Dániel Huber

Velars in the history of Old English[*]

0 Introduction: what velars did to OE

There are a number of phonological processes in the history of Old English that involve velar obstruents. This paper reviews some of these changes, both from a historical and a phonological perspective, in order to show that a number of important adjustments can be made to the views held by (historical) phonologists concerning these phenomena. The paper does not intend to cover all processes involving velars: mainly such developments will be considered that had morphological consequences. Nevertheless, one of the most prominent phenomena in Old English, i-mutation and the accompanying palatalization of velars, as well as some of the minor processes, will not be considered here because they are both well-known and appropriately described.

The changes that involve velars in OE can be conveniently divided into two groups according to what role velars play in them: on the one hand, there are changes that velars undergo themselves, and on the other there are processes that are triggered by velars. The first group of changes, those affecting velars, is manifest, for instance, when OE /x/ (assumed to be pronounced [h] word-initially) from Gmc */x/ is deleted in certain phonological environments. The loss of intervocalic /x/ led, for example, to the emergence of a special type of verb in OE, called contracted verbs (e.g. *þēon* 'to thrive' < *þīhan*), while the loss of /x/ between sonorants introduced some allomorphy to nominal stems (e.g. *wealh* nom. sg. 'foreigner', but *wealas* nom. pl.). Also, Gmc */x/ had become voiced in certain environments along with the other voiceless fricatives, as the result of Verner's law. This change introduced a voicing alternation between certain forms of strong verbs. The various palatalizations of original velars, too, belong here: these also introduced alternations to the paradigms, for instance, *cēosan* [tS-] 'to choose' inf., but *curon* [k-] pret. pl., or *dæg* [-j]'day' nom. sg., but *dagas* [-γ-] nom. pl. (these processes will not be discussed here). Independent of the previous changes, and one without crucial morphological repercussions, is the reduction of the OE initial velar clusters [hl-, hr-, hw-, hn-, kn-, gn-] to [l-, r-, w-, n-], which led to the merger of velar clusters and plain sonorants in initial positions.

While the general tendency to eliminate clusters of velars and especially the voiceless fricative /x/ is prominent in OE, there is a second group of processes, namely those that are triggered by velars. These include the general breaking of front vowels in nearly all OE dialects. – It has to be made clear that the grouping just outlined is simply to be considered a methodological help, a typology basically, rather than anything deeper, either historically or phonologically.

The structure of the paper is the following. Section 1 discusses the loss of nasals before the Germanic voiceless fricatives, and answers the question why it is /x/ before which nasal deletion occurred the earliest in the Germanic dialects. Section 2 offers a detailed presentation of the general breaking of front vowels before /x/ (and in some other environments). A brief analysis of this process in CV phonology will be given. This is followed by a discussion of the loss of /x/ between sonorants in section 3, where it will be

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argued that, for a certain, well-defined class of words, the text-book analysis assuming compensatory lengthening is unwarranted. A presentation of the reduction of the numerous velar clusters will follow in section 4, where a possible explanation will be offered for why there is a difference in the later development of words like *what*, *when*, *white*, *wheel* with initial [w-] as opposed to *who* with initial [h-]. While *A Guide to Old English* by Mitchell and Robinson (2001) has been used to organize the discussion of the material for this paper, most of the data and their analyses are based on Campbell's classic (1959) *Old English Grammar*. For the analyses Hogg (1992) and Lass (1994) have also been consulted.

1 Loss of nasals before voiceless fricatives

This section discusses the loss of nasals before the Germanic voiceless fricatives, and tries to answer a question that has hardly been raised: Why is it the velar fricative before which nasal deletion occurred earliest in the Germanic dialects? This is a non-trivial question since it has to be answered what made /x/ particularly prone to trigger such a process. In a government phonological approach (see Harris 1994, Kiss 2002) a possible solution to the problem is straightforward: the velar, lacking a phonological place of articulation, is too weak to perform its governing duties on a preceding nasal, which then becomes associated with the preceding vocalic slot (nasalization). In addition, it will be argued that the later loss of nasals before the other fricatives in OE and Old Frisian is the continuation of the nasal deletion before /x/.

1.1 Loss of nasals before /x/

Following Campbell (1959:44,47), Primitive Germanic is assumed to have the following nasal + voiceless fricative clusters (with the place of the nasal being determined by the fricative, of course) at the time after Grimm's law had applied and before written records began:

(1)   nasal + voiceless fricative clusters in Primitive Germanic

        -mf, -nθ, -ns, -ŋx

Two remarks are in order. First, note that it is possible that a fricative after a nasal could not be but voiceless in Primitive Germanic, since voiced fricatives – produced by Grimm's law from IE voiced aspirates – either became voiced stops [b d g] in this position or they had never actually been fricatives after a nasal. Nevertheless, they would still be allophones of voiced fricative phonemes at this time (Lass 1994:77). Therefore, it seems correct to go on speaking of 'loss of nasals before voiceless fricatives'. Second, the clusters in (1) could only occur after */a i u/ due to some previous changes that are irrelevant now. This distribution of nasal + voiceless fricative clusters was, however, modified relatively early in Germanic.

In Primitive Germanic the nasal disappeared before the velar fricative „by loss of the nasal consonant, and compensatory lengthening and nasalization of the vowel" (Campbell 1959:44). The original */-iŋx, -uŋx, -aŋx/ thus became nasalized long */-ĩːx, -ũːx, -ãːx/ sequences. Subsequently, */ĩː/ and */ũː/ must have lost their nasal quality since they developed just like non-nasal long */iː/ and */uː/. The third vowel, nasalized */ãː/, however, developed into and along with non-nasal long /aː/ in Gothic, North Germanic, Old High German and Old Saxon (in other words, no different from the development of the two other vowels), but it became long /oː/ in Old English and Old Frisian, probably because it remained nasalized for a longer time, Campbell assumes. (Lass (1994:38) mentions that in fact every pre-nasal /aː/ was so affected in Ingvaeonic: OHG *māno*, but OE *mōna* 'moon'.) These vowel

developments can be seen in the following group of words (data from Campbell 1959:44, with modern Dutch added):

(2)   Prim.Gmc   OE   compare   gloss

       -iŋx   *þīhan > þēon   OS thīhan   to thrive
       -uŋx   fūht   Dutch vocht   moisture
       -uŋx   ūhte   Dutch ocht(end)   dawn
       -aŋx   ōht   Dutch acht, OHG āhta   persecution
       -aŋx   þōhte   Dutch dachte, OS thāhta   he thought

This change, that is loss of nasals before a voiceless velar fricative, had important morphological repercussions, especially in the verbal inflectional system. The change occurred, for example, before velar fricatives that were the result of an independent process where velar stops were lenited (weakened) to a velar fricative before another consonant, such as the weak past tense ending -*t*, as in (3a) below. It will also be recalled that deletion happened before voiceless fricatives, but nasals were preserved before voiced fricatives created by Verner's law (which had already turned into stops after nasals), as in (3b). This caused some allomorphy in the conjugations. The following verb forms show these alternations as compared to some Old Saxon forms (data again from Campbell 1959:44):

(3a)   OE Infinitive   OE Past tense   OS Past tense

       *-ŋk-   versus   ***-ŋxt-**

       þy**nc**an [-ntS] < *-ŋk-   þū**h**te < *-ŋxt- < *-ŋkt-
           to seem   it seemed
       þe**nc**ean [-ntS]   < *-ŋk-   þō**h**te < *-ŋxt- < *-ŋkt-   th**ā**hta
           to think   he thought

(3b)   OE Infinitive   OE Past participle   OS Infinitive

       *-ŋx-   versus   ***-ŋγ-**

       þ**ē**on   < *þiŋxan   ge**þung**en [-ŋg-]   < *-ŋγ-   thīhan
           to thrive   thriven
       fõn   < *faŋxan   ge**fang**en [-ŋg-]   < *-ŋγ-   f**ā**han
           to take   taken

More on these and similar verbs will be said later when discussing contracted verbs (see section 3). There are two conclusions at this point. The nasal, but not its nasality, was eventually lost before a voiceless velar fricative in Primitive Germanic. Note also the different development of *-aŋx in OE and Old Frisian as opposed to the other West-Germanic varieties. Although these facts have been known for a long time, I am not aware of explanations as to why the nasal was deleted in Germanic only before a (voiceless) velar fricative. This issue will be dealt with in 1.3 below.

