

**Eötvös Loránd Tudományegyetem
Bölcsészettudományi Kar**

DOKTORI DISSZERTÁCIÓ

HUBER DÁNIEL

**“VELARS AND PROCESSES: THEIR TREATMENT IN
PHONOLOGICAL THEORY”**

**„VELÁRISOK ÉS FOLYAMATOK: FONOLÓGIA-ELMÉLETI
ELEMZÉSÜK”**

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Budapest, 2007

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Acknowledgements

Although I am only responsible for the content and outlook of this dissertation, many people have helped me in writing this work, and I thank them all. Many of them gave me hints on what to do and what to avoid, and some of them, especially my family and friends, made it possible for me to devote myself to writing. A special thank-you goes to Péter Szigetvári, my supervisor, who meticulously read early drafts of everything I have written and made a number of comments and suggestions without which this work would be much poorer both for its contents and its outlook – even though he still might frown at me for some of the typological aspects of the work. Also, to Professor László Varga, the head of the Doctoral Programme in English Linguistics, for helping both in the administrative matters and for reading and commenting on my research papers, the earliest versions of the following ideas. Ádám Nádasdy also read many of the articles, published or not, that eventually found their way into the chapters to follow – hopefully, he will realize that I have kept most of his suggestions, and probably he will not reproach me for not keeping a few of them. I also owe much to Attila Starčević for discussing aspects of my ideas on velars. I thank Gizella Nagy for the articles she directed me to. Of course, everybody else at the Department of English Linguistics has supported me in many many ways, I thank them all.

There were numerous people outside ELTE as well who offered considerable help. First and foremost, I thank Mónika Fischer, from the University of Szeged, for getting me a copy of Paradis and Prunet (1991). Most of the ideas put forward here were aired at conferences and workshops, in particular at the Budapest Vienna Phonology Circle, the Manchester Phonology Meeting and the conferences for doctoral students in Szeged and Bilbao. Many people gave me feedback on what they thought about my dealing in velars, but Monik Charette, Tobias Scheer, Ilona Kassai and László Kálmán must be mentioned by name – all of them are to be thanked.

Furthermore, it was a major incentive for the research on this dissertation that part of the research could be carried out at SOAS, London, between September 2005 and January 2006, supported by a grant from the Hungarian State Eötvös Scholarship.

Chapter 1

Introduction: velars are placeless

1.1 Thesis

The following dissertation more or less approximates the work I was looking for when I embarked on researching the phonological behaviour of velar consonants. No doubt, many problems will still remain unresolved and left for future research. Nevertheless, I hope the following thesis will be proven using a large set of data from a range of languages:

(1.1) Thesis:

I assume velars to have a phonological representation where place specification may be accommodated, but this hosting site is left empty.

In other words, I assume velars to be placeless in their phonological representation. This hosting site can have a number of formulations, depending on the particular phonological model. It can be conceived as a Place node, like in Feature Geometry, or an element tier as in Government Phonology, or a particular dependency relation as in Dependency Phonology. According to the thesis, velars share the *presence* of this hosting site in their representation with labial and coronal consonants (and with vowels, of course), while differing from labials and coronals in not having anything to occupy this hosting site.

The assumption of the *emptiness* of this hosting site is proposed for two reasons. The most important reason is that the behaviour of velars supports exactly this representation – aspects of the evidence will be treated all through the dissertation. The other reason to represent velars as placeless is to tell them apart

from glottals (or laryngeals), which are also placeless, but they even lack such a hosting site altogether – there is fairly general agreement among phonologists for this latter position to need detailed documentation and analysis in the present work (see Lombardi (2002) for a detailed exposition of this issue; see Steriade (1995:135-136), too). Graphically, velars have then the following representation:

(1.2) node, tier, etc > PLACE
 |
 specification > —

The thesis is supported by phenomena from a range of languages. Vocalizations of velars, palatalizations of velars, and velar-to-labial changes are all analyzed as filling in the empty place-hosting site of velars, while the various reductions to velars as losing place properties, but not the hosting sites themselves, to yield velars, that is, to leave a bare place site behind. Velar vocalizations uniformly yield glides /j w/, the identity of which is determined by the adjacent vowel: the place property of the vowel spreads into the empty place-hosting site of the velar. Palatalizations similarly involve the spreading of the palatality of the vowel into the empty place-hosting site of velars. Often, labio-velars become labials: this involves the reconfiguration of labiality, from a dependent to a dominant position, or to put it differently, from the secondary place of articulation (as they are called in traditional phonetics) to the primary place of articulation. Labio-velars also turn into simple velars: this is simply the loss of labiality. Velars are frequently the result of various reductions: these involve the loss of the place properties, leaving a velar behind. Finally, sometimes a glide [j] strengthens to a [k], which is taken to be a case where a glide becomes the minimal oral stop.

