on moraic trochees differs from previous accounts in predicting that disyllabic Heavy+Light disyllables pattern metrically with Light monosyllables, rather with Heavy monosyllables. This prediction is supported by comparative Germanic phonology, and by such internal Gothic evidence as can be gleaned from scribal practice. Thus, *iupabroo* “from above” is divided as *iupab|roo*, reflecting a metrical structure [iu].[paβ].[roo], rather than  $*[iu].pa.[broo]$ , with an unparsable syllable.

Since syllabification is predictable in Gothic, there is no lexical contrast between /i/ and /j/, or between /u/ and /w/.<sup>4</sup> I will write /i/ for the alternating segment in words like [harj-] ~ [hari-] “army”. While nothing at this point hangs on that choice, it is a principled one, for the constraint system to be introduced below selects /hari/ over /harj/ as the optimal lexical representation because the latter violates a more highly ranked constraint, namely  $Cj$ .

I further assume that tautosyllabic  $Vi$  and  $Vj$  (including  $ii$  and  $ij$ ) are the same thing, not only in segmental content — since /i/ and /j/ are not featurally distinct — but also in syllabic structure, namely, both constitute a long nucleus of the form  $[\mu_s\mu_w]\sigma$ .

Heterosyllabic  $i.V$ ,  $i.jV$  and  $V.i$ ,  $V.ji$  (including  $ii$  and  $iji$ ) are excluded in Gothic.  $i.V$ ,  $V.i$  violate ONSET. ONSET dominates the FAITHFULNES constraints that preserve the input’s syllable structure in the output, so word-internally hiatus is eliminated by glide formation and contraction of like vowels

<sup>3</sup>As well as *kwiman* “come”, *hwoopan* “brag”, where *kw*-, *hw*- might however be considered unitary labiovelar phonemes rather than clusters.

<sup>4</sup>Except word-initially, where there is a (marginal) contrast between *iu*- and *ju*-, e.g. *iupa* “above” vs. *juggs* “young”.

wherever possible. This happens without exception in the native vocabulary; and in Greek loans,  $\iota\alpha$  is often replaced by Gothic  $ja$ , e.g.  $Μαρία > Marja$ ,  $Ἀντιόχεια > Antiokja$  (Braune and Ebbinghaus 1961, Calabrese 1994). But melodic FAITHFULNESS in turn dominates ONSET, which means that hiatus cannot be removed by deletion or epenthesis. Hiatus therefore occurs even in the native vocabulary where glide formation and contraction cannot apply. Such cases include  $e.V$  in  $Ce$ -reduplication of vowel-initial verbs, e.g. /e.auk/ (spelled *ai auk*) “increased”, and initial  $CiV$ -sequences such as /fi+an/  $\rightarrow$  [fi.an] (spelled *fian*, *fijan*) “hate”.<sup>5</sup>

As for  $i.jV$ ,  $V.ji$  we must take care to exclude both the representation with two  $i$  melodies and the representation with one  $i$  melody spread over two syllabic positions. The two-melody representation is excluded by the OCP, assumed to be undominated, and the shared single-melody representation is excluded by the ONSET constraint, formulated as requiring a melodically independent and non-empty onset consonant.

#### 4. Allomorphy

With these phonological prerequisites in place, we are ready to return to the  $-ja$  stems. The first question is how to deal with the contrast between light and heavy nominatives in the original system [3]. Light stem nominatives such as *\*haris* are unproblematically segmentable as /hari+s/, with the stem /hari/ that forms the basis for the entire paradigm, and the normal nominative ending /-s/. It is the long vowel in heavy stem nominatives such as *herdiis* that is the problem. Synchronically, no phonological process of Gothic, and certainly no version of Sievers’ Law, could turn /herdi+s/ into *herdiis*. Its long vowel must therefore be accounted for by positing a different underlying form for the nominative of heavy stems — either a different ending, as in [9a] or a different stem, as in [9b]:

- [9] a. *Suffix allomorphy*: heavy stems take a Nom.Sg. allomorph /-is/, or  
 b. *Stem allomorphy*: heavy stems have a Nom.Sg. stem in /-ii/.

Previous treatments have all assumed suffix allomorphy as in [9a] as a matter of course, but for no particular reason. In fact it is the inferior alternative, because it fails to relate the allomorphy to anything else in the language, and posits suffix shapes and alternation patterns otherwise unknown in Gothic, whereas the stem

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<sup>5</sup>In such cases, the spellings  $iV$  and  $ijV$  seem to be in free variation in the Gothic manuscripts, both in loans and in native words; whether the spelling variation represents a variation in pronunciation is not clear, but there is at any rate no contrast between them, and both occur only where glide formation and contraction of like vowels are inapplicable. There is no evidence of a contrast between  $ija$  and  $ia$  in any of the other older Germanic languages either, as far as I am aware.

allomorphy solution conforms to to the rest of Gothic inflectional morphology and allows a significantly simpler overall analysis.

In the first place, the Nom.Sg. ending /-is/ postulated by the stem allomorphy solution would be exceptional, for the Nom.Sg. in other declensions is either /-s/ (*dags, gasts, qeens, sunus, nasjands, borgs*), or null (*word, giba, mawi, guma, tungoo, brooþar*). Secondly, suffix selection governed by syllable weight of stem would be exceptional in Gothic: elsewhere its case allomorphs are selected in accord with the gender and final segment of the stem. For example, the main synchronic rule for the distribution of the two nominatives just mentioned is that most non-neuter consonant stems have /-s/, and other stems have no ending.

