The Deletion of [x] in Proto-Germanic and in Old English

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Roh, Keun-Young. 2005. The Deletion of [x] in Proto-Germanic and in Old English. *SNU Working Papers in English Linguistics and Language* 4, 59-72. The voiceless velar fricative [x], one of allophones of the phoneme /x/, is deleted in Proto-Germanic and in Old English. This paper argues that the [x] is deleted when posited in three kinds of weak positions at mora, syllable, and foot level simultaneously: in the moraless position, in the onset of non-head syllable, and outside the head foot. Also, it is claimed that even though located in the strong position at the foot level, that is, in the head foot, the [x] is deleted if posited in the weak positions at both mora and syllable level: in the moraless position and in the coda of syllable. **(Seoul National University)**

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1. Introduction

This paper will explain the deletion of the voiceless velar fricative [x] in Proto-Germanic (hereafter PG) and in Old English (hereafter OE). Let us start by investigating which status the [x] has in PG and later in OE. In PG, the consonant phoneme inventory is as follows[1]).

1) Among consonant phonemes, k^w and x^w are labiovelars.

(1) PG Consonant Phoneme Inventory (Voyles 1992)

	bilabial	labio-dental	inter-dental	alveolar	alveo-palatal	palatal	velar
stops	p, b			t, d			k, k^w, g
fricatives		f	θ	s, z			x, x^w
affricates							
nasals	m			n			
liquids				l, r			
glides	w					j	

In this period, the phoneme /x/ is realized as two allophones [x] and [h][2]. The voiceless glottal fricative [h] appears word-initially, and the voiceless velar fricative [x] occurs elsewhere. The [x], one allophone of /x/, is deleted between sonorants in this period as the examples in (2) show[3].

(2) The [x]-deletion in PG

a. verb stem+infinitive ending

**seox+an* > **seo+an* > *sēon* 'see'
**fōx+an* > *fōn* 'receive'
**slax+an* > *slēan* 'strike'

b. stem+adjective inflectional ending

**nēax + is* > **nēais* > .. > *nearra* 'nearer'
'near + adj. comp.'[4]

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2) Scholars have disputed about whether the phoneme is /x/ or /h/. Following Hogg (1992), I consider /x/ as the phoneme here because I assume [h] occurs only word-initially in PG. Moreover, according to Kwon (2003), there is a general assumption among Germanic linguists that PG /x/ had weakened to [h] word-initially in the early OE.

3) The symbol '*' indicates reconstructed forms.

4) The following abbreviations are used throughout the paper: adj. (adjective), mas. (masculine), neut. (neuter), sg. (singular), pl. (plural), gen. (genitive), acc. (accusative), comp. (comparative).

c. within one morpheme
**ēaxu* > **ēau* > *ēa* 'water'
**hweoxul* > *hwēol* 'wheel'
**flēaxm* > *flēam* 'flight'

As seen in (2), the [x] is deleted not only at the boundary of morphemes as in (2a-b), but also within one morpheme as in (2c).

Let us turn to the consonant phoneme inventory in OE. The consonant phoneme inventory in OE is illustrated in (3).

(3) OE Consonant Phoneme Inventory (Moon 2002)

	bilabial	labio-dental	inter-dental	alveolar	alveo-palatal	palatal	velar
stops	p, b			t, d			k, g
fricatives		f	θ	s	ʃ		x
affricates					ʧ, ʤ		
nasals	m			n			
liquids				l, r			
glides	w					j	

In OE, the phoneme /x/ surfaces as three allophones [x], [ç], and [h]. The [x] appears after a back vowel or /l, r/ while the voiceless palatal fricative [ç] appears after a front vowel. [h] occurs elsewhere[5].

(4) The allophones of OE /x/ (marked by the spelling <h>)
a. [x]: *sōhte* 'sought', *þurh* 'through'
b. [ç]: *riht* 'right', *niht* 'night'
c. [h]: *hand* 'hand', *hlædel* 'ladle'

Among three allophones, [x] and [ç] are in complementary distribution. The [x] is deleted between sonorants in OE as well[6].