So far the thesis may appear straightforward. There seems to exist, however, a general agreement in contemporary phonological thinking (practically all through the generative history of phonology) that there is a direct relation between placelessness and unmarkedness: what is placeless is unmarked. Accordingly, in the light of the thesis proposed here, velars should be interpreted as the unmarked place of consonantal articulation. However, there is an equally

general agreement that the unmarked place of articulation is coronal rather than any other place, as put forward in Paradis and Prunet (1991), in particular (see also Steriade (1995) on this issue). I will, therefore, propose that placelessness and unmarkedness do not go hand in hand. In fact, all that I will be arguing against is that coronals are placeless. But I will leave the question open which place of articulation, if any, should be considered the *unmarked* place of consonantal articulation. I will demonstrate that quite a number of the most frequently cited cases in support of the unmarked status of coronals do not seem to constitute firm evidence for coronal unmarkedness (and in fact for markedness in general). This suggests that if coronals are still to be considered unmarked, it will have to have a different reason – such is proposed by Nasukawa and Backley (2004).

As for markedness issues, I will accept the proposal by Hume (2003, 2004), and Hume and Tserdanelis (2002) that the markedness issues of places of articulation are perhaps better viewed as language-specific, rather than universal, and that “there is no single, universal unmarked place of articulation” (2002:442). In their article Hume and Tserdanelis provide convincing evidence for labial unmarkedness in Sri Lankan Portuguese Creole, which is based on assimilation data (coronals resist assimilation to labials and velars), and nasal deletion (only /m/ may be deleted, but not /n ŋ/). In addition, two other received diagnostics of markedness, distribution and frequency, also unequivocally select labial as the unmarked member among the nasals of Sri Lankan Portuguese Creole (2002:447). It has to be added, though, that all these markedness relations hold explicitly for nasals (for instance, “only nasals undergo assimilation”, 2002:450, N12) – there are no hints about the similar or identical behaviour of obstruents in the system. (For a possible drawback of this approach see section 3.6 below.) Nevertheless, their conclusion (2002:449) is worth keeping in mind: “markedness considerations do not provide compelling motivation for arguments concerning the structural representation of place features”. They actually predict, using OT rankings, that any place (or places) may appear as unmarked in a given language (2002:454). Finally, Hume (2003) gives a detailed account of how the interpretation of markedness relations changed throughout the history of

phonology, and she draws attention to the fact that Trubetzkoy used the term in a language-particular context (see section 3.1.2) – there was originally no universality about this term.

The major problem with markedness is that the diagnostics often imply contradictory assumptions. Diagnostics include phonetic and/or articulatory simplicity, neutralization, epenthesis, assimilation, segment deletion, distribution, structural complexity, language acquisition, sound change, cross-language frequency, creole genesis and implicational relations (Hume 2004:2). From among all these diagnostics, only implicational relations will be shown to be of real use in the discussion of the markedness relations of places of articulations. Nevertheless, for Hume the decisive factor is *predictability* and this follows from functional load, social factors and, most importantly, linguistic experience (2004:4). She concludes that “the traditional markedness diagnostics (...) provide evidence for a speaker/hearer’s experience with some element of his/her language” (2004:8). From this it follows that elements that speaker/hearers have more experience with will have less information content (hence likely to be deleted, reduced). Or, speaker/hearers are more biased towards these elements, particularly when information specifying a sound is indeterminate (2004:10). She reaches the conclusion that “[u]nmarked elements are those that have a high degree of predictability within a system (or a given context).” (2004:13). Notice that markedness has no direct consequences for the representation of places of articulation because it is not defined in terms of place, but in terms of predictability. This stance is consistent with my proposal as far as the direct causal relationship between placelessness and markedness is denied.

I am not aware of extensive studies that give detailed empirical support for the view put forward here. The idea that velars are placeless is not new, however: Trigo’s (1988) dissertation, as cited by van der Hulst (1994:472), seems to have made a similar, yet crucially different claim. The major difference is that while Trigo identifies velars as placeless (just as it is proposed here), she also assigns the unmarked status to velars. I have nothing similar to state, I will deny that assumption. Again, it is an important aspect of the argumentation below that the

above representation for velars does *not* imply that velars are the unmarked consonantal place of articulation. Rather, my claim is that these two issues, placelessness in representations and markedness, are independent problems.

As a matter of fact, certain phonological theories have already implicitly held that velars lack a phonologically relevant place of articulation. For one, Harris and Lindsey claim (1995:67): “Vocalization of velars (...) typically results in reduction to zero, sometimes via F. This development is not unexpected, given the assumption that velar resonance is associated with the element [ʔ]”. They do not specify how this assumption can be verified. Incidentally, radical CV phonology (van der Hulst 1994, 1995) also claims that velars are placeless. This dissertation can be read as substantiating this assumption of government (and dependency) phonology.

1.2 The method

1.2.1 Sources for the research

The velars the phonological behaviour of which I am discussing are /k g x F/ as well as /ŋ/ occasionally. Articulatorily, these sounds are produced in the region extending from the start of the soft palate, the velum, back as far as the uvula. Note that I will not be explicitly discussing the behaviour of uvular sounds, but there are some remarks on this choice. The difference between velar and uvular places, in articulatory terms, is not as clear as that between, say, the hard and the soft palate. Especially, the voiceless uvular stop /q/, in Arabic for instance, must be in fact far forward in the velar region for complete closure to be possible. On the other hand, uvular trill and fricative, [Q X], as attested in German and French, are often lumped under velars in systems where they are not in opposition with velars. In other words, although I am not explicitly treating uvulars, there may be

good reasons for their inclusion in this group (see Clark and Yallop 1995:40-41). Pharyngeals and glottals, on the other hand, are obviously produced at a different place.