If, on the other hand, the alternations are treated as stem allomorphy (solution [9b]), they fit tidily into Gothic morphology as part of a larger pattern of stem alternations. Also, the context of the alternation can then be stated in a more general way. The long stem /herdii/ in *herdiis* is the *bound stem*, selected before *any* case ending, and the short stem /herdi/ in Acc.Sg. *herdi* is the *free stem*, selected when no case ending follows. This is because phonological constraints neutralize /-ii+V/ and /-i+V/ to *-jV*. For example, the optimal output of both /herdi+a/ and /herdii+a/ is *herdja*.

Once the V ~ VV- alternation of the *-ja* stems is generalized in this way, a further unifying theme emerges. The alternation falls in with a system of free/bound stem allomorphy that runs through the whole nominal morphology. In particular, there is a closely parallel V ~ VV- alternation in the *-ō* and *-jō* stems:<sup>6</sup>

- [10] a. *ja*-stems: free stem *herdi*, bound stem *herdii-* (e.g. Gen.Sg. *herdiis* ‘shepherd’)
- b. *ō*-stems: free stem *herda*, bound stem *herdoo-* (e.g. Gen.Sg. *herdoos* ‘herd’; *a:oo* is the regular length alternation in low vowels)
- c. *jō*-stems: free stem *banja*, bound stem *banjoo-* (e.g. Gen.Sg. *banjoos* ‘injury’)

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<sup>6</sup>Other free/bound alternation patterns occur in several unproductive declensions: *r*-stems (*brooþar* ~ *brooþr-*), *n*-stems (*guma* ~ *guman-*, *gumin-*), suppletives: *foon*, *watoo* ~ (*funin-*, *watin-*).



[11]

	$\bar{o}$ -stems	$j\bar{o}$ -stems
Nom.	herda	banja
Gen.	herdoos	banjoos
Dat.	herdai	banjai
Acc.	herda	banja
Nom.	herdoos	banjoos
Gen.	herdoo	banjoo
Dat.	herdoom	banjoom
Acc.	herdoos	banjoos
	‘herd’	‘injury’

The dative singular is not an exception; its *-ai* is enforced by the fact that *-ooi* is an impossible diphthong in Gothic.

By the same token, two separate stem allomorphs need be posited only for that class of *ja*-stems where they are motivated by an overt alternation, namely in masculines. In neuters, a bound allomorph in */-ii/* could never be realized in the output, since they have no consonantal case endings. Because there is no positive reason to posit any allomorphy in neuters, simplicity (and lexicon optimization) dictate that they have a single underlying stem form.<sup>7</sup>

I conclude that Gothic morphophonology motivates the analysis of *herdiis* as */herdii+s/*, and more generally that heavy masculine *ja*-stems have a bound inflectional allomorph in */-ii/*.

## 5. The restructuring of nominal stems

In Proto-Germanic, most nominal stems ended in a vowel, e.g. *\*/daga-/* ‘day’, *\*/gasti-/* ‘guest’, although there were also some consonant stems, such as */brooþ(a)r-/* ‘brother’. At this stage, the stem-final vowel appeared overtly in most forms of the noun and would certainly have been part of the underlying representation. Subsequently, short vowels in word-final syllables were lost. As a result, former short-vowel noun stems were reanalyzed as consonant stems, e.g. *\*/daga/* as */dag/*, *\*/gasti/* as */gast/*, merging with original consonant stems. Nevertheless, the color of the original stem-final vowel continued to determine the shape of certain inflectional endings in Gothic. For example, the endings of the accusative plural are *-ans*, *-ins*, or *-uns*, for the most part depending on whether the stem had formerly ended in *-a*, *i*, or *-u*. The resulting synchronic situation for Gothic is shown in [12].

<sup>7</sup>Once again, this difference between masculine and neuter *-ja* stems is part of a larger pattern. Other noun paradigms in Gothic have split by gender in a similar way (for somewhat analogous reasons, which I will not go into here), most strikingly the *i*-stems, where masculines and feminines have diverged in the singular.

[12]

	<i>a</i> -stems	<i>i</i> -stems	<i>u</i> -stems	<i>r</i> -stems
Nom.	dags	gasts	sunus	brooþar
Gen.	dagis	gastis	sunaus	brooþrs
Dat.	dags	gasta	sunau	brooþr
Acc.	dag	gast	sunu	brooþar
Nom.	dagoos	gastiis	sunjus	brooþrjus
Gen.	dagee	gastee	suniwee	brooþree
Dat.	dagam	gastim	sunum	brooþrum
Acc.	dagans	gastins	sununs	brooþrun
	‘day’	‘guest’	‘son’	‘brother’

From the synchronic point of view, the vowel quality of the ending continues to be determined by the stem. The selection of suffixal allomorphy by the stem could be accounted for in two ways, (1) *declensionally*, with different stem classes determining particular sets of case endings, or (2) *phonologically*, with floating melodies corresponding to the lost stem vowel, which dock on to an empty nucleus in the case ending.