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5) [x]s and [ç]s in (4a) and (4b) respectively are pronounced in OE, but they are dropped in Present English.

6) The deletion of [ç] as well as that of [x] occurs in OE though few examples are

(5) The [x]-deletion in OE

a. stem+noun inflectional ending

mearh /mearx/ + *es* → *meares* [meares]
'horse + mas. gen.'

wealh /wealx/ + *as* → *wealas* [wealas]
'foreigner + mas. pl.'

b. stem+adjective inflectional ending

hēah /hēax/+ *ne* → *hēane* [hēane]
'high + mas. sg. acc.'

wōh /wōx/ + *ra* → *wōra* [wōra]
'wrong + comp.'

c. stem+derivational ending

hēah /hēax/ + *nes* → *hēanes* [hēanes]
'high + ness'

wōh /wōx/ + *lic* → *wōlic* [wōliʧ]
'wrong + ly'

As indicated in (5), the [x]-deletion in OE occurs only when morphological processes apply: inflection in (5a-b) and derivation in (5c).

Now look into the environment where the [x] in PG and OE is deleted in detail. The environment "between sonorants" covers the four cases in (6).

(6) a. Between vowels

PG: **bitwɨxun* > *betwɨ̄on, betwēon* 'between'
OE: *scōh* /scōx/ + *as* → *scōas* [scōas]
'shoe + mas. pl.'

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found: *eher* [eçer] > [eer] > ... > [ɪər] 'ear of corn' (Campbell 1959: 178).

b. Between a vowel and /l, r, m, n/
PG: **flēaxm* > *flēam* 'flight'
OE: *wōh* /wōx/ + *ra* → *wōra* [wōra]
'wrong + adj. comp.'

c. Between /l, r, m, n/ and a vowel
PG: **swerxa* > **sweorxa* > **sweora* 'neck'
OE: *feorh* /feorx/ + *es* → *fēores* [fēores]
'life + neut. gen.'

d. Between /l, r, m, n/s
PG: not found yet
OE: *þweorh* /θweorx/ + *ne* → *þweorne* [θweorne]
'crooked + mas. sg. acc.'

In the [x]-deletion, the metrical factor functions: in order for [x] to be deleted, the vowel before [x] must be stressed according to Hogg (1994). This fact is confirmed by the stress pattern of examples of the [x]-deletion:

(7) The stress pattern of the [x]-deletion in PG
a. **fóx+an* > *fóan*

b. **néax* + *is* > **néais* > .. > *néarra*

c. **bitwíxun* > *betwíon, betwéon*
**fléaxm* > *fléam*
**swérxa* > **swéorxa* > **swéora*

(8) The stress pattern of the [x]-deletion in OE
a. *méarh* + *es* → *méares* [méares]
scōh + *as* → *scōas* [scōas]

b. *héah* + *ne* → *héane* [héane]
wōh + *ra* → *wōra* [wōra]

c. *héah* + *nes* → *héanes* [héanes]
wōh + *lic* → *wōlic* [wōliʧ]

If the vowel after [x] is stressed, the [x]-deletion doesn't occur.

(9) *behíndan* 'behind', *behíldan* 'to depart'

Previous analyses of the deletion of [x] (Yang 2002, Kim 2005) have some drawbacks, and cannot offer a comprehensive account.

In this paper, I aim to argue that the [x] is deleted in two cases: (1) when located in three kinds of weak positions at mora, syllable, and foot level simultaneously and (2) when posited in the weak positions at both mora and syllable level, though not at foot level. The organization of the paper is as follows. Section 2 examines previous analyses of the [x]-deletion. In section 3, I provide a comprehensive explanation for the [x]-deletion. Section 4 concludes this paper.

2. Previous analyses of the deletion of [x]

In this section, two previous analyses of the deletion of [x], which claim that the [x] is deleted in prosodically weak positions, are examined.