1.2 Loss of nasals before the other fricatives, /f θ s/

Pretty much the same deletion applied later to nasal + nonvelar fricative clusters in the West Germanic languages, except Old High German. The clusters underwent the same development as when deletion happened before the velar fricative: nasalized */ĩ: ũ:/ lost nasality and fell together with non-nasal long /i: u:/, while nasalized */ã:/ became non-nasal /a:/ in Old Saxon, but /o:/ in Old English and Old Frisian (Campbell 1959:47, N3 notes: „Some forms with *ō* appear in OS texts"). Examples are the following (all OE, OHG and Gothic are as they appear in Campbell 1959:47, with Modern High German examples added):

(4)		OE >	English (or gloss)	OHG	>	Modern HG
	_s	gōs	goose	gans	>	Gans
		Ōs-	(god) \<in names>	Ans-		Ans-
	_θ	līþe	(gentle)	lindi	>	lind
		mūþ	mouth	mund	>	Mund
		tōþ	tooth	zand	>	Zahn
	_f	fīf	five	fimf	>	fünf
		sōfte	soft	samfto	>	sanft

Some morphological consequences of these deletions have to be added, namely that the nasal was also lost in endings. For instance, the OE present indicative plural *-aþ* goes back to Prim. Gmc. *-anþi*, through *-anþi > *-ōþ > -aþ*, the change in the vowel due to the ending being unstressed (Campbell 1959:140).

1.3 The two processes are the same

The process deleting nasals before the velar fricative and that deleting nasals before the remaining voiceless fricatives are traditionally treated as two separate changes operating at different periods in time (e.g. in Campbell 1959). There are, however, no pressing reasons to exclude that they are in fact the same (elongated) process, the later deletions being the continuation of the earlier general process. It is reasonable to assume the following course of events. The change started with the voiceless velar fricative in Primitive Germanic. Then it began to extend its application, but this later progress of the change did not reach OHG and Gothic, leaving Old High German and Gothic only with the pre-velar nasal lost. There is nothing *a priori* that would exclude this possibility since the change could happen anytime before the first written records in a Germanic language other than Gothic.

To find support for this view, it may be important to recall the different behaviour of */-aŋx/ in the various West-Germanic languages. If the development to /o:/ in OE and Old Frisian indeed indicates that the nasal quality of the vowel was retained for a longer period (which raised the low vowel to /o:/ as can be attested in other languages too), then it does not seem to be forced to assume that this was actually the trigger for the deletion of nasals before all fricatives exactly in these varieties. It is, namely, an unstable system where nasalized vowels occur only before a velar fricative and non-nasal vowels occur before the other nasal + fricative clusters. There are two options: either the nasalized vowels are denasalized (OHG and Gothic), or all vowels occurring before all nasal + fricative clusters are nasalized (OE, Old Frisian). Notice that either option is the direct result of the loss of nasals before /x/, which created an unstable situation among these clusters. A meaningful causal link can then be

established between the deletion of nasals before all fricatives and the different development of */-aŋx/ since they occurred in the same linguistic area.

This observation explains why it is from the Ingvaeonic area that the change started to spread (and why it did not reach Gothic). This definitely dates the process to the period before the Angles and Saxons crossed over to Britain. Notice as well that no crucial rule (that is, one directly interacting with it) seems to pre-date this loss of nasals before fricatives, while some later rules must assume that this nasal deletion had already applied (namely, those affecting long /i: u: a: o:/). Nasals were, then, affected in consecutively broader environments: in Gothic and in Old High German, only nasals before the velar fricative were deleted, while in the rest of the West Germanic languages all nasals before all fricatives disappeared.

1.4 Phonological analysis of nasal loss before fricatives

It has been noted above that the reason why the pre-velar environment was the earliest of these deletions has not been discussed in works like Campbell (1959), and does not seem to constitute common knowledge to include in 'practival grammars' of OE either (although the alternations themselves in (3) above are mentioned). Of course, the fact that nasals are deleted before fricatives is not unusual, and that is not the problem. The problem is why it is before velars that nasals came to be lost first. Kiss (2002) offers an analysis of nasal–continuant processes in CV phonological terms (using elements to describe the make-up of segments). The basic insight of his paper is that these processes can be captured as complexity effects, and he correctly points out (2002:57) that „a nasal and a continuant usually establishes a very unstable relation which often results in various „repair" strategies", such as the deletion of the nasal. He cites (2002:58) the process of nasal loss in Old English and notes that deletion of „[ŋ] before [x], is, however, common to Germanic languages". He makes no comment, nevertheless, on why this loss came earlier than nasal loss before, say, /f/ or /s/.

This is especially interesting if the following representations are assumed for the Primitive Germanic clusters of (1) above (based on Harris 1994:126, with heads underlined):

(5)   Primitive Germanic nasal + fricative clusters expressed in elements

(a)   C   v   C   (b)   C   v   C
       | | | |
       N   h̲   N   h̲
       | | | |
       ? | ? |
       | | | |
       __   <<   U   __   <<   R

       m   f   n   s

(c)   C   v   C   (d)   C   v   C
       | | | |
       N   h   N   h
       | | | |
       ? | ? |
       | | | |
       __   <<   __   __   <<   R̲

       ŋ   x   n   θ

It can be observed that these clusters are undesirable and unstable because the segment to be governed, that is the nasal stop, is either more complex (5c) than or just as complex (5a,b,d) as the following fricative which should govern it in theory. This situation is most burning in the case of the velar cluster because there is even no place element in the velar component that could spread. The representations above simply assume nasality and stopness in nasal stops, no pre-specified place. This brings out the intended place assimilations: the place of the (governing) fricative spreads into the place slot of the nasal, thereby satisfying its governing duties (although making the nasal more complex than the fricative itself). Again, the problem of the velar cluster is apparent: there is no place in the velar to spread. Spreading cannot take place and the cluster is unstable because of the complexity relations; something has to be done with it. What happens then is that the nasal element itself spreads (or is pushed, if you prefer that metaphor) to the vowel slot thereby nasalizing the preceding vowel (which later de-nasalizes through delinking N from the C-slot). An alternative analysis could argue that that nasals do not have the stop element in the first place. Notice that although this would make the nasal in (5a,b,d) less complex than the governing fricative, it would not make the pre-velar situation any better. Even on this reading the velar cluster would be the least phonologically stable.