The difference between the declensional analysis and the phonological analysis can be illustrated by the accusative plural. The declensional analysis would posit three endings *-ans*, *-ins*, or *-uns*, respectively selected by noun stems like *dag-*, *gast-*, and *brooþr-*. The phonological analysis would have just one accusative plural ending *-Vns*, with an unspecified vocalic nucleus which receives its segmental content from the floating stem-final melody, e.g. /dag<sup>a</sup>/, /gast<sup>i</sup>/, /brooþr<sup>u</sup>/, /sun<sup>u</sup>/, /herdii<sup>a</sup>/. The theoretical justification for such an analysis comes from autosegmental phonology’s separation of syllabic skeleton and phonemic melody; in the case at hand, the stem is monosyllabic but has a final vowel in its phonemic melody, which can dock (subject to locality constraints) on a suffixal vowel.<sup>8</sup>

The choice between the declensional analysis and the phonological analysis with floating vowels is actually not crucial to what follows, because the alternations in vowel color do not play much of a role in the analogical changes discussed here. It is syllable and foot structure and not vowel color that is really important here. In any case, the phonological analysis seems preferable because it captures a significant generalization about the Gothic data in [12], namely that for any given stem, the color of alternating suffix vowels is the same throughout the paradigm. For example, the stems that get accusative plural *-ans* also get dative plural *-am*, the stems that get accusative plural *-ins* also get dative plural *-im*, and the stems that get accusative plural *-uns* also get dative plural *-um*; similarly in the nominative plural. On a purely declensional analysis this would be an accident.

<sup>8</sup>Floating phonemic elements are in general suited for the treatment of what Bloomfield called “reminiscent sandhi”; see Tranel 1998 and Kiparsky to appear (Ch. 5) for French liaison.

I will, therefore, be assuming the phonological analysis with floating vowels. Specifically, I posit the principal allomorphs of the declensional endings in [13], combining with the stem types shown in [14]:

[13]

	Sg.	Pl.
Nom.	-s	-VV <sup>s</sup>
Gen.	-is	-ee
Dat.	-a	-Vm
Acc.	-∅	-Vns

- [14] Nom.Sg. /dag<sup>a</sup>+s/ → *dags*  
 Gen.Sg. /dag<sup>a</sup>+is/ → *dagis*  
 Dat.Pl. /dag<sup>a</sup>+Vm/ → *dagam*  
 Nom.Pl. /dag<sup>a</sup>+VV<sup>s</sup>/ → *dagoos* (\*aa → oo)  
 Nom.Sg. /gast<sup>i</sup>+s/ → *gasts*  
 Gen.Sg. /gast<sup>i</sup>+is/ → *gastis*  
 Dat.Pl. /gast<sup>i</sup>+Vm/ → *gastim*  
 Nom.Pl. /gast<sup>i</sup>+VV<sup>s</sup>/ → *gastiis*  
 Dat.Pl. /herdii<sup>a</sup>+Vm/ → *herdjam*  
 Nom.Pl. /herdii<sup>a</sup>+VV<sup>s</sup>/ → *herdjoos* (\*aa → oo)  
 Dat.Pl. /giboo+Vm/ → *giboom*  
 Nom.Pl. /giboo+VV<sup>s</sup>/ → *giboos*

In the interests of simplicity, the floating vowel will be omitted from phonological representations below unless specifically relevant to the point.

The restructuring just outlined only affected short-vowel stems. Long vowels were retained in final syllables under certain conditions, and so Gothic retains bound allomorphs ending in underlying -VV, e.g. /giboo/. Indeed, the stock of inherited /-VV/ stem allomorphs was augmented by new ones that arose by analogy, as we shall see.

As a result of these developments, Gothic nominal and verbal inflectional stems tend to end either in -C (most original -V and -C stems) or in -VV (most original -VV stems). I assume that at this point Gothic acquires a constraint that stems should end in a short vowel, which I dub STEM-FORM:

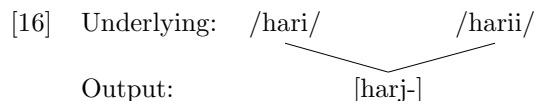
- [15] STEM-FORM: \* $\check{V}$ <sub>STEM</sub>

STEM-FORM is dominated by certain Faithfulness and syllable structure constraints, and violable where those constraints demand it. Stems like /sunu/, and originally /hari/ as well, violate it in virtue of Faithfulness to the underlying representation. Still, its synchronic effects are visible throughout the inflectional system, and its scope is extended to new cases by analogical change. In fact, the morphological changes we are considering, including not only the remodeling of the genitive singular of heavy neuter *-ja* stems (*\*riikiis* > *riikjis*) and of the nominative singular of light masculine *-ja* stems (*\*haris* > *harjis*), but also of *-wa* stems (*\*triggus* > *triggws*, *\*lasjus* > *lasiws*, *\*worstu* > *worstw*), of the past tense of strong verbs (*\*walu* > *walw*), and of the 2.Sg. imperative of weak verbs in *-jan* (*\*nasi* > *nasii*, *\*sooki* > *sookii*), are so many generalizations of STEM-FORM, albeit with local variations due to other morphological factors.

With all the pieces of the puzzle now in place, we are ready to examine the analogical changes in the declension.

## 6. The innovations in the noun declension

The change from *\*haris* to *harjis* in the nominative singular of light masculines can now be recognized as a *generalization of the bound form*: the /-ii/ stem<sup>9</sup> is extended to light stems. Prior to the change this stem type instantiates the situation represented by the schema in [1]:



Of the two potential underlying forms for bound forms of the light stems, /-ii/ is preferred over /-i/, for two reasons. First, this form is positively required by the the corresponding heavy stems, and secondly, it conforms to STEM-FORM. The generalization of the bound /-ii/ stem to short masculines thus both eliminates the weight condition from the allomorphy, making for a more general distribution of stem classes, and optimizes a class of stems by bringing them into complicity with the STEM-FORM constraint. In that respect, the innovation increases the simplicity and system-conformity of the grammatical system.