2.1 Yang (2002)

Yang reviews previous rule-based analyses of the [x]-deletion (Lass and Anderson 1975, Keyser 1975, Kiparsky and O'Neil 1976, Peinovich 1979), and points out previous studies cannot explain the motivation of the [x]-deletion. He argues that the [x] is deleted in the onset of unstressed (non-head) syllable. The syllabification of some of data presented above confirms his argument:

(10) Between vowels: **fó.xan*, scó.xas
Between /l, r, m, n/ and a vowel: **swér.xa*, méar.xes
Between a vowel and /l, r, m, n/: **flé̞a.xm̩*

All the [x]s between vowels or between /l, r, m, n/ and a vowel are assigned to the onset of unstressed syllable. In case of **flé̞axm*,

the word-final *xm* cannot be a complex coda because *m* is more sonorous than *x*. Then, considering the sonority hierarchy, it is possible that *m* is a syllabic consonant (m̩), thereby functioning as a nucleus, and *x* is its onset.

Yang's argument can be justified by the fact that the onset position of unstressed syllable is viewed as a prosodically weak position in the literature (Vijayakrishnan 1999, Lavoie 2001). However, the [x]-deletion occurs in the coda of stressed syllable as well as the data in (11) show.

(11) The [x]-deletion in the coda of stressed syllable
wōh /wōx/+ *ra* → wṓx.ra (syllabification)→ [wṓra]
hēah /hēax/+ *ne* → hḗax.ne (syllabification)→ [hḗane]
hēah /hēax/+ *nes* → hḗax.nes (syllabification)→ [hḗanes]
Þwéorh /θweorx/+*ne*→θwéorx.ne (syllabification)→ [θwéorne]

The complex onset [xr] or [xn] is allowed only word-initially in OE (Hogg): **wṓ.xra*, **hḗa.xne*. Therefore, the [x]s in (11) are in the coda position of the stressed syllable, not the onset position of the unstressed syllable. As the data in (11) illustrate, the [x] syllabifying as the coda of stressed syllable is located in the environment between a stressed vowel(+sonorant) and sonorant+vowel sequence:

(12) V́(S)[x]SV
wṓx.ra
hḗax.ne
hḗax.nes
θwéorx.ne
(V́: stressed vowel, V: vowel, S: sonorant)

2.2 Kim (2005)

Kim accounts for the [x]-deletion in terms of the domain of the foot. He assumes that the foot type in Germanic and in OE is the bimoraic trochee, which is formalized as in (13):

(13) The bimoraic trochee in Germanic and in OE

a. (Ĥ) b. (ĹL)

| ||

mm *m m*

(( ): foot boundary)

One heavy syllable (13a) or two light syllables (13b) form the foot due to its bimoraic requirement. The direction of footing is from left to right and the footing is non-iterative (non-exhaustive). Thus, the only one foot is constructed at the left edge of stem (word)[7].

In Kim's foot, the Consonant Extrametricality rule (as a notion of metrical theory), which makes the word-final consonant not be counted in the foot, in other words, extrametrical, is not applied. As a result, words ending in a consonant or consonants like *scōh*, *wōh*, *hēah*, or *thweorh* have the following foot structure[8]:

(14) (scōx), (wōx), (hēax), (θweorx)

*(scō)<x>, *(wō)<x>, *(hēa)<x>, *(θweor)<x>

If a word is composed of a long vowel and more than one coda consonant in the case of words in (14), it is assumed that the long vowel is linked first to two moras and the word-final consonants remain moraless because of the bimoraicity of the foot: (scō$_{mm}$x), (wō$_{mm}$x), (hēa$_{mm}$x), (θweo$_{mm}$rx).

A finally important aspect of Kim's foot is that the footing is cyclic. The foot is imposed on a stem before the morohological processes, affixation or compounding, apply. After affixation or

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7) Even if the footing is iterative unlike Kim's footing, only one foot remains at the left edge of words. All the words where the [x]-deletion occurs are disyllabic, and thus their second syllables are the final syllables. In OE, final syllables are said to be unstressed by Destressing Rule (Dresher and Lahiri 1991) even though they are heavy (Light final syllables are unfooted). Furthermore, the final syllables of all OE words correspond to the suffixes, which get unstressed in OE. Also, in all PG words, the final syllables, which the suffixes like *-an* or *-is* consist of, are unstressed although some superheavy suffixes having the form VCC, longV+C, or longV+CC(C), not found in all PG words where the [x]-deletion happens, become stressed (D'Alquen 1988).