If the analysis above is tenable it explains why the nasal + voiceless velar fricative cluster is the first to undergo any change: it is the most unstable of all the nasal–fricative clusters. Also it constitutes further evidence that velars lack a phonologically relevant place specification.

2 Breaking of front vowels and the role of velars

The following description of breaking is based on Campbell (1959:54-60), and most of the examples are taken from that source, too. According to him (1959:54), the front vowels „are protected from the following consonant by the development of a vocalic glide". Breaking, generally, affected front vowels before the voiceless velar fricative /x/, and the liquids /r l/ if they stood before a consonant (which could be /x/, of course). The general rule can be sketched like this:

(6)   Breaking in OE

æ, æ:	>	<ea> [æa], [æ:a]	
e	>	<eo> [eo]	/ ___ {x, rC, lC}
i, i: > (io, īo)	>	<eo> [eo], [e:o]	

(Long /e:/ does not feature in this discussion because, according to Campbell (1959:54, N2), /e:/ and /æ:/ are merely dialectal variants of Primitive Gmc /æ:/. Nevertheless, he mentions (1959:38) that „Prim. Gmc. *ē* is found in OE mainly in the past tenses of strong verbs of Class VII, but it also occurs in [a very small number of words like] *hēr* here …". In this word no breaking is expected, however, since there is no C after /r/. As for the verbs of Class VII, see below.)

Not all front vowels were affected alike, and liquids had a breaking effect only before another consonant – the patterns are interesting phonologically. These are discussed first.

2.1 The details of the patterns and some data

According to Campbell (1959:57-58), the high front vowels /i/ and /i:/ were broken to <io īo>, later <eo ēo>, before /x/+C. The long /i:/ was also broken before single /x/ – it is not made

clear by Campbell whether or not it is due to chance that short /i/ was not broken, but there are signs that probably it is accidental (see later). The following includes some typical West-Saxon examples from Campbell:

(7) /i/ broken to <io>, later <eo> (Campbell 1959:57)

__/x/(C) *tiohhian* to consider, *Peohtas* Picts, *meox* /-xs/ manure

(8) /i:/ broken to <īo>, later <ēo> (Campbell 1959:58)

__/x/(C) *betwēoh* between, *lēoht* light (in weight), **wēoh* (pl. *wēos*) idol
with loss of /x/ *fēol* file; *lēon* to lend, *sēon* to sieve, *tēon* to accuse

(for the loss of [x], see section 3)

The short /i/ was broken, however, also before /r/+C, where – together with some instances of /x/+C – the result is not <eo>, but <ie> due to umlaut. It is a coincidence that all /r/+C (and some /x/+C) clusters happened to have /i/ in the following syllable, which resulted in umlauted vowels in all these cases: *bierhto* 'brightness', *fierr* 'farther', *afierran* 'to drive out', *hiertan* 'to encourage', *ierre* 'anger, angry', *wierþe* 'worth', *hierde* 'shepherd', etc (Campbell 1959:80). Long /i:/ was not broken in this environment. – The important observation is that high front vowels were broken before /x/ when followed by another consonant, and only /i/ was also broken before /r/+C: in other words, high front vowels tended to break before /x/+C. A secondary observation is that breaking must have taken place before i-mutation (in West-Saxon at least).

The non-high front vowels /e/ and /æ/ were regularly broken in more enviroments: when followed by single /x/, /x/+C, /rx/, /lx/, and /r/+C. Short /æ/ is also regularly broken before /l/+C, although /e/ is not, except before /lx/. Interestingly, /e/ is broken before /lk/ if there is a preceding /s/: *aseolcan* 'to become languid', but *melcan* 'to milk' (this restriction also applies in non-West-Saxon dialects to other clusters than /lk/: eg, non-WS *seolf* vs. WS *self* 'self'; Campbell 1959:57). Long /æ:/ appears to be broken only before single /x/, although this is probably due to chance rather than to a phonotactic constraint. The following are typical West-Saxon examples from Campbell:

(9) /æ/ broken to <ea> (Campbell 1959:55-7)

__/l/C *eall* all, *healdan* to hold, *healf* half, *sealfian* to anoint, *weall* wall
__/r/C *bearn* child, *heard* hard, *hearg* temple, *mearh* horse, *wearm* warm
__/x/(C) *eahta* eight, *hleahtor* laughter, *seax* /-xs/ knife, *neaht* night
with loss of /x/ *ēa* river, *ēar* ear of corn; *slēan* to strike, *lēan* to blame

(10) /æ:/ broken, in West-Saxon only, to <ea> (Campbell 1959:58)

__/x/ *nēah* near
with loss of /x/ *nēar* nearer

(11) /e/ broken to <eo> (Campbell 1959:57)

__/lx/ *eolh* elk, *seolh* seal, *sceolh* oblique
__/r/C *eorþe* earth, *eorl* warrior, *sweord* sword, *steorra* star

__/x/(C) *feoh* cattle, *eoh* horse; *feohtan* to fight, *cneohtas* boys
with loss of /x/ *fēolan* to press on

To summarize the observations in the preceding discussion, the distribution of the broken vowels is tabulated below, where '+' expresses that the vowel is affected (although Campbell does not always provide an example), with the ? sign indicating an accidental gap; *ēa* and *lēon* underwent loss of intervocalic /x/, therefore they no longer have it in OE:

(12) The distribution of broken vowels in OE (West-Saxon mainly)

before:	/x/	/x/+C	/rx/	/lx/	/r/+C	/l/+C
æ	+ *ēa*!	+ *eahta*	+ *mearh*	+ *wealh*	+ *heard*	+ *healf*
æ:	+ *nēah*	?	-	-	-	-
e	+ *feoh*	+ *feohtan*	+	+ *seolh*	+ *sweord*	-
i	?	+ *Peohtas*	+	-	-	-
i:	+ *lēon*!	+ *lēoht*	-	-	-	-

It can be seen that the voiceless velar fricative had the most wide-spread effect. Crucially, /x/ affected practically all front vowels on its own, or before another consonant, and it affected most vowels even if either liquid preceded it. Importantly, neither liquid caused breaking of vowels in OE on its own. {r, l}+C (other than /x/) had a more limited breaking effect, /l/-clusters were the most limited. It is right, therefore, to conclude that /x/ had a breaking effect on any non-high front vowel even 'across' a liquid. As for the /x/+C, /r/+C, and /l/+C clusters, they influenced the preceding vowel in diminishing order: /x/+C affecting practically all, /l/+C affecting least of the vowels. – It has to be added that the patterns above show considerable variation among OE dialects, and even the spreading of the phenomenon can be traced through time, which partly explains the gaps in (12).

A few thoughts have to be said also about the environments /x/+C, /r/+C and /l/+C because some points are not clear on them. These environments can naturally include geminates /xx/, /rr/ and /ll/. Campbell (1959:54, N3) indeed notes that <ll>, <rh> (!), and <hh> have the same effect as {l, r, h}+C, in other words, there is breaking before these clusters. As for the velar clusters, there are no restrictions on C, and geminate /x:/ regularly breaks a preceding front vowel (note the umlauted broken vowel in *hliehhan* 'to laugh'). The geminates /xx/ and /ll/ can be due to West-Germanic Gemination. Although /r/ could not be geminated by this rule (this is noted by Campbell *ibid.*), nevertheless there are some examples for /-rr-/ from other sources, and breaking does take place (with subsequent umlaut occasionally): *steorra* 'star' and *fierr* 'farther'. Campbell does not seem to take note of these, although he cites these data elsewhere.