In most of the paradigm, the change is *covert*, in that the new base form yields the same output as the old base form did. For example, the change from /hari+a/ to /harii+a/ does not alter the output *harja*. But there is an *overt* effect in the nominative singular, where the change of underlying /hari+s/ to /harii+s/ entails the surface change of *\*haris* to *harjis*, in accord with the constraints of Gothic phonology. The overt and covert changes for three of the singular forms are shown in [17].

<sup>9</sup>More precisely, the /-ii<sup>a</sup>/ stem; recall that we are omitting the floating vowel melodies for simplicity.

[17]

Old system		New system		
Underlying	Surface	Underlying	Surface	
/hari+a/	<i>harja</i>	/harii+a/	<i>harja</i>	(covert change)
/hari+is/	<i>harjis</i>	/harii+is/	<i>harjis</i>	(covert change)
/hari+s/	* <i>haris</i>	/harii+s/	<i>harjis</i>	(overt change)

Now consider the neuter *-ja* stems. Unlike the masculines, heavy neuters do not have an allomorph in */-ii/* because there is no alternation to motivate positing two allomorphs in the first place. Therefore, there is no question of neuters generalizing */-ii/* to light stems, as masculines did. This stem type retains a single underlying representation */riiki/* — not */riikj/*, in spite of STEM-FORM, because it would violate the higher-ranked, in fact undominated, constraint *\*Cj*, nor obviously */riikii/*, which would generate the wrong output *riikii* in the nominative and accusative singular.

Now consider the change in the genitive singular of heavy neuter stems, from *\*riiki+is* to *riikj+is*. We have just seen that the underlying form is */riiki+is/* in both stages. There are two competing realizations, the original *\*riiki+is* and the new *riikj+is*, of which each satisfies just one of two constraints, STEM-FORM, and *\*SUPERHEAVY*, which imposes a bimoraic foot maximum. The form *\*rii.ki+is* violates STEM-FORM, which prohibits a stem from ending in *-V*, but (in virtue of final C-extrametricity) it fulfills the requirement that syllables be maximally bimoraic. On the other hand, *riik.j+is* conforms to STEM-FORM but its three-mora first syllable exceeds the syllabic template. (The syllabification *\*rii.kj+is* with its forbidden *Cj* cluster violates an even more highly ranked constraint.) The historical change from *\*riikiis* to *riikjis* shows that the morphological constraint STEM-FORM has become more important than the phonological constraint on the size of the foot. Formally, the change corresponds to a *reranking*:<sup>10</sup>

- [18] a. Old system: *\*SUPERHEAVY*  $\gg$  STEM-FORM (*/riiki+is/*  $\rightarrow$  *\*rii.ki+is*)  
 b. New system: STEM-FORM  $\gg$  *\*SUPERHEAVY* (*/riiki+is/*  $\rightarrow$  *riik.j+is*)

Positing a reranking of STEM-FORM and *\*SUPERHEAVY* commits us to the prediction that other instances where these two constraints conflict should have changed in a parallel fashion. And this expectation is confirmed.

Another set of paradigms where syllable structure and stem shape place contradictory demands are the *wa*-stems. Here, the historically expected nominative singular forms in *-u*, *-us* have been replaced by forms in *-w*, *-ws*, e.g. *\*worstu*  $\rightarrow$  *worstw* “work”, *\*triggu+s*  $\rightarrow$  *triggw+s* “faithful”. The reconstructed forms *\*worstu* and *\*triggu+s* obey *\*SUPERHEAVY* and violate STEM-FORM. The new forms *worstw* and *triggw+s* obey STEM-FORM and violate *\*SUPERHEAVY*. The

<sup>10</sup>As usual, the word-final mora can be ignored in the mora count.

appearance of *-w*, in spite of the resulting superheavy syllable, is thus another consequence of the promotion of the morphological constraint STEM-FORM over the phonological constraint \*SUPERHEAVY.<sup>11</sup>

- [19] a. Old system: \*SUPERHEAVY  $\gg$  STEM-FORM (output \**worstu*)  
 b. New system: STEM-FORM  $\gg$  \*SUPERHEAVY (output *worstw*)

Another prosodic constraint, FOOT-FORM, which requires that words should be parsed into moraic trochees (feet consisting of long syllables or two short syllables) in turn dominates STEM-FORM; hence the output of /*harii+s*/ is *harjis* rather than \**hariis*.

Another reassertion of the morphological STEM-FORM constraint over prosodic markedness appears in the verb system. The analogical generalization of stem-final *-w* in the past tense of strong verbs, as in *walw*, for phonologically expected \**walu* (from *wilwan* “rob”), and *blaggw*, for \**blaggu* (from *bliggwan* “hit”) extends the consonantal stem throughout the conjugation.

Moreover, our analysis explains why there was no parallel extension of *-j* in the free allomorph of *ja*-stems. From a purely morphological point of view, we might have expected *riiki*  $\rightarrow$  \**riikj*, like \**worstu*  $\rightarrow$  *worstw*. We know from section 3 that *Cj* clusters are barred by a more stringent (higher-ranked, in fact undominated) constraint than all other consonant clusters, *Cw* included. Thus, the analogical changes are blocked by constraints that outrank the constraints that drive them. In this way, the analogical changes are shaped by the interplay of phonological and morphological conditions. STEM-FORM triggers only those analogical changes that its precise position in the ranked constraint system of the language enforces.