8) The angled bracket < > indicates "extrametrical".

compounding, the footing occurs again.

(15) *fōx > (fṓx) (FC) > (fṓx)+an (A) > (fṓ).xan (ReSy and ReF)
wōx> (wṓx) (FC) > (wṓx)+ra (A) > (wṓx).ra (No ReSy & ReF)

(FC=Foot Construction, A=Affixation, ReSy=Resyllabification, ReF=Refooting)

Kim argues that the [x] is deleted when it is located outside of the head foot, in other words, when it is not parsed in the foot. Let us check if all the [x]s to be deleted come to be outside of head foot. The foot structure of examples in (10) and (11) is illustrated in (16a) and (16b) respectively.

(16) The foot structure based on Kim
a. The [x] in the onset of unstressed syllable
*fōx> (fṓx) (FC) > (fṓx)+an (A) > (fṓ).xan (ReSy and ReF)> (fṓ).an ([x]-deletion)

(scṓ).xas > (scṓ).as
*(swér).xa > (swér).a
(méar).xes > (méar).es
*(flḗa).xṃ > (flḗa).ṃ

b. The [x] in the coda of stressed syllable
wōx>(wṓx) (FC)> (wṓx)+ra (A)> (wṓx).ra(No ReSy &ReF) > (wṓ).ra ([x]-deletion)

(hḗax).ne > (hḗa).ne
(hḗax).nes > (hḗa).nes
(ɵwéorx).ne > (ɵwéor).ne

The [x]s in the onset of unstressed syllable are outside of head foot as seen in (16a), but those in the coda of stressed syllable are within the head foot as shown in (16b). Thus, it is obvious that his argument that the [x] is deleted only outside of foot is wrong.

3. A comprehensive explanation for the [x]-deletion

In this section, the [x]-deletion patterns will be analyzed in a comprehensive way.

It has been shown in the preceding section that at the syllable level the [x]-deletion occurs not only in the onset of unstressed syllable, but also in the coda of stressed syllable. The [x]-deletion in the coda is a natural process in that the coda position of syllable is regarded as a prosodically weak position (Beckman 1998, Kirchner 1998, Koo 2003). In addition, there exists a new kind of the [x]-deletion occurring in the coda. This deletion occurs between a stressed vowel and a voiced obstruent like /b/ or /d/ as both Campbell (1959) and Hogg (1992) point out. They find that the [x]-deletion in this context is restricted to cases of compounding as we see in (17)[9].

(17) The [x]-deletion between a stressed vowel and a voiced obstruent (Hogg 1992: 278)
PG: **wíx-bèod* > *wéofòd*[10] 'altar'
OE: *hēah+dēor* /hēaxdēor/→ *héadèor* [héadèor]
'high, major + dear' → 'a male adult dear'

In terms of syllable structure, the [x] is in the coda of stressed syllable because [xb] or [xd] is not allowed as a complex coda by phonotactics of PG and OE according to Hogg (1994) although it maintains the sonority hierarchy. The examples of [x]-deletion in (17) can be represented in terms of foot and prosodic word as in (18)[11]:

(18) PG *[[(wíx)] [(bèod)]]

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9) The compounds allowing the deletion don't have the full meaning of their components. The compounds that maintain the full meaning of components block the deletion: *héahbùrh* 'high, major + city'→'chief city' (Campbell 1959)
[x]

10) For the substitution of *f* for *b*, see Hogg (1992).

11) The prosodic word boundaries are represented by the square brackets.

OE [[(héax)] [(dèor)]]

The new [x]-deletion offers support for the fact that the [x] can be deleted in the coda position of syllable.

Now turn to the analysis of the [x]-deletion in terms of foot, which is a higher prosodic unit than syllable. First, let us see the [x] in the onset of unstressed syllable. The [x] in the onset of unstressed syllable is outside of head foot (see (16a)). Therefore, it can be said that this [x] is posited in two kinds of prosodically weak positions simultaneously, one at the syllable level and the other at the foot level, and thus deleted.