As for geminate /l:/ due to West-Germanic Gemination, Campbell claims (1959:54) that these do not break preceding vowels, and cites *tellan* 'to tell', *sellan* 'to sell', and *hell* 'hell'. Nevertheless, broken vowels from W-Gmc */æ/ are in fact attested in West-Saxon: *eall* 'all', *weall* 'wall' – the geminate /l:/ is not due to West-Germanic Gemination. This situation may help explain why the environment /l/+C only affected /æ/, not /e/. Geminate /ll/ due to Gemination seems to occur only after /e/, and all examples of <ea> come from /æ/ – although Campbell does not note the existence of broken vowels before /l:/ at all. All that Campbell (1959:22) notes in connection with the failure of breaking is that <ll> from West Germanic gemination as well as <l> after a mutated vowel, had a palatal pronunciation. It is not quite clear from this what exactly precludes breaking here in the first place. Equally, it does not immediately follow why /æ/ is still affected before geminate /l:/, and what palatality itself had

to do with the change. Lass (1994:50) describes that the inhibiting environment in *sellan* and *tellan* is an earlier /j/ in the ending: **saljan*, **taljan*, which gave **sælljan* > OE *sellan*, and **tælljan* > OE *tellan* (see Hogg 1992:103 for essentially the same argumentation). Nevertheless, the view has to be corrected that before /l:/ there is no breaking, see *weall* and *eall* for examples of breaking before geminate /l:/. The precise circumstances of these breakings will have to be addressed in another discussion.

2.2 The phonetic description of breaking and its modelling

The general assumption about the actual phonetic value of these diphthongs is that they were composed of front-back sequences of the same height, the front member preceding the back (broken) half. The motivation for the change is not as obvious, though, as it seems at first sight. Breaking is the approximation of the vowel to the following consonant, in particular to the [+back] feature specification of /x/ (see Campbell 1959). The liquid+C clusters are a little difficult to account for in this way, especially given that the liquids do not trigger breaking on their own. Lass (1994:49) assumes that originally an [u] was inserted in the breaking environments. It will be put forward in this paper that the phonetic realization that is usually associated with the orthographic symbols *a*, *o* may be a simple [ə], [u] or [u].

The change, in element terminology, could simply be that the monophthongs became contour structures having the same height but consisting of a front and a back half. The back half is the result of the rightward spreading of the non-palatal element. The representations below illustrate the elemental make-up of the short diphthongs /æa/, /eo/ and /io/:

```
(13a)  V            >            V
       |                        / \
       A                       A>>__
       |                        |
       I                        I

       æ            >           æ    a

(13b)  V            >            V
       |                        / \
       I                       I   \
       |                       |    \
       |                       |     U
       |                       |     |
       A                       A>>__

       e            >           e    o

(13c)  V            >           V          >           V
       |                       / \                    / \
       I                      I   \                  I   \
                                   \                 |    \
                                    U                |     U
                                    |                |     |
                                    A               __ << A

       i            >            i   o       >        e    o
```
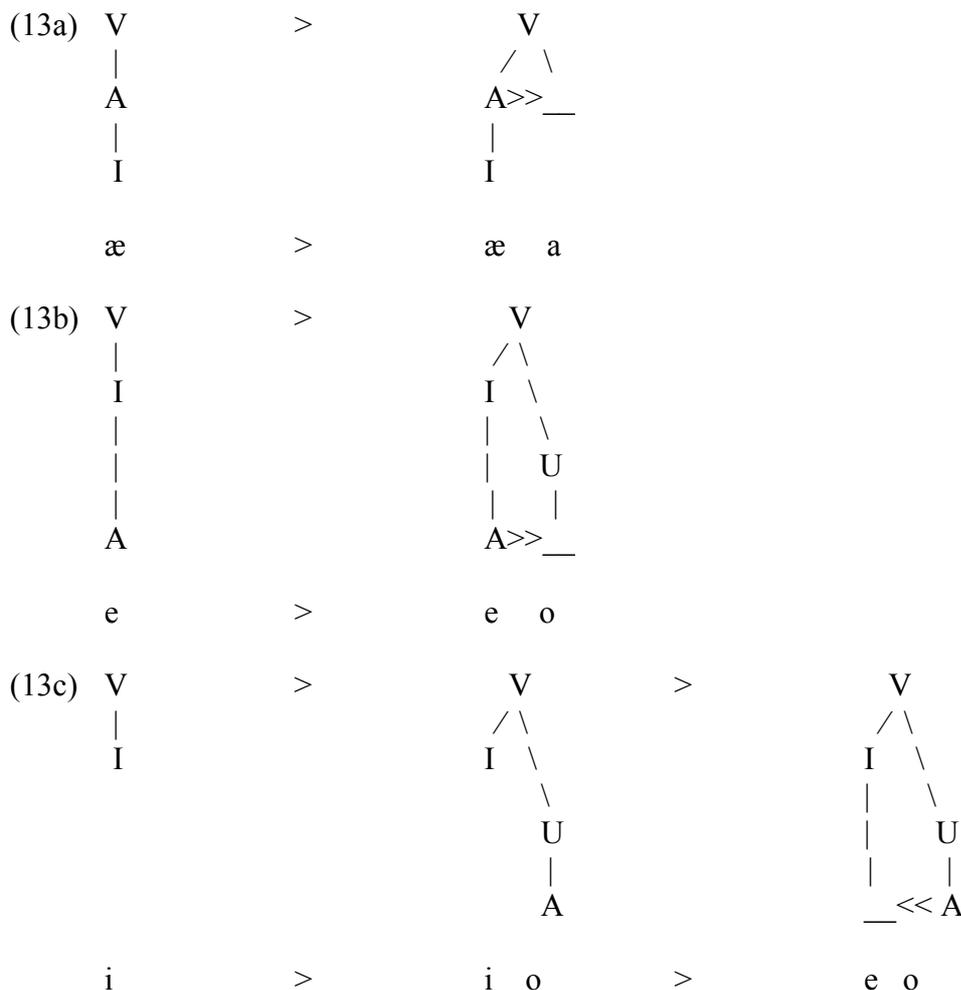
While the representation of /æa/ is not very difficult even assuming the traditional phonetic values of the broken vowels, the representation of <eo> and <io> is fairly problematic in element terms since there does not seem to be any reason for the emergence of U or A, especially both! Why the U element appeared in this environment cannot be answered in this model (nor in others for that matter).