We have now provided a rationale for both morphological changes in [3] to [2]. We have also answered the first question in [5]. *Stem-Form* is generalized in two basic ways: underlying forms are modified to conform to it, and reranking brings additional output forms under its sway. Is there a connection between these changes? My guess is that there is, in that analogical tends to make constraints dominant in the measure that they are unviolated. The more STEM-FORM approaches surface-trueness, the greater the pressure to eliminate the remaining violations of it.

I now turn to a final class of changes driven by STEM-FORM, after which I will formulate the constraint system and the relevant constraint tables. That will, as promised, provide answers to the other three questions in [5].

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<sup>11</sup>A fortiori, STEM-FORM dominates the general CLUSTER constraint, which is dominated by all other constraints considered here.

## 7. The innovations in the verb conjugation

Not only are verbs subject to STEM-FORM, they even morphologically regulate the two stem shapes permitted by that constraint as follows:

- [20] a. nonpast weak verb stems end in -VV,  
b. other verb stems end in -C.<sup>12</sup>

The generalization of stem-final *-w* in strong verb forms like *walw* and *blaggw* mentioned in the preceding section thus obeys [20a] as well as the general STEM-FORM constraint.

The first class of weak verbs, the *-jan* verbs, turns out to be no exception to the constraint that weak verbs end in /-VV/. For reasons that have already become apparent in the discussion of *-ja* stem nouns like /herdii/, underlying stems like /sookii-/ and /nasii-/ will be realized as *sookj-*, *nasj-* before vocalic suffixes in forms like *sookjan*, *nasjan*. The conclusive positive evidence for those underlying stems comes from 2.Sg. imperative, which are suffixless and show the stem overtly ending in *-ii*, e.g. *sookii*, *nasii*. The 2.Sg. imperative always consists of the bare present verb stem, e.g. *far* “go!”, *ur-riis* “get up!” (strong verbs), *salboo* “anoint!”, *pahee* “be quiet!” (weak verbs), and displays the base form unmodified by the phonological constraints activated in prevocalic position (consonantal endings would reveal it too, but there are none), in this case allowing the otherwise hidden underlying /-ii/ to surface.

But significantly enough, precisely these imperatives in *-ii* appear to be analogical innovations, which have replaced the phonologically expected forms *\*sooki*, *\*nasi*. Prior to this replacement, then, the weak verbs of the first class, the *-jan* verbs, were actually exceptions to the constraint [20a] that weak verbs end in -VV, albeit their exceptional status hung by the thin thread of the 2.Sg. imperative form in *-i*. So the new imperative forms in *-ii* are the overt manifestations of another instance of reanalysis that brings stems into line with the language’s morphological preferences. The real locus of the change is the underlying form of the stem, of which the imperative is a direct diagnostic. The present stem of *-jan* verbs acquired the general stem shape of the weak verbs stipulated by STEM-FORM. Thus /sooki-/ > /sookii-/ , /nasi-/ > /nasii-/ , like the second class (/salboo-/ “anoint”) and the third class (/pahee-/ “be silent”).<sup>13</sup> The rise of /-ii/ in the *-jan* verbs thus essentially parallels the rise of /-ii/ in the *ja*-stem nouns.

We have thus identified yet another instance of the pattern [1], parallel to that of [16] in the nouns. As before, it is a change in *underlying* forms, consisting

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<sup>12</sup>E.g. *bind-* “bind”, *gib-* “give” (present stems of strong verbs), *band-*, *gab-* (past stems of strong verbs), *sookid-* “sought”, *bruuht-* “used” (past stems of weak verbs).

<sup>13</sup>The fourth class (/fullnoo-/ “fill”) is not so relevant here because it actually inflects as a weak verb only the past tense.





It seems impossible to represent it by any single proportion (much less unify it with the corresponding shifts in the noun declension). Here are some plausible tries that fail:

- [25] a. 2Pl.Imper. *salboop* : 2Sg.Imper. *salboo* = *nasjib* : X (X = *\*nasji*)  
 b. 3Sg. Imper. *salboodau* : 2Sg. Imper. *salboo* = *nasjadau* : X (X = *\*nasja*)  
 c. 2Sg. Opt. *salboos* : 2Sg. Imper. *salboo* = *nasjais* : X (X = *\*nasjai*)

## 8. The constraint system

Recall that I am assuming a constraint-based version of Lexical Phonology and Morphology, where the constraint system both determines the optimal output for a given lexical input, and applies at the level of lexical representations to select the optimal base form from among those potential representations that, in combination with each other, yield the correct output forms of the language (lexicon optimization). Diachronically, analogical changes are optimizations, and the optimization may affect either lexical representations, or output representations, increasing their conformity with the system. Crucially, some of the changes are motivated only at the level of lexical representations, because they optimize the base forms without necessarily optimizing output representations. Analogical changes corresponding to such optimizations cannot be characterized in purely surface terms.

Turning now to the constraints at work in the lexical phonology of Gothic, our account has made use the following:

- a. FAITHFULNESS. The most important subconstraint of this family for present purposes is that segmental content is not to be inserted or deleted (melodic faithfulness). E.g. an input /ia/ should not be realized as *\*ii*, *\*aa*, *\*ita*. It is undominated in the subsystem of constraints we are concerned with, hence unviolated in the phonological and morphological phenomena considered here. To save space I will leave it, and the candidates it rejects, out of the constraint tables.<sup>14</sup>

I also assume that segmental slots are not to be inserted or deleted (segmental faithfulness). E.g. an input long vowel /VV/ should not be realized as a short vowel /V/ or vice versa. This constraint is dominated by ONSET but in turn dominates FOOT-FORM below.