The fact that velars lack a phonologically relevant place of articulation does not mean, of course, that they are not articulated at some place. Obviously they are produced with the tongue raised against the velum, accompanied by laryngeal and resonance activity as required for aspiration or voicing, for instance. But it seems to be the case that they lack a place of articulation which could be relevant *phonologically*. In other words, no phonological rule can make direct reference to a velar place. It can be said then that what sets velars apart from segments which are produced at a labial and a coronal place of articulation is that velars are not produced at either of these places. Phonologically thus, velars are neither labials nor coronals and this is exactly what makes them phonologically distinct.

For the collection of data, I have researched various journal articles and books, some of which are hard to access. The advantage of these works is that practically none of them were written for the specific purpose I am using them for. In addition, I have used various monolingual and bilingual dictionaries I deem reliable as well as etymological dictionaries for checking meaning and etymology. It has to be noted, however, that no special emphasis was laid on philological detail beyond necessity. For Spanish, I have used the Clave dictionary, which contains etymological information – I have checked these against Corominas (1961). For Galician, the Xerais dictionary was used, which also has etymology (apparently agreeing with Corominas). Hall (1960) was used for Old English. Le Robert Micro was used for French because it brings IPA transcription for each entry. The dictionaries I used are listed separately in the Bibliography; I do not usually refer to them in the text, though.

I have also incorporated earlier work in the present dissertation. In particular, Chapter 2 draws on a presentation, Huber (2006e), Chapter 3 on a paper, Huber (2006a), Chapter 7 on Huber (2006b), section 4.4 on Huber (2007?) and Huber (2006f). All these pieces have been thoroughly revised, corrected and

expanded for this dissertation.

1.2.2 *Phonological theories*

It is important to point out at the outset that I do not intend to defend one particular phonological theory. Nevertheless, underlying the present dissertation is the framework of government phonology (Harris 1994, 1997, Harris and Lindsey 1995, KLV 1990, etc), especially its VC version (Dienes and Szigetvári 1999, Szigetvári 2000, 2001). Since it is not my primary aim to contribute to on-going debates within this theory, I will now limit my presentation of the framework to its essential properties and tenets. This theory is chosen because it is a very restrictive theory, hence it has great predictive power, and it is actually capable of handling the material to be analyzed, and also because at least some approaches within the theory assume that velars are placeless. (Incidentally, a similarly restrictive theory, Dependency Phonology, also claims that velars are placeless, as will be presented in Chapter 2).

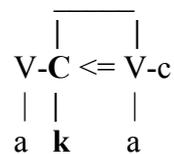
VC phonology (as described in Dienes and Szigetvári 1999) gets its name from its basic tenet that the skeleton is made up of strictly alternating VC units where V and C are claimed to have inherent properties: vowels are inherently loud and “want” to be pronounced, whereas consonants are inherently mute and remain so unless an “external force” intervenes, such as being lexically linked to melodic primes. The only forces that are allowed to operate between the VC units of the skeleton are *government* and *licensing*. These terms are not new to phonology, but they get a slightly different interpretation in this theory. Government is seen as a force which intends to destroy the inherent properties of V’s and C’s, and licensing helps support melodic structure. It is important to point out that government and licensing are not antagonistic forces, they have different duties to carry out. Obviously, these restrictions on the theory greatly enhance the amount of lexical stipulation, which might not be such a repellent side-effect on closer inspection (but this is not germane to the argumentation here).

Two types of weakening are distinguished, which are both relevant for the



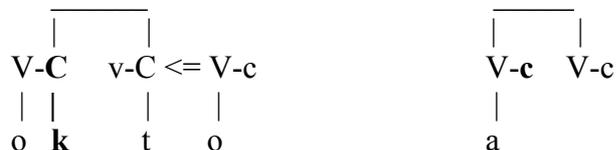
A licensed and governed consonant both precedes and follows a full, that is, pronounced vowel (the first /a/ below). Vocalic lenition is then predicted in this configuration (as will be the case in Spanish spirantization of voiced stops or velar vocalizations intervocalically):

(1.5)

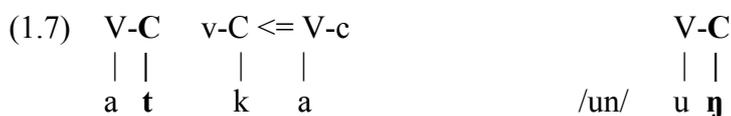


Either vocalic or consonantal lenition (or both) is expected when the consonant, the first *C* or *c* below, is unlicensed and is governed (as will be shown in preconsonantal reductions to glides in Galician and Spanish *-kt*-clusters):

(1.6)



The fourth possibility, when a *C* slot is neither licensed nor governed, accounts for cases of consonantal lenitions (such as glottalization in English, word-final reductions to velar nasals in Galician or dialectal Spanish):



Government Phonology operates with element tiers to host the elements, the privative units of its representations. Backley (1995) offers a *tier geometrical analysis* of how elements are arranged under the *C* and *V* slots of the skeleton. If his description is combined with the skeleton as defined by VC phonology, a re-evaluation of lenition (and strengthening) can also be done. Backley's theory has

two assumptions: one is that *all positions contain all melodic elements* (that are required by the system at hand) and the other is a mechanism of *tier-activation*. (This idea of alignment is worked out in considerably more detail in Backley and Takahashi (1998), but most of that illuminating argumentation is not really necessary for the present purposes.)