The representation for a long diphthong could be the following:

```
(13d) V              >        V        V
      | \                     | \      |
      A>>__                   A>>__ >>__
      |    |                  |    |
      I>>__                   I >>__


        æ :      >              æ :    a
```
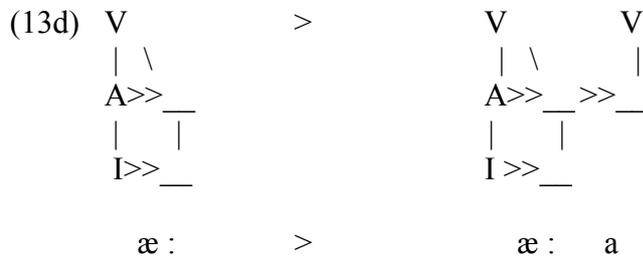
This representation of a long diphthong with a broken addition is problematic for another reason, too. There does not seem to be any reason to create a second V slot out of nothing. Lass (1994:47), whose diagram (3.20) is much the same for content as those in (13) above, is also confronted with this length problem. He attaches short diphthongs to a single V-node and long diphthongs to two V-nodes. He cites the contrast between single-C /tS/ and CC-c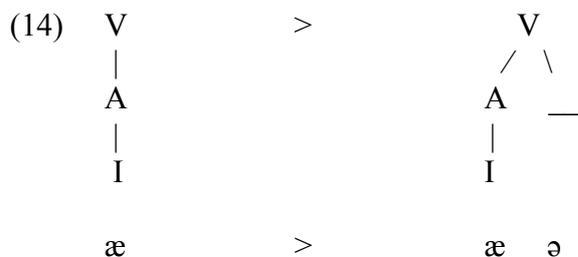lusters like -nd-. But the comparison is false: these diphthongs are more like single-C /tS/ and CC /t/+/S/. This is problematic since these consonants are exactly not expected to contrast in a language (at least tautomorphemically).

As for the theoretical significance of the apparent spread of A 'lowness' in the representations above, it would seem at first sight that the three consonants /h r l/ shared this element and spread it into the preceding vocalic slot. This assumes an active spreading of a given element, that of A. Moreover, to assume A in /x l r/ is also wanting further justification. However, it can equally be argued that in fact a lack of a place specification made it possible for the front vowels to develop a contrastive portion. To put it informally, it is exactly the lack of a place specification in the consonants, especially /x/, that made room for the development of a second portion to these vowels.

As already indicated, the possibility that our phonetic interpretation of orthographic <io> is not correct cannot be discarded: it seems to be quite reasonable to assume [iu] / [iu] to be the approximate pronunciation of <io>, which could be identified perceptually with [iə] or even [io]. Similarly, a [ə]-like second half can be posited for the other broken vowels too: [æə], [eə]. These reduced vowels are typically associated with no place in government phonology, which property they would „share" with velars. On this view, the second half of broken vowels is but an empty slot, with no place element in it and no spreading:

```
(14)   V              >               V
       |                             / \
       A                            A   __
       |                            |
       I                            I


       æ              >             æ   ə
```

In this approach, then, breaking is nothing else but the approximation of front vowels to the placelessness of /x/, by creating an empty slot between the vowel and the consonants.

There are a number of tough problems that remain unresolved, though. It remains to be answered why only front vowels were affected, not back vowels /o u/ and /a/ since they could also develop a reduced second half. It might be interesting, in this respect, to draw attention to the later breaking caused by modern English /r/ and /l/ (final velars are lost), where both front and back vowels are equally affected: *pear* /peə/, *peer* /piə/, *pure* /pjuə/, etc. Another problem is why only /x/ triggered breaking among the velars? Why did [ɣ], which is also a fricative, not cause breaking? And why did the liquids, only when followed by another consonant?

2.3 The effect of breaking on strong verbs

It has already been pointed out that breaking was a truly phonological process and it affected all words, nominals and verbs alike. In (7-11) above, ample examples were cited to illustrate the phenomenon for nouns, adjectives and other word classes. In the remainder of this section only verb forms will be treated because verb forms are more complex, therefore more interesting. It is useful to begin with looking at the seven classes of OE strong verbs. Mitchell and Robinson (2001:37) give a summary of the stressed vowels in each principal part of each type of strong verb (with 3sg present indicative vowels added from their Appendix One 2001:152-158, and Class VII supplied from Campbell):

(15)		infin.	3sg pres	past sg	past pl	pt part.
Class I	-C	i:	i:	a:	i	i
Class II	-C	e:o	i:e	e:a	u	o
		u:	y:			
Class III	-CC	e	i	æ	u	o
Class IV	-C	e	i	æ	æ:	o
Class V	-C	e	i	æ	æ:	e
Class VI	-C	a	æ	o:	o:	a
Class VII		a:, ea	a:, ea	e:, e:o	e:, e:o	a:, e:a

Strong verbs may contain all the vowels that are subject to breaking. It is rewarding to compare the vowels in (15) and the distribution of broken vowels in (12). It was noted that short /i/ does not undergo breaking, and /i/ does not indeed stand in relevant positions. For instance, in Class I verbs, all relevant examples show /ɣ/ due to Verner's law and this precludes breaking. In other classes where /i/ figures in 3sg present forms, there happens to be no examples with the relevant consonants and vowels. Therefore, it seems to be due to chance that short /i/ does not suffer breaking rather than to a phonotactic contraint: simply, there does not seem to exist any word that could undergo it. The same can be said of long /æ:/, which happens not to occur in classes IV and V in an environment where it could suffer breaking. For these vowels it is safe to assume that they could undergo breaking theoretically, but they accidentally happen not to.

Nevertheless, all classes, except Class IV, are affected by breaking in some way. Class IV verbs cannot be affected since the single consonant had to be a sonorant, not an obstruent, and liquids on their own do not cause breaking (perhaps because they are not 'heavy' codas except in this position?). Class II verbs are only affected in the infinitive, which is blurred by the later loss of /x/ (see section 3 below), while their 3sg present and past singular forms do not positively reveal breaking since for verbs of this class the regular stem vowels are exactly those that would be created by breaking anyway.

The infinitive forms of Class I verbs were affected by /i:/ > /e:o/ before a single /x/, the 3sg present tense is affected in addition by umlaut. With loss of /x/, the result was the

emergence of contracted verbs (because of their infinitives). /x/ had regularly become /γ/ in the preterite plural and the past participle – due to Verner's law –, and therefore they would not be affected. Such a verb is *lēon* (note that <-g-> is the voiced fricative [-γ-]!):

(16)

infinitive	3sg present	past sg	past plur	past participle	
lēon	**lī**eh**þ**	**lā**h	**li**gon	**li**gen	lend

It is important to point out that neither of the other velars, /γ/ or /k/, triggered breaking:

(17)

infinitive	3sg present	past sg	past plur	past participle	
bl**ī**can	bl**ī**c**þ**	bl**ā**c	bl**i**con	bl**i**cen	shine
st**ī**gan	st**ī**g**þ**, st**ī**h**þ**	st**ā**g, st**ā**h	st**i**gon	st**i**gen	ascend

Class II verbs are affected by breaking in their infinitives, they are also contracted verbs. Their 3sg present tense and past singular forms do not directly reveal breaking because they contain /i:e/ and /e:a/ anyway (not from breaking, of course):

(18)

infinitive	3sg present	past sg	past plur	past participle	
fl**ēo**n	fl**ī**eh**þ**	fl**ē**ah	fl**u**gon	fl**o**gen	flee
t**ēo**n	t**ī**eh**þ**	t**ē**ah	t**u**gon	t**o**gen	draw

Class III verbs are affected to a great extent by breaking, in their infinitives and 3sg present, and past singular forms. This is due to the fact that in this class of verbs, the stressed vowel was followed by two consonants, meaning that breaking could apply in its fullest force, with all clusters exerting their breaking influence. Some examples with a velar consonant are:

(19a)

infinitive	3sg present	past sg	past plur	past participle	
feohtan	**fieht**	**feaht**	fuhton	fohten	fight
beorgan	**bierhþ**	**bearg**	burgon	borgen	protect, bury
belgan	bilhþ	be**alg**	bulgon	bolgen	be angry
sw**eorc**an	sw**iercþ**	sw**earc**	swurcon	sworcen	grow dark

Notice that *belgan* (and others like *delfan* 'to dig', *helpan* 'to help', *meltan* 'to melt') do not show breaking in their infinitive and 3sg form because /e/ does not undergo it before /l/+C – the past singular, however, has **/æ/ and breaking regularly applies (*dealf, healp, mealt*).