- b. *\*Complex-j*: A consonant clusters may not contain the glide *j*. Unviolated. This constraint is obtained by conjoining the two primitive constraints

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<sup>14</sup>I also assume tacitly that a FAITHFULNESS constraint prohibits mismatches of morphological bracketing between input and output, for example a realization of input [X][YZ] as output [XY][Z].

\**j* and \*COMPLEX. The conjoined constraint, which says that both the primitive constraints may not be violated at the same time, is visible because it is ranked higher than either of the primitive constraints that it is composed of (Prince & Smolensky 1993). The former of these constraints properly says that a vocalic melody must be affiliated with a mora, and comes from a theory of the syllable that I hope to present elsewhere. It is part of a hierarchy of constraints which, in conjunction with other constraints, generates a typology of syllable structure:

- [26]
1. [+lo]  $\supset \mu (a)$
  2. [-hi]  $\supset \mu (a, e, o)$
  3. [-cons]  $\supset \mu (a, e, o, i, u)$
  4. [+voc]  $\supset \mu (a, e, o, i, u, r, l)$
  5. ...

The primitive constraint \**j* (formally, [26c]) can be seen in action in languages like Italian (where *yV* sequences are ruled out) and Spanish (where *y* belongs to the nucleus, since *yV* sequences form a single mora, as shown by stress; see Harris 1983).

- c. ONSET: a syllable must have a (melodically independent) onset. Dominated by FAITHFULNESS and by \**Cj*, and therefore violated where its satisfaction would require either the deletion or epenthesis of melodic content, or an impermissible *Cj*-cluster. These onset violations include initial position (e.g. *akran*, *eh̄ta*), and the abovementioned medial cases of the types *aīauk* and *fian*, *fijan*. Note that for simplicity I assume that the latter two are the same, and in general, that *i.V* and *i.yV* are both \*ONSET violations.
- d. FOOT-FORM: A word must consist of moraic trochees (allowing for the extrametricality of a final mora or the equivalent, as indicated). That is, it must be parsed into long syllables and pairs of light syllables. The consequence is that \* $\smile$  — sequences are avoided initially and after a heavy syllable (or after an even number of light syllables). Violated when higher-ranked constraints so require.
- e. STEM-FORM: \* $\check{V}$ <sub>STEM</sub>
- f. \*SUPERHEAVY: No superheavy syllables (syllables of three or more moras). This constraint does not hold for word-final syllables; I have assumed that a final mora, including a sequence of consonants, may be extrametrical, and thus need not count in the metrical parse of the word. The metrical constraints must accordingly evaluate every word in two ways, one with the final mora included, the other without it, and accept the better of the two parses.<sup>15</sup>

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<sup>15</sup>I am also assuming that *nuclei* of three or more moras, e.g. \**iii*, are prohibited by an undominated constraint, not included in the tables.

g. \*COMPLEX: No consonant clusters!

Ranked as given, these constraints account for all the phonological and morphological data we have considered.

Underlying form	Candidates	*COMPLEX- <i>j</i>	ONSET	FOOT-FORM	STEM-FORM	*SUPERHEAVY	*COMPLEX
Nom.Sg. /harii+s/	☞ har.ji+s				*		
	ha.rii+(s)			*			
	ha.ri.i+s		*		*		
Nom.Sg. /herdii+s/	☞ her.dii+(s)						
	herd.ji+s				*	*	
	her.di.i+s		*				
	her.dji+s	*			*		*
Nom.Sg. /managii+s/	☞ ma.na.gii+(s)						
	ma.nag.ji+s			*			
	ma.na.gi.+i(s)		*				
	ma.na.gji+s	*					*
Gen.Sg. /riiki+is/	☞ riik.j+is					*	
	rii.ki+i(s)				*		
	rii.ki.+i(s)		*		*		
	rii.kj+is	*					*

The following table shows how the constraints predict the right syllabification for medial clusters, including the uniform treatment of *-Cj-* and the weight-sensitive syllabification of other *-CR-* clusters:

Underlying form	Candidates	*COMPLEX- <i>j</i>	ONSET	FOOT-FORM	STEM-FORM	*SUPERHEAVY	*COMPLEX
/herɓram/	☞ her.ɓram						*
	herɓ.ram					*	*
/hleɪɓrai/	☞ hlii.ɓrai						**
	hliɪɓ.rai					*	*
/iupaɓroo/	☞ iu.paɓ.roo						
	iu.pa.ɓroo			*			*
/woopjan/	☞ woop.jan					*	
	woo.pjan	*					*

The derivation of the verbs is as follows:

Underlying form	Candidates	*COMPLEX- <i>j</i>	ONSET	FOOT-FORM	STEM-FORM	*SUPERHEAVY	*COMPLEX
2.Sg.Pres. /sookii+is/	☞ soo.kii+(s)						
	soo.ki.+i(s)		*		*		
	sook.j+is					*	
	soo.kj+is	*					*
2.Sg.Pres. /nasii+is/	na.sii+(s)			*			
	na.si.i+s		*	*			
	☞ nas.ji+s				*		
	na.sji+s	*			*		*
2.Sg.Imp. /sookii/	☞ soo.kii						
	sook.ji				*	*	
2.Sg.Imp. /nasii/	☞ na.si(i)						
	nas.(ji)				*		

Observe how the constraint system explains the difference between the short noun and verb stems, viz. /harii+s/ → *harjis* versus /nasii/ → *nasii*, not *\*nasji*. Because final moras may be ignored for purposes of assessing metrical well-formedness (“extrametricality”), *nasi(i)* is a good moraic trochee, and satisfies FOOT-FORM just as well as the rival candidate *\*nasji* does. It wins over it by because, unlike that form, it also satisfies the next lower constraint STEM-FORM.