Backley sets out from the hypothesis (1995:431) that “all melodic primes (while respecting language-specific tier configurations) are latently present at every position on the timing tier, and that in the event of an element being lexically activated, it can (potentially) be interpreted.” In other words, melodic elements (A, I and U for vowels) are all there on the timing tier, where they rest on their respective melodic tier even if they are not active. This hypothesis is meant to offer a better alternative to the approach with heads and dependents, which assumed an asymmetrical relationship between the melodic units of a structure. In Harris and Lindsey’s (1995) theory, for instance, alternations in the identity of a stressed vowel of the same morpheme under certain licensing conditions are explained in terms of head-switching, which simply means that the dependent and the head switch function. This mechanism is also put to use in ATR contrasts between pairs like ATR /e/ and non-ATR /ɜ/, both containing elements I and A (as well as the neutral element @), differing only in which occupies the head position (heads are underlined):

$$(1.8) \quad /e/ = \{A, \underline{I}, @\} \qquad /ɜ/ = \{A, I, \underline{@}\}$$

Backley (1995:402-405) correctly argues that head-switching as an operation is in fact a violation of the Structure Preservation Principle because it changes pre-set oppositions on the surface. In fact, he is claiming that heads should be dismissed from representations once no use is made of them in head-switchings. His argumentation to prove this point is not relevant for the present purposes, but its implications do bear on velars since in element theories, velars are usually taken to be headed by the empty element (see section 2.5), and there should be nothing in principle that would prevent exactly the type of head-

where the unsplit I/U-tier is aligned to match the tier-configuration of the adjacent segment. Since this segment follows the C slot, it is naturally interpreted as a licensing effect obtaining between the two positions. It is noteworthy that the tier must be unsplit since the I and U elements are never allowed to combine in velars. What is peculiar about this setting, though, is that it seems to be blind to the potential governing effects since it does not show modifications under government. To be less cryptic, consider the two strings below:

$$(1.11) \quad v-C \leq V-C \quad \text{and} \quad V-C \leq V-C$$

The configuration to the left is taken to be that of a word-initial position whereas the one to the right is that found between two full vowels. As the double arrows show, the C's of the first VC units are licensed by the following full V. It means that they are capable of supporting melodic material since the melodic tier is licensed. The governing potential of the second vowel is absorbed by the empty nucleus in the first case, but it is absorbed by the governed C in the latter case, yet the outcome does not show any difference: both can surface as the affricate /tS/, for instance. The operation of palatalization itself is simply an alignment of the I element on the I/U-tier (with the complement tier represented by a line slanting to the right):

$$(1.12) \quad \begin{array}{c} v-C \leq V-C \\ | \quad | \quad \quad | \quad | \\ x \quad x \quad \quad x \quad x \\ | \quad | \quad \quad | \quad | \\ \text{I/U-tier} \quad [] \quad [] \leq [I] \quad [U] \\ \quad \quad \quad | \quad \quad \quad \backslash \quad | \quad \backslash \\ \quad \quad \quad | \quad \quad \quad [I] \quad | \quad [U] \\ \text{?-tier} \quad \quad [?] \quad \quad \quad [] \\ | \quad \quad \quad | \\ \text{H-tier} \quad \quad [H] \quad \quad [H] \\ \\ \quad \quad \quad k \rightarrow c \quad i \quad f \end{array}$$

For a structural problem with the representation above, see the passage following (2.29).

Phenomena where labiality is acquired are more tricky. Two possibilities will be encountered. In English, the velar fricative changes into the labial fricative in word-final position, while in Rumanian velar stops in pre-consonantal as well as in intervocalic position were affected. The word-final position is neither governed nor licensed, consequently consonantal lenition is expected. Yet, there is an U element which gets interpreted in English despite the expectation to lose rather than gain melody in this position. Fortunately, there is a source for this: this time it is the preceding U element which gets aligned. In the Rumanian data, both pre-consonantal and intervocalic positions are governed (and only the latter is licensed at the same time). Gaining melody is not expected under government (see 7.3.2-7.3.3 for a detailed analysis).

Loss of velars is the result of their I/U-tier being unlicensed, when they cannot activate further tiers, namely the ?- and H-tiers. On the other hand, reductions to velars are cases where the melodic elements are suppressed through government, but the tiers themselves remain active and keep tiers below active as well.