One verb, *fēolan* 'to press on' is a contracted verb. The long vowel of this verb is subject to compensatory lengthening – on why this assumed lengthening is not warranted in this case will be discussed later. Its forms are:

(19b)

infinitive	3sg present	past sg	past plur	past participle	
f**ēo**lan	<not recorded>	fe**alh**	fulgon	folgen	press on

To add some further examples, the 3sg present and past singular form of some other verbs shows breaking before /r/+C clusters:

(20)	infinitive	3sg present	past sg	past plur	past participle	
	ceorfan	**cierf**þ	**cearf**	curfon	corfen	cut, carve
	weorpan	**wierp**þ	**wearp**	wurpon	worpen	throw, warp

Although Class IV verbs cannot be affected since the single consonant had to be a sonorant, not an obstruent, yet curiously, *brecan* belongs to this class, and it is regular: there is no breaking. Its forms are:

(21)	infinitive	3sg present	past sg	past plur	past participle	
	br**ec**an	br**ic**þ	br**æc**	br**āc**on	brocen	break

Class V verbs are affected by breaking in the infinitive, 3sg and past singular form of the contracted verb 'to see' and the past singular of another verb, 'to partake':

(22)	infinitive	3sg present	past sg	past plur	past participle	
	s**ēo**n	s**ieh**þ	s**eah**	s**ā**won	sewen	see
	þicgan [-dZ:-]	þigeþ [-j-]	þ**eah**	þ**ā**gon [-γ-]	þegen	partake

Class VI verbs that are affected by breaking are all contracted verbs and show effects of umlaut in their 3sg present tense forms:

(23)	infinitive	3sg present	past sg	past plur	past participle	
	l**ēa**n	l**ieh**þ	lōh, lōg	lōgon	lagen	blame
	sl**ēa**n	sl**ieh**þ	slōh, slōg	slōgon	slagen / slægen	strike

Class VII includes the most phonologically complex forms. A verb of this class is *weaxan* 'to grow' which illustrates breaking (with /xs/ all through the paradigm):

(24)	infinitive	3sg present	past sg	past plur	past participle	
	w**eax**an	w**iex**t	w**ēox**	w**ēox**on	w**eax**en	grow

This example shows that breaking must have taken place before the /xs/ clusters became /ks/ since /k/ could not cause breaking, as illustrated in (17, 21) above.

3 The loss of /x/ between sonorants

The voiceless velar fricative /x/ was lost in Old English between sonorants, that is, between vowels and when between a vowel and a sonorant. As Campbell correctly points out, this change must have taken place after breaking since often the only trace of an original /x/ is a broken vowel. This is most obvious in infinitives of contracted verbs. This justifies the ordering of this loss after breaking. In fact, it is the loss of /x/ that created the contracted verbs

cited above. Consider the following examples for loss of /x/ (based on Mitchell and Robinson 2001:41 with class III added):

(25)   the infinitives of contracted verbs

Class I	*wri:xan	>	*wre:oxan	>	wre:on	to cover
Class II			*te:oxan	>	te:on	to draw
Class III	*felxan	>	*feolxan	>	fe:olan	to press on
Class V	*sexan	>	*seoxan	>	se:on	to see
Class VI	*slaxan >*slæxan >		*sleaxan	>	sle:an	to strike
Class VII	*faŋxan	(>	*fo:xan)	>	fo:n	to take

(Class IV is excluded because it could not have obstruents stem-finally. The example for Class III is my addition. It is curious that this verb is not discussed by Mitchell and Robinson.)

Campbell (1959:186) cites a number of items mainly from the early glosses that still show the presence of /x/ between sonorants. These include: Corpus *bituihn*, *raha*, *tahae*, Epinal *furhum*, *ryhae*, *thohae*, *uulohum* for West-Saxon *betwēonan* between, *rā* roe, *tā* toe, *fūrum* dat.pl furrows, *rēo* blanket, *þō* clay, **wlōm* dat.pl fringes. Add the name *uelhisci* of Charter 4 (Kentish, original from AD 679, in Hoad 1988:200). This indicates that this loss took place during the written history of OE.

It is usually held that this loss of the voiceless velar fricative resulted uniformly in compensatory lengthening (see Campbell 1959:225). It will be shown in 3.1 that this is warranted only intervocalically, but not when /x/ followed a liquid. In 3.2 Verner's law will be discussed. It will be noted in passing that some of the words cited in this section have been cited above since they also show breaking.

3.1 The loss of /x/ in nominals

In this section it will be shown what effect the loss of /x/ exerted on nouns and adjectives. In addition, it will be pointed out that stems fall into two separate groups and they do not behave identically.

Consider the following nouns *scōh* (masc) 'shoe', *eoh* (masc) 'horse', *mearh* (masc) 'horse, steed', *wealh* (masc) 'foreigner':

(26a) Sg				(26b)	
	N/A	scōh	eoh	mearh	wealh
	G	scōs	ēos	mēares	wēales
	D	scō	ēo	mēare	wēale
Pl	N/A	scōs	ēos	mēaras	wēalas
	G	scōna !	ēona !	mēara	wēala
	D	scōm	ēom	mēarum	wēalum

Such words in fact form two quite disparate groups with respect to their morphophonological properties: those like *eoh* and *scoh* as opposed to those like *mearh* and *wealh*. The basis for their differentiation is their different phonotactic patterns. As for the first type (26a), it is characterized by vowel coalescence and, in consequence, pervasive lengthening of the stressed stem vowel. The loss of the intervocalic /x/ resulted in *sco:es (g.s), *sco:e (d.s), *sco:um, *eoes, *eoe, *eoum, etc, and the adjacent vowels fused to form a long vowel, leaving only the consonants of the relevant ending: *scōs* (g.s), *scōm* (d.p), *ēos* (g.s), *ēom* (d.p).

This is a perfectly regular phonological change: vowel fusion with resulting long vowels. Furthermore, this group of words is also characterized by a historically inappropriate morpheme in the genitive plural. The *-na* ending is borrowed from the weak declension for phonological reasons: the form would have coincided with the dative singular, and for some reason this seems to be why the weak ending was used instead (see Mitchell and Robinson 2001:24, Campbell 1959:225, N1). To sum up, in this group vowel lengthening is justified phonologically, and the special behaviour of these words is also shown by the irregular genitive plural ending.