On the other hand, *\*hariis* violates FOOT-FORM even with final extrametricality, so it is rejected in favor of *harjis*, in spite of violating the lower-ranked STEM-FORM constraint.

The changes due to the reranking of STEM-FORM above \*SUPERHEAVY are displayed next. The new ranking enforces Gen.Sg. *\*riiki+is* > *riikj+is* over *\*riikiis* in neuter nouns, as well as Nom.Sg. *triggw+s* over *\*triggu+s* and similar cases, and *walw* over *\*walu* in the verb system. Presumably the *-w* in longer stems like *þiwadw* “servitude”, is also restored from *-u*. This follows from the constraint system as well.

Underlying form	Candidates	*COMPLEX- <i>j</i>	ONSET	FOOT-FORM	STEM-FORM	*SUPERHEAVY	*COMPLEX
Nom.Sg. /worstu/	☞ worst(w)					*	*
	wor.stu			*	*		
Nom.Sg. /sangu+s/	☞ sangw+(s)					*	*
	san.gu+s				*		
Nom.Sg. /riiki/	riikj	*				*	*
	☞ rii.ki			*	*	*	
Gen.Sg. /riiki+is/	☞ riik.j+is					*	
	rii.ki+i(s)				*		
3.Sg. Past /walw/	☞ wal(w)						*
	walu				*		
3.Sg. Past /þiwadu/	☞ þiwad(w)			*			*
	þiwadu			*	*		

For masculine *ja*-stems, this reranking of STEM-FORM above SUPERHEAVY will have no overt effect, since, as a result of the restructuring discussed in section 2, they end in /-ii/ = /- $\mu_s\mu_w$ /.

This answers question [5b].

After the reanalysis described in section 7, weak *jan* verbs end in /-ii/, so they are therefore unaffected by the reranking, just like *-ja* stem nouns.

This answers question [5c].

Adjectives also have a bound stem in /-ii/. It is motivated by the masculine nominative singular form, as in nouns, e.g. /uilþii+s/ → *wilþiis*. The failure of neuter genitive singular adjectives to change in parallel with neuter genitive singular nouns (*wilþiis* ≠ *\*wilþjis*, in spite of /riiki+is/ *\*riiki+is* > *riikj+is*) is explainable on morphological grounds as follows. Assume that a lexical item

will have a uniform underlying representation if possible. Masculine and neuter adjectives are different inflectional forms of the same lexical item. So, since adjective stems in the masculine end in /-ii/, the neuter forms of those stems end in /-ii/ too. But the optimal output of underlying /uilþii+iis/ is *wilþiis*. Hence, the neuter genitive singulars of adjectives remain unchanged.

This answers question [5d].

## 9. Summary: the changes and their motivation

Here I restate in summary form the five analogical innovations in Gothic inflectional morphology treated in this paper. For each, I state the status quo ante of the grammar, how the grammar changed, why it changed, and the effect of the change on the language’s output forms. It will be seen that all five are driven by the STEM-FORM constraint. Given the hypothesis that transparency favors high ranking, each reinforcement of STEM-FORM has a “snowball” effect which adds to the structural pressure for subsequent innovations.

- a. Nom.Sg. *haris* > *harjis* (section 2).

*The starting point:* At the stage preceding the change, represented by the paradigms in [3], heavy stems have two underlying allomorphs, e.g. /herdi/ (free) ~ /herdii/ (bound), and light stems have one underlying allomorph, e.g. /hari/.

*The change:* The bound allomorph in /-ii/ is extended to light stems, e.g. /hari/ (free) ~ /harii/ (bound).

*The motivation:* The change (1) establishes uniform stem allomorphy for masculine *ja*-stems, and (2) minimizes violations of STEM-FORM: the lexical representation /harii/ is preferred to /hari/, as the following table shows. (Note that this table simply motivates the *diachronic* replacement; /harii/ and /hari/ do not compete in the synchronic system, since they yield different outputs due to dominant Faithfulness constraints.)

Candidates	*COMPLEX- <i>j</i>	ONSET	FOOT-FORM	STEM-FORM	*SUPERHEAVY	*COMPLEX
☞ hari(i)						
hari				*		
har(j)	*				*	*

*The surface effect:* The stem in *-ji-* is extended to the nominative singular of masculine light stems, and the stem in *-i* becomes restricted to the accusative singular.

- b. 2.Sg. imperative *\*sooki*, *\*nasi* > *sookiis*, *nasiis* (section 7).

*The starting point:* At the stage preceding the change, *-jan* verbs have an underlying stem in /-i/, on the evidence of the 2.Sg. imperative, where the stem is overtly realized. This stem violates both the generalization [20] and STEM-FORM.

*The change:* the underlying stem changes to /-ii/, e.g. */\*sooki*, *\*nasi/* > */sookii*, *nasii/*.

*The motivation:* The change (1) removes a class of exceptions to [20], and (2) optimizes lexical representations by eliminating violations STEM-FORM and FOOT-FORM. To see how */sookii/* is preferred to */\*sooki/*, see the constraint table below, for */nasii/*, cf. the table for */harii/* above.