However, the [x] in the coda of stressed syllable is within foot, more precisely in the final position of head foot (see (16b) and (18)). We can say that this [x] is located in a weak position at the syllable level, but not in a weak position at the foot level.

Here, the question of why the [x] in the final position of head foot is deleted should be answered. I will seek to explicate the [x]-deletion within foot in terms of mora, the lowest prosodic unit. Recall that the foot in Germanic and OE allows up to two moras following Kim[12]. Kim claims if a stem is composed of a long vowel and more than one coda consonant, the long vowel is linked first to two moras and the stem-final consonants remain weightless because of the bimoraicity of the foot (stated earlier in section 2.2). The matter of fact is that the vowels before the [x] within foot are all long:

(19) The [x] within foot (the final position of head foot)
  a. the [x] between a stressed vowel+(sonorant) and sonorant+vowel sequence
    (wṓx).ra (No ReSy & ReF) > (wṓ).ra ([x]-deletion)
    (héax).ne > (héa).ne
    (héax).nes > (héa).nes
    (θwéorx).ne > (θwéor).ne

12) The bimoraicity of foot has been assumed in the literature (Dresher and Lahiri 1991, Halle, O'Neil and Vergnaud 1993, Idsardi 1994).

b. the [x] in compound
*[[(wɨ́x)] [(bȅod)]] → [wɛ́ofòd]
[[(hɛ́ax)] [(dȅor)]] → [hɛ́adȅor]

As a result, the [x]s can get no mora due to preceding long vowels like *ō*, *ēa*, *eo*, and *ī* though they are within foot. Mora, as the lowest prosodic unit, is a unit of weight, and is considered the stressable element (Dresher and Lahiri 1991, Halle, O'Neil and Vergnaud 1993, Idsardi 1994). Accordingly, it can be said that the [x]s in (19) which don't occupy mora are "weak" in terms of mora. Thus, I suggest a scale concerning mora:

(20) Prosodic strength scale based on mora
Coda consonant with one mora > Coda consonant without mora

As for the consonants in onset, they inherently lack mora, and thus they can be considered as weak at the mora level. The final version of the scale in (20) is as follows:

(20′) Prosodic strength scale based on mora
Coda consonant with one mora > Coda consonant without mora
Onset consonant

We can say that the [x]s in (19), though in the strong position at the foot level, in the head foot, are deleted for two reasons: (1) they occupy the moraless position and thereby they are weak at the mora level, and (2) they are posited in the coda, which is weak at the syllable level.

In sum, the [x]-deletion occurs in following two cases. First, the deletion occurs when the [x] is posited in three kinds of weak positions at mora, syllable, and foot level simultaneously: in the moraless position, in the onset of non-head syllable, and outside head foot (The segments in the onset of syllable inherently lack mora, and thereby they are always weak at the mora level). Second, the deletion happens in the case that the [x] is posited in the weak positions at both mora and syllable level, in the moraless position

and in the coda of syllable, even though located in the strong position at the foot level, that is, in the head foot.

4. Conclusion

I have investigated the deletion of the voiceless velar fricative [x], one allophone of phoneme /x/ in PG and OE. The discussion is summarized in (21).

(21) Two cases of the deletion of [x] in PG and OE
   a. in three kinds of weak positions at mora, syllable, and foot level simultaneously: in the moraless position, in the onset of non-head syllable, and outside head foot.

   b. in the weak positions at both mora and syllable level: in the moraless position and in the coda of syllable (though in the strong position at the foot level, in the head foot)

I suggest that both the coda consonant without mora and the onset consonant lacking the mora inherently are prosodically weak at the mora level. The finding in (21b) implies that the weakness at mora and syllable level overrides the strongness at foot level in PG and OE. It has been also observed that the segmental environment where the [x]-deletion occurs comprises not only the enviroment between sonorants, but also the one between a stressed vowel and a voiced obstruent (in the case of compounding).

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