The other group, (26b), is quite different. The important observation in connection with such items as *mearh*, *wealh* is that the /x/ follows a liquid, /l/ or /r/, therefore it is not intervocalic. It is fair to say that most historical analyses (as well as modern critical text editions) show an alternation in the length of the vowel in the stem of these words (e.g. Campbell 1959, Lass 1994:76). The loss of /x/ resulted in the compensatory lengthening of the stressed vowel in the preceding syllable. There is thus alternation of (assumed) short /ea/ in *mearh* (nom/acc sing.) but (assumed) long /e:a/ in all other forms, *mēare*, *mēares*, *mēaras*, *mēara*, *mēarum*. This assumed lengthening also finds its theoretical justification in the intended similarity in the behaviour of this group of words to those of the *eoh* type, (26a), discussed above, where long vowels appear for most cases.

However, the two groups do not behave identically, and there is no reason to assume compensatory lengthening in the *mearh* group at all. Such lengthened forms are cited by Mitchell and Robinson (2001:24), where they add in a note that „metrical and placename evidence shows that forms with a short diphthong […] also occurred under the influence of the short sound in [the nominative and accusative forms]". Campbell (1959:225) claims: „Nouns in *-h* lost this between voiced sounds; if these sounds were both vowels contraction followed, if one was a consonant the root syllable underwent compensatory lengthening." This sentence admits the intended similarity between the two groups. Then he cites forms with appropriate length marks for *mearh*. Similarly to Mitchell and Robinson (2001), Campbell (*ibid.*) remarks that „short quantity can be transferred from nom. and acc. sg. to inflected forms." At this point, he refers to another paragraph (1959:104, §240) where he confirms that „[m]etrical evidence shows that short quantity was often replaced from related forms [into *meares*, etc]". Quite curiously however, he states in the footnote to this very paragraph that „there is no evidence except that of metre that lengthening took place: e.g. place-name evidence points always to *Wala* as g.p. of *Wealh*, and *hale* as d.s. of *healh*." In fact, Quirk and Wrenn (1957:137) also make this disinction: „In all the instances of the loss of intervocalic *h*, there was contraction of the first vowel or diphthong with the second vowel… On the other hand, when *h* was lost between a liquid and a vowel, the vowel or diphthong in the preceding syllable remained unchanged in length…" They also note (*ibid.*, in small letters) that „Grammarians have generally concluded *without much discussion* [mine] that there was the same compensatory lengthening [in the two phonological environments]." This translates simply into claiming that there is no positive evidence (apart from inconsistent evidence from metre) that compensatory lengthening had ever taken place in words of the -*{l,r}h* type.

Moreover, there is another difficulty with the assumed compensatory lengthening approach for (26b). It would require substantial evidence to show that such lengthening can ever take place: it can only happen under special circumstances that the loss of sound after a consonant results in the lengthening of the vowel *preceding* that same consonant. While lengthenings such as *nixt > ni:t* are expected and frequently attested cross-linguistically, lengthening of a hypothetical *melx > me:l* type are suspect at the very least. Although Beekes (1995:68) cites a case for compensatory lengthening of exactly this type from Ionic Greek where **kalwos > kālós* (though Attic *kalós*) 'beautiful', the direct attribution of the long

vowel to the loss of /w/ would require further justification in my opinion (see below). Kenstowicz (1994:436) also cites examples from East Ionic Ancient Greek where the deletion of [w] before a rounded vowel „lengthened the preceding vowel across an intervening consonant: *woikos > oikos* 'house', *newos > neos* 'new', but *odwos > o:dos* 'threshold'." Notice, however, that there are significant differences in the syllabic contacts of Ancient Greek and OE. First of all, the Ionic Greek syllable contact -d.w- could form a perfect onset cluster -.dw- possibly in Ionic Greek too (see English *dwarf*, *Dwight*), while the OE -l.x- cluster cannot be but a coda-onset cluster. (In fact, it is remarkable that this possibility is not even raised in the discussion.) Secondly, the Ionic Greek examples, *kālós* and *o:dos*, exclusively go back to a form containing a glide, **kalwos* and **odwos*, respectively. The metathesis of such clusters cannot be excluded as shown by developments like Latin *sapiam* 'so that I know' > Gallego *saiba*. However, no such analysis is available for OE -l.x-, -r.x- sequences. As for the OE process, it is then safe to conclude that no lengthening occurred in this group of words in Old English at all because (a) there is no positive evidence that it did; (b) the process is theoretically suspect. Notice, too, that no generalization is lost by accepting this view.

Now consider adjectives like *heah* 'high' and *þweorh* 'crooked', which present a similar distribution of forms:

(27a)			Masculine	Feminine	Neuter
Sg	N		hēah	hēa	hēah
	A		hēane	hēa	hēah
	G		hēas	hēare	hēas
	D		hēam	hēare	hēam
	I		hēa		hēa
Pl	N		hēa	hēa	hēa
	A		hēa	hēa	hēa
	G		hēara	hēara	hēara
	D		hēam	hēam	hēam
(27b) Sg	N		þweorh	þwēoru	þweorh
	A		þweorne	þwēore	þweorh
	G		þwēores	þweorre	þwēores
	D		þwēorum	þweorre	þwēorum
	I		þwēore		þwēore
Pl	N		þwēore	*þwēore, -a	þwēoru
	A		þwēore	*þwēore, -a	þwēoru
	G		þweorra	þweorra	þweorra
	D		þwēorum	þwēorum	þwēorum

Among adjectives, the same observations hold as for nouns: there are two types and they do not behave alike. Rather they behave like the corresponding noun groups. The *hēah* type, (27a), shows compensatory lengthening in all of its forms where /x/ is lost. Other examples include (Campbell 1959:265): *fāh* 'hostile', *flāh* 'deceitful', *gemāh* 'depraved', *hrēoh* 'rough', *scēoh* 'shy', *tōh* 'tough', *þrōh* 'rancid', *anwlōh*, *gewlōh* 'fruitful', *wōh* 'crooked' and *nēah* 'near'. (In addition, *rūh* 'rough' declines with −w- or −g-: *rūwes*, *rūge*.) The *þweorh* type, (27b), does not show such wide-spread lengthening. Notice especially that there is no

lengthening in *þweorre, þweorra*, where *-rx+re/ra* gave *-rr-* with loss of medial /x/. Other examples are *gefearh* (nom.sing.fem, only form recorded) 'pregnant (of the sow)', *sceolh* (only weak inflections occur) 'oblique'. One example for verbs has to be indicated here: *fēolan* (see above).

3.2 The loss of /x/ and the effect of Verner's Law on verbs

The loss of /x/ is manifest in the infinitive of the so-called contracted verbs. These have already been cited above (16, 18, 19b, 22). Here, another property of these verbs is presented. There is a regularity in the history of Germanic languages where voiceless fricatives alternate with their voiced counterparts in medial and final positions if the preceding vowel is not stressed. This system of alternation is known as Verner's law. The correspondence sets are: f–v, þ–đ (>d), s–z (> r), x–γ (or zero). Here are some examples to illustrate *þ–đ* and *s–r* alternations in verbal paradigms:

(28)	inf	3sg pres	pret sg	past pl	past part	gloss
	snīþan	snīþþ	snāþ	snidon	sniden	to cut
	lēasan	līest	lēas	luron	loren	to lose

In this section, the set of velars is discussed exclusively. Verner's law affected the plural past form and the past participle of verbs. Such verbs appear in classes I, II, III, V, VI, VII of strong verbs; class IV could not show this phenomenon.