*The surface effect:* The 2.Sg. imperative of *-jan* verbs comes to end in *-ii*.

Underlying form	Candidates	*COMPLEX-j	ONSET	FOOT-FORM	STEM-FORM	*SUPERHEAVY	*COMPLEX
	☞ sooki(i)						
	sooki			*	*		
	sook(j)	*				*	*

- c. Gen.Sg. *\*riikiis* > *riikjis* (section 2).

*The starting point:* At the stage preceding the change, the morphological constraint STEM-FORM is violated in the genitive singular of heavy neuters, e.g. *\*riikiis*, due to domination by the phonological constraint SUPERHEAVY.

*The change:* STEM-FORM is reranked above SUPERHEAVY.

*The motivation:* Changes (a) and (b) reinforced STEM-FORM by decreased the extent to which it is violated. We supposed that constraints tend to become dominant in the measure that they are unviolated on the surface.

*The surface effect:* Gen. Sg. *\*riikiis* > *riikjis*.

- d. *\*triggus* > *triggws* (section 6).

*The starting point:* At the stage preceding the change, *-wa* stems violate the morphological constraint STEM-FORM, e.g. *\*triggus*, due to domination by the phonological constraint SUPERHEAVY.

*The change:* same as (c).

*The motivation:* same as (c).

*The surface effect:* Nom.Sg. *\*triggus* > *triggws*.

e. *\*walu* > *walw* (section 7).

*The starting point:* At the stage preceding the change, the general morphological constraint STEM-FORM, as well as the verb-specific constraint [20], are violated by strong verb forms like *\*walu*, due to domination by the phonological constraint SUPERHEAVY.

*The change:* same as (c) and (d).

*The motivation:* same as (c) and (d).

*The surface effect:* 3.Sg. Past *\*walu* > *walw*.

## 10. Conclusion

I have argued that a series of analogical changes in Gothic declension and conjugation are all driven by a constraint on the form of stems in concert with constraints on syllable and foot well-formedness. The most interesting cases are the original *-ja* stems, where the constraint is implemented at the level of underlying representations even though it is violated in every output occurrence of the stem. They challenge theories which define optimality only on output representations.

The analogical changes examined here do not complicate either the phonological or the morphological system of Gothic. The phonological constraints do not pick up any exceptions or morphological conditions. In particular, Sievers' Law does not acquire any lexical or morphological exceptions, but continues to operate, as a by-product of metrical and syllabic parsing, in a fully regular way. In constraint-based terms, the unity of the changes is that they all involve STEM-FORM asserting itself in the morphology. None of the changes need be treated as a case of surface analogy, and some of them cannot be so treated without loss of generalization. Under the unified perspective proposed here, all the changes are variations on a single theme: the increasing conformity to the morphological generalization STEM-FORM. Thus they are consistent with the view that analogical change is grammar optimization.



## Bibliography

- BRAUNE, WILHELM AND ERNST EBBINGHAUS. 1961. *Gotische Grammatik*. Tübingen: Niemeyer.
- CALABRESE, ANDREA. 1994. Sievers' Law in Gothic: A synchronic analysis with some notes on its diachronic development. *The Linguistic Review* 11:149-194.
- DRESHER, B. ELAN AND ADITI LAHIRI. 1991. The Germanic foot: metrical coherence in Old English. *Linguistic Inquiry* 22:251-286.
- DRESHER, B. ELAN AND ADITI LAHIRI. 1991. Diachronic and synchronic implications of declension shifts. *The Linguistic Review* 3:141-163.
- HARRIS, JAMES. 1983. *Spanish phonology*. Cambridge, Ma.: MIT Press.
- HOOPER, JOAN. 1976. *An introduction to Natural Generative Phonology*. New York: Academic Press.
- KIECKERS, E. 1928. *Handbuch der vergleichenden gotischen Grammatik*. München: Hueber.
- KIPARSKY, PAUL. 1968. Linguistic universals and linguistic change. In Emmon Bach and Robert Harms (ed.), *Universals in linguistic theory*. New York: Holt.
- KIPARSKY, PAUL. 1973. Phonological representations. In Osamu Fujimura (ed.), *Three dimensions of linguistic theory*. Tokyo: TEC.
- KIPARSKY, P. 1998. Sievers' Law as prosodic optimization. In Jay Jasanoff, H. Craig Melchert, and Lisi Oliver (ed.) *Mír Curad. Studies in honor of Calvert Watkins*. Innsbruck: Innsbrucker Beiträge zur Sprachwissenschaft.
- KRAUSE, WOLFGANG 1953. *Handbuch des Gotischen*. München:Beck.
- LAHIRI, ADITI. 1982. *Theoretical implications of phonological change: Evidence from Germanic languages*. Ph.D. Dissertation, Brown University.
- MURRAY R.W. AND T. VENNEMANN. 1983. Sound change and syllable structure in Germanic phonology. *Language* 59:514-528.
- PRINCE, ALAN AND PAUL SMOLENSKY 1993. *Optimality theory: Constraint interaction in generative grammar*. Ms., Rutgers University and University of Colorado.
- RIAD, TOMAS 1992. *Structures in Germanic phonology*. Ph.D. Dissertation, Stockholm University.
- STAMPE, DAVID 1972. *How I spent my summer vacation*. Ph.D. Dissertation, University of Chicago. New York, Garland, 1980.
- TRANEL, BERNARD. 1998. French liaison and elision revisited: A unified account within Optimality Theory. *ROA* 15.