The proposed expression of velar segments in element terms is the following (with the status of H/h unsettled):

(1.16)	/f/	/g/	/x/	/k/	/kʰ/	/kʷ/	/p/
	x	x	x	x	x	x	x
						/ \	
I/U-	[]	[]	[]	[]	[]	[] [U]	[U]
tier							\
							[U]
?-tier	[]	[?]	[]	[?]	[?]	[?]	[?]
H-tier	[]	[]	[H]	[H]	[H]	[H]	[H]
					\		
					[H]		

This is where the problem of telling /x/ and /h/ apart becomes a burning issue. As can be seen, the former is headed while the latter is not. This translates

into an expression with *H* complement-tier for /x/ and a single *H*-tier for /h/. To argue that it is /h/ which lacks a complement-tier is supported by the well-known reductions to /h/ as the last stage on the lenition trajectory. But now the question arises where /x/ got the power from to license a complement-tier which had not been licensed either in /f/ or /p/? It is to be observed that in these labials the U-tier contained a complement tier, but the protocol to transfer this earlier right to maintain a complement is far from clear as yet. If a means could be found to achieve this, probably not much more would be needed to split the expression in (1.16) above. Furthermore, it is not clear either how a H-tier can maintain a complement tier once it is not even a melodic tier. A simple glottal stop and /h/ lack an active I/U-tier. What these structures imply for other consonants is not yet clear. This line will be left to future research.

1.2.3 *Structure of the dissertation*

The dissertation consists of nine chapters. The Introduction is followed by two theoretical chapters and five data chapters. Chapter 2 discusses the representation of velars and coronals across phonological theories, and the conclusion will be drawn that the placelessness of velars is not incompatible with a range of phonological theories, from distinctive feature theory (Jakobson and Halle 1956) through feature geometry (Clements and Hume 1995) to government (Harris and Lindsey 1995, Dienes and Szigetvári 1999, and others) and dependency phonology (van der Hulst 1994). It will also be pointed out that coronality can be fruitfully associated with palatality, for instance. Chapter 3 investigates the behaviour of velars from the perspective of markedness, and establishes that placelessness and consonantal markedness do not imply each other. In the meanwhile certain aspects of epenthesis, frequency, assimilations will be discussed. Chapter 4 presents and analyzes the changes to velars through the history of English, especially its Old English period. Chapter 5 analyzes velar processes in the history of Romance languages, especially Iberian Romance and French. The next chapter brings in evidence from a number of non-Indo-European

languages such as various Tai and Chinese varieties as well Hungarian and Semitic. A separate chapter, chapter 7 is devoted to a discussion of velar and labial interactions, while chapter 8 analyzes velar palatalizations and other velar–palatal interactions. Conclusions and bibliography closes the dissertation.

1.3 Results

The dissertation contributes to the debate what representation velars should be assumed to have. The thesis denies that there is a direct link between placelessness and markedness. This approach allows us to concentrate on representations and processes, based on a wide range of linguistic data. In connection with representations, it will be concluded that there is no universal agreement that coronals universally lack a place of articulation. Lowness or even frontness, for instance, seems to be a suitable feature to represent coronals. Some of the data have not yet figured in a detailed discussion on velars. Moreover, some of the phenomena that are often cited to show the placelessness/unmarked status of coronals will be shown not to show this.

The dissertation also aims at analyzing a range of velar processes. A number of small adjustments to earlier treatments of certain processes will be proposed to describe and analyze these phenomena more adequately. To give a brief overview: (i) To account for the different patterns of nasal loss before Primitive Germanic */x/ on the one hand, and /s f T/ on the other, it will be 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). To put it differently, the velar /ŋx/ cluster is the most unstable of all the nasal–fricative clusters of Prim. Germanic because the velar does not have a place specification to share with the preceding nasal. (ii) In connection with the phonetic interpretation of Old English breaking, it will be put forward that the phonetic realization is rather a simple [ə]. (iii) As far as OE /hw/ clusters are

concerned, a possible explanation will be offered for why there is a difference in the later development of *what*, *when*, *wheel* as opposed to *who*. The role of the following labial vowel is pointed out. (iv) As for the loss of /x/ between sonorants in OE, it is argued that, for a certain well-defined class of words, the traditional analysis assuming compensatory lengthening is unwarranted because there is no positive evidence, either in the written sources or in phonological thinking, that compensatory lengthening took place in words of the *-{l,r}h* type. (v) As for labio-velar > labial changes, it will be shown that they occur in prevocalic positions, whereas reductions of labials to velars happen in preconsonantal and word-final positions.

A range of phenomena will be discussed from the history of Romance languages, Finno-Ugrian languages such as Hungarian, from Semitic and also from East and South Asian languages. While a wide scope of systematic data collection was aimed at, unfortunately African and American Indian languages are not often cited, and not analyzed for velar processes.

Beyond providing considerable empirical support for viewing velars as placeless, the dissertation has some practical consequences. In at least three cases, the analyses provided here offer a better and more thorough analysis, which in addition draws these seemingly isolated cases into the sphere of more general phenomena. (i) In Hungarian, the word *uborka* comes from *ugorka*. The received explanation involves dissimilation of *g...k* to *b...k*. Here it will be analyzed as the spreading of labiality from the vowel to /g/, which is placeless. (ii) For similar considerations, it will be proposed that two Tai words can be related. (iii) Furthermore, a phonologically justified explanation will be offered for alternations like /hu:ps wu:ps/ for *whoops*.

Chapter 2

On the representation of coronals and velars across theories

2.1 Introduction

This chapter discusses the representations of coronal and velar consonants in selected phonological theories. The major aim of this discussion is to show that, as opposed to the view of underspecification theories and the feature geometry view on coronals presented in Paradis and Prunet (1991), there is in fact no universal agreement across phonological theories that coronals universally lack a place of articulation. This issue is, of course, closely related to the major thesis of this dissertation, where velars are claimed to lack a phonologically relevant place of articulation.

To argue for the view that coronals indeed have a place of articulation or that velars do not have such, the mere presentation of a number of theories to support either position is not enough since this issue cannot be decided unequivocally by referring to various theories. Nevertheless, it is instructive to review the implicit or explicit ideas put forward in the literature because they help establish a more balanced view on the representation of consonantal places of articulation than the allegedly universal placelessness of coronals. Indeed, reviewing the representation of places of articulation in some phonological theories, the following observations can be made in particular:

- (2.1) (a) the basic ingredients for the velar placelessness view are implicit even in the distinctive features of classical generative phonology;
- b) some varieties of feature geometry are equally not incompatible with the view that velars are placeless;
- c) government phonology (and radical CV phonology) explicitly claims that velars are “empty”, and it had an interesting debate in connection with the representation of coronals.

In general then, it can be observed that the idea that velars lack a phonologically relevant place of articulation has already been around in some corners of phonological theory. A more detailed investigation of this issue, in the present chapter, is therefore justified.

The choice of theories for the discussion to follow is somewhat arbitrary, although the major modifications and insights of phonological theory, pertaining to the representation of places of articulation, are traced throughout its history in the second half of the 20th century. Classical generative phonology, feature geometry and government phonology will be dealt with in detail. Dependency phonology, especially its Radical CV Phonology version, for example, would definitely be worth discussing at more length – but since it shares a number of properties relevant here with government phonology, only the essentials of its representational aspects will be treated. At the same time, theories that take surface markedness relations to be basic to their claims, such as Radical Underspecification Theory, Natural Phonology and Optimality Theory, are not examined here on the general grounds that it is exactly markedness that is under attack. The issue of markedness is under review in the next chapter, on its own (also in Huber (2006a) for details of the markedness argument). The really relevant question in this chapter is what theories say that do not incorporate markedness relations in their explanatory machinery. It also has to be noted again that this chapter does not intend to support, that is, provide detailed arguments for, the segmental representations proposed in any of these theories – the only point that matters is what they say about the representation of coronals and velars.

2.2 Representation of velars and coronals in SPE terms

The analysis of the representation of velars and coronals will have to begin with a review of feature-based analyses since they bring out important characteristics of velars as well as their representational relations with other major and minor places of articulation. Namely, an interesting aspect of such a feature theory is that it encodes a number of phonological and phonetic connections between velars and other classes of sounds. It will be discussed, in particular, what consequences it has that velars are negatively specified for all place features in classical featural terms, and to what extent this can be taken to support the view that velars are phonologically placeless. The presentation of the (“classical”) theory of distinctive features is based on Durand (1990) and Kenstowicz (1994).

Before moving on to the representation of place of articulation in its SPE and “classical” form, it has to be noted that in the early feature systems places of articulation were not encoded by features of their own. A case in point is Jakobson and Halle’s *Fundamentals of Language* (1956/1980), a less often cited, but illuminating work, where they do not list any place features at all. Places of articulation were derivative, so to speak: they were seen roughly as the outcome of the combination of a bundle of features. They are not considered primitives of phonological structure. The authors divide distinctive features in two groups, prosodic and inherent, further subdivided into force, quantity, tone and sonority, protensity and tonality, respectively (pp. 34-35, 40-44), the details of which are not relevant in this discussion. The following table summarizes the features they deem universally enough for all the distinctions a language can make:

(2.2) The features in Jakobson and Halle (1956)

Prosodic features:

- | | |
|--------------------|-------------------|
| force features: | - stress |
| | - stød (Stosston) |
| quantity features: | - length |
| | - contact |

tone features:	- level - modulation
Inherent features:	
sonority features:	- vocalic/non-vocalic - consonantal/non-consonantal - nasal/non-nasal - compact/diffuse - abrupt/continuant - strident/non-strident - checked/unchecked - voice/voiceless
protensity features:	- tense/lax
tonality features:	- grave/acute - flat/non-flat - sharp/non-sharp

Although most of these features recur in the SPE with mainly identical acoustic and articulatory correlates, the major observation is that there are no explicit place features in the above system. In particular, the relations between velars and labials on the one hand, and velars and palatals on the other, fall out as follows according to Jakobson and Halle (1956/1980:47):

Thus the difference among the four articulatory classes of consonants – velar, palatal, dental and labial – dissolves itself on the acoustic level into two binary oppositions: on the one hand, labials and velars concentrate their energy in the lower frequencies of the spectrum in contradistinction to dentals and palatals, which concentrate their energy in the upper frequencies – the grave/acute opposition. On the other hand, velars and palatals are distinguished from labials and dentals by a greater concentration of energy in the central region – the compact/diffuse opposition.

Thus, Jakobson and Halle make do without place features, places of articulation are basically the acoustic outcomes of the combination of the grave/acute and the compact/diffuse features. The idea that place of articulation is not a primitive of phonological representation is worth keeping in mind.

Turning to distinctive feature theory in its classical form, it has to be established first that distinctive feature theory does not recognize an independent

[velar] place feature in its inventory. While in the classification of distinctive features in Durand (1990), [coronal] is found among primary stricture features, and [labial] figures as a lip-attitude feature, no feature makes reference to [velar]. ([labial] itself is not a place feature in SPE treatments, but it came to be regarded as a place defining feature, also defended by Durand (1990:49); see 2.2.1 below.) The closest one gets to the “velum” in features is an extremely controversial air-stream mechanism feature [velaric], mentioned by Durand (1990:58). Van der Hulst (1995:84, 88), in his presentation of Dependency Phonology of Anderson and Ewen (1987), also includes “velaric suction” as an air-stream mechanism, only to be discarded altogether in his own radical CV approach. (Kenstowicz (1994) does not include any comparable feature.) What is important is that this air-stream mechanism, [velaric], is crucially not a place feature, and that distinctive feature theory does not have a single place feature to define velars.

Incidentally, as pointed out by Kenstowicz (1994:28), [coronal] and [anterior] served to distinguish the major places of articulations even in SPE:

(2.3) SPE specifications of major (oral) places of articulations

	[anterior]	[coronal]
labial	+	–
dental-alveolar	+	+
alveopalatal	–	+
velar	–	–

Again, places are not encoded directly for what they are, but are merely the traditional phonetic label given to the specific combinations of [coronal] and [anterior]. Furthermore, velars are defined as [–anterior][–coronal]. Later research, however, “amalgamates some of the traditional place-of-articulation categories according to the active articulator that forms the consonantal constriction: the lower lip [labial], the tongue blade [coronal], the tongue body [dorsal], the tongue root [radical], and the vocal folds [laryngeal]” Kenstowicz (1994:27). Thus, the post-SPE place features came into existence.

In the distinctive feature system presented in Durand (1990), velars are marked [–coronal] and [–labial], which suggests that they lack a phonologically

relevant place of articulation for which they could be positively specified in feature-based analyses. Instead, they are defined negatively with respect to coronality and labiality. Feature specifications for the major places of articulation are shown below (following Durand 1990):

(2.4) The featural representation of major places of articulation

labials:	[+labial] ([-coronal])
coronals:	[+coronal] ([-labial])
velars:	[-labial] [-coronal]

In distinctive feature theory every segment had to be specified for all features (no underspecification). As for the three major places of articulation, they were defined in terms of two only: [labial] and [coronal]. In the case of velars, whatever properties [labial] and [coronal] stand for, velars are negatively specified for them. Below, some consequences will be dealt with of these negative specifications, and then the connection between labials and velars in featural terms will be discussed.

2.2.1 *Velars and articulatory features: velars are negatively specified for place features*

In terms of “classical” distinctive features, velars share the [-coronal] specification with labials, uvulars and pharyngeals. In fact, as Durand himself confirms (1990:63), “[–coronal] sounds are defined negatively – *ie* as involving the absence of a raising of the tongue blade”. The feature [labial], however, is not part of the SPE inventory proper, but Durand argues for it on the grounds that it is needed as distinct from [round] because a number of rules become simpler and more natural to explain, while an analysis with [round] only does not bring out what is really at work. The feature [labial] stands for *constriction* at the lips as opposed to the *protrusion* of the lips associated with [round], he argues. These two articulatory gestures must be kept apart. To support his view, Durand cites (1990:49) a rule from Finnish in its earlier format with [round], (2.5). According

to the rule, a voiced velar fricative [F] becomes a labial fricative [v] between high round vowels (/u/ and /ü/):

$$(2.5) \quad F \rightarrow v \ / \begin{matrix} [+high] \\ [+round] \end{matrix} \quad \text{_____} \quad \begin{matrix} [+high] \\ [+round] \end{matrix}$$

Durand argues, quite correctly, that in the above formulation of the rule the actual change, $F > v$, does not receive a natural explanation from its [+round] environment, since why should a velar become a labial between high round vowels? With [labial] instead of [round], however, the change boils down to a simple case of assimilation to the surrounding labials:

$$(2.6) \quad \begin{matrix} [+high] \\ [+back] \\ [+continuant] \\ [+voice] \end{matrix} \quad \rightarrow \quad [+labial] \ / \quad \begin{matrix} [+high] \\ [+labial] \end{matrix} \quad \text{_____} \quad \begin{matrix} [+high] \\ [+labial] \end{matrix}$$

In other words, a high voiced non-labial fricative becomes a labial fricative between high labial vowels: an assimilation of [+high] segments in a labial environment. The change itself is another case of interaction between velars and labials, a phenomenon treated in detail in Chapter 7 (also in Huber (2006b); for the interesting and essentially identical change in Hungarian *ugorka > uborka*, see 6.2.4).

A further point of connection between velars and other classes of sounds is the feature [anterior], the other primary stricture feature besides [coronal]. Velars share a negative setting for this feature with palato-alveolars and palatals on the one hand, and uvulars and pharyngeals on the other. It is then not due to coincidence that velars often develop to [+coronal] palato-alveolar or palatal affricates, with which a [+high] feature is also shared (although note the existence of affricates which are [-coronal]: /pf/ and /kx/). Again, it is suggested to be a straightforward case of assimilation in the feature [coronal]. It can then be concluded that velars are negatively specified for all place features: [-coronal], [-anterior] and [-labial].

Consequently, assimilation processes to both coronals and labials receive a natural interpretation in a feature system: the acquisition of a positive setting for these features. Such processes are widely attested across languages, as will be shown below. Since place specifications are in fact associated with either the raising of the tongue blade (coronals) or with a constriction at the lips (labials), the negative specification of velars for both these features means straightforwardly that velars actually lack these gestures in their representation. This situation is considered an encouragement to claim that velars are placeless phonologically.

2.2.2 *Velars and acoustic features: velars share [grave] with labials*

Besides encoding a number of connections between velars and other classes of sound in terms of articulatory features, feature theory also brings out a direct connection between velars and labials in the acoustic feature [grave] as well. The feature [grave] marks labials and velars (as well as back rounded vowels) positively (recall the quote from Jakobson and Halle above). This is the formal recognition of the observation that not all phonological processes are based on “local” assimilation–adjustment (articulatory) processes, but a number of them are based on acoustic similarity of some sort.

In establishing this feature, one of the main supporting evidence was the recognition that well-attested phenomena that relate labials and velars are rather difficult to explain with articulatory, that is, “production” features: “For what affinity is there between the lip gesture which defines labials and the raising of the back of the tongue towards the velum which defines velars?” (Durand 1990:63). Such cases are found in Dutch morphologically related pairs like *kocht* [-xt] < **koft* as the past tense form of *kop-en* to ‘buy’, or *gracht* ‘channel’ and *grav-en* ‘to dig out’ (see Chapter 7, and Huber 2006b for a detailed treatment). Durand also admits that in a feature-based theory these phenomena cannot be explained. In theories cherishing some form of element theory, on the other hand, such phenomena are interpreted as cases of element suppression of some sort: the labial element is suppressed and it yields a velar. This issue was already introduced in

Chapter 1, and will be taken up later again.

In summary, it can be concluded that places of articulation were not directly encoded in early distinctive feature systems, not even in SPE. Later, the importance of the active articulators was acknowledged. Notwithstanding, in the feature system presented by Durand (1990), the velar place of articulation is defined negatively, that is, as the absence of both lip-rounding and the raising of the tongue body: [-labial][-coronal].

2.3 Feature geometry

The next approach to be discussed is feature geometry, which arranges the features into a tree hierarchy instead of a matrix format. Of course, this approach is only useful if it better explains phonological patterns. Without defending in detail the view that segments are made up of hierarchically grouped components rather than a loose, unorganized bundle of features (see Kenstowicz 1994:451-455 for a review of the evidence), this approach supersedes classical SPE in attributing internal structure to segments, as well as establishing various connections among the individual features. In particular, it is not apparent in SPE matrices why certain features (or one of their specifications) can spread on their own, while others assume the simultaneous spreading of other features as well. This will be of special relevance for the discussion of coronal and velar place specifications.

In the model of feature geometry presented by Kenstowicz (1994:462), the Dorsal node dominates both velars and all the vowels since it is under Dorsal that the [high], [back] and [low] vowel features reside. Again, velars are defined in terms of features which are not unique to them: they are defined in terms of a set of features that they share with all the vowels, [high], [back], [low]. Implicit in this configuration is that velars inherently have something to do with vowels, which is readily supported by palatalizations or vocalizations of velars, for example. In particular, Pulleyblank (1997:206), for example, explicitly claims: “The insertion of a Dorsal node by default into the empty place node of the vowel

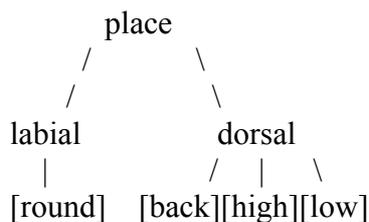
root corresponds to the insertion of [ə].” This view is in line also with the government phonology approach to be presented later in this chapter, namely, that both velars and reduced vowels (such as schwa) are “empty” in a representational sense. Moreover, according to one of the two feature geometry models to be presented, the Clements and Hume model, coronals have no really special status since the [coronal] feature also defines front vowels: it is not a purely consonantal feature then.

In an influential feature geometric article, Clements and Hume (1995) present a constriction-based feature geometry in which the geometry is defined by the combinability of the various constrictions. They provide an excellent comparison of two competing models of feature geometry, their own constriction-based model and Sagey’s articulator-based model (1995:275-7). Clements and Hume’s model seems to square better with attested phenomena.

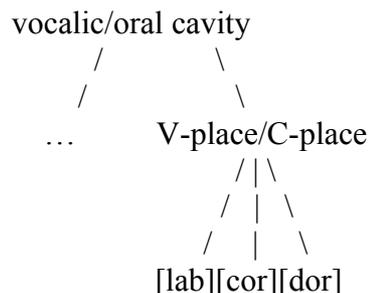
As for the connection between the representations of vowels and consonants, the two approaches make quite different predictions. To begin with, in Sagey’s model major consonant places dominate vowel features: for instance, Labial dominates [round] in vowels. In Clements and Hume’s model, on the other hand, consonant and vowel places are defined by the same set of features: [labial, coronal, dorsal] for both consonants and vowels. From this a second major difference follows, namely that while coronality is usually non-distinctive in vowels (it is reserved for retroflex vowels) according to Sagey, it defines front vowels for Clements and Hume. This is summarized below:

(2.7a) A comparison of two models of feature geometry

Sagey 1986



Clements and Hume



Sagey's model

1) major C-places dominate vowel features

labial dominates:