(29)	inf	3sg pres	pret sg	past pl	past part	gloss
Class1	þēon	þīehþ	þāh	þigon	þigen	prosper
Class2	flēon	flīehþ	flēah	flugon	flogen	flee
Class3	fēolan	\<not att.\>	fealh	fulgon	folgen	press on
Class5	sēon	siehþ	seah	sawon	sewen	see
Class6	lēan	liehþ	lōh, lōg	lōgon	lagen	blame
Class7	fon	fehþ	fēng	fēngon	fangen	seize

The phonological history of these forms gives a proper summary of all the processs that have been discussed so far in this paper. Consider the following examples:

(30)	OE infinitive form		OE past participle form			
	þēon	< * þīxan < *þiŋxan	geþungen [-ŋg-]	< *-ŋγ	to thrive
	fōn	< *fāxan < *faŋxan	gefangen [-ŋg-]	< *-ŋγ	to seize

The history of their infinitives: The loss of nasal before /x/ resulted in compensatory lengthening: *-iŋx > *-ĩːx > *-iːx, and similarly *-aŋx > *-ãːx > *-oːx (note that *-uŋx could not appear in this form of verbs). This loss was followed by breaking in the case of the front vowel *-iːx > -eːox. In the infinitives, /-eːoxan/ and /-oːxan/ lost their intervocalic /x/ with vacuous compensatory lengthening: /-eːon/ and /-oːn/ were long anyway. The past plural and past participle form of these verbs illustrate the effect of Verner's law: the *x was voiced to /γ/ because stress did not fall on the preceding syllable in these forms, and it became a stop after a nasal.

4 The reduction of velar clusters

Old English had a range of velar clusters in initial position. The phonemic status of /x/ deserves attention. Lass (1994:78) and Hogg (1992:95) include /x/ as a phoneme, and Lass claims that /h/ as a phoneme „did not develop until the loss of postvocalic /x/ sometime after 1600" (1994:75). It had, nevertheless, a [h] allophone already in OE, in initial positions, and Hogg (1992:94) treats [hn-, hl-, hr-, hw-] as containing the [h] allophone of /xn-, xl-, xr-, xw-/.

The clusters were a combination of one of the three velar obstruents /k g x/ followed by one of the liquids /l r/, or the glide /w/, or the nasal /n/. Clusters were also formed with other obstruents, just like in modern English: *fram* 'from', *fleax* 'flax', *dropa* 'drop', *smæc* 'smack, taste', *smiþ* 'smith', etc. It is noteworthy, however, that the velar clusters were eliminated from the system in the course of time. The following table gives a summary of the clusters as well as their later developments.

(31)   OE clusters   examples   modern reflexes of the examples

/xl-/   <hl->   hlæder   ladder
/xr-/   <hr->   hring   ring
/xw-/   <hw->   hwæl   whale
/xn-/   <hn->   hnutu   nut

/gl-/   <gl->   glæs   glass
/gr-/   <gr->   grund   ground
/gw-/   <gw->   -
/gn-/   <gn->   gnætt   gnat

/kl-/   <cl->   clif   cliff
/kr-/   <cr->   crabba   crab
/kw-/   <cw->   cwēn   queen
/kn-/   <cn->   cnēo   knee

It can be seen that the fricative clusters merged completely with the plain sonorants. It is interesting that the stops /k/ and /g/ are retained in /kl-, gl-, kr-, gr-, kw-/, and modern spelling still preserves the trace even of OE <cn-> and <gn->. Notice that <hw> has been retained as <wh> in modern English (and even in pronunciation in certain varieties). The retention of /gC-/ in parallel to /kC-/ indicates that the voiced velar fricative had already become a stop in OE in this postion. While the fricative clusters usually lost the velar element, in some important cases the velar has been retained as glottal /h/ to this day. In High German and Dutch the fate of the velar fricative was the same as in OE, but the stops /k g/ are still retained even in /kn- gn-/.

The development of the initial OE /xw/ cluster is interesting because of a small regularity. Words with /xw/ regularly lost the velar element: *hwær* > [weə] *where*, *hwonne* > [wen] *when*, *hwy* > [wai] *why*, *hwile* > [wail] *while*, *hwelp* > [welp] *whelp*, *hweol* > [wi:l] *wheel*, etc. However, forms like *how* [hau] and *who* [hu:] preserve the etymological velar as a glottal [h]. These forms are not quite as exceptional phonologically as they seem, rather the loss of the labial secondary articulation is due to the influence of the following labial vowel. The forms go back to OE *hū* and *hwā*, respectively. As can be seen, *hū* does not have /xw/

even in Old English. Campbell (1959:47-8) mentions that there was probably a change of *o >
u* after glide /w/, which was then lost: „O[ld]S[axon], OFris[ian] *hu* (in both languages beside
huo) suggests that the change could occur after *ū* in all the 'Ingvaeonic' area." This means
that there was a change **hwo > hu:* by the first written records in OE, with loss of the labial
secondary articulation of the original **xʷ-* (< IE **kʷ-*) before a labial vowel. This change is
not uncommon, of course, see for instance Latin *cum* from an Old Latin *quom* (Beekes
1995:63). The change is simply that the labial secondary articulation is suppressed
phonetically before a labial vowel: **kwu-* becomes *ku-*.

It seems now that a similar change happened later to *hwā*, although when /w/ was lost
cannot be determined exactly. The long vowel *ā* became close /o:/ before the Great Vowel
Shift – this is not quite regular, it should have become an open vowel: its raising was probably
due to the preceding /w/. At this stage, **hwo:* could change to *ho:*, with loss of the secondary
articulation. Then a form /ho:/ (or still /hwo:/) regularly became the modern form [hu:] by the
Great Vowel Shift. Alternatively, the /w/ was lost only after GVS had produced /u:/: *hwo: >
hwu: > hu:*. An additional example for the loss of secondary labial articulation may be a
poetic OE *hwōpan* 'to threaten', which may be the ancestor of modern *whoop* 'to give a loud
cry of joy or excitement'. This would explain why it has two modern pronunciations: /wu:p/
and /hu:p/.

5 Conclusions

The paper reviewed a number of phonological processes in the history of OE where velars
played a role. A number of small adjustments were proposed to describe and analyze these
phenomena more adequately.

In connection with nasal loss before Prim. Gmc. **/x/*, two proposals were made. First,
it was proposed that the velar fricative, lacking a phonological place of articulation, is too
weak to perform its governing duties over a preceding nasal. Therefore, nasality becomes
associated with the preceding vocalic slot (=nasalization). Second, it was argued that the later
loss of nasals before the other fricatives in OE and Old Frisian is quite reasonably the
continuation of the nasal deletion before /x/. This is supported by the unique development of
*/-aŋx/ in exactly the varieties where the nasal loss extended its scope of application.

In connection with the phonetic interpretation of breaking, it was put forward that the
phonetic realization may be a simple [ə] or [u], of a melodically empty vocalic slot.

As for the loss of /x/ between sonorants, it was argued that, for a certain, well-defined
class of words, those of a *-{l,r}x-* shape, the analysis assuming compensatory lengthening is
unwarranted because there is no conclusive positive evidence that compensatory lengthening
had ever taken place.

Finally, the reduction of velar clusters was presented, and a possible explanation was
offered for why there is a difference in the later development of *what, wheel, where* as
opposed to *who*. The role of the labial vowel following OE *xw-* was pointed out.

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Dániel Huber
PhD student in English Linguistics, ELTE, Budapest
huberd@freemail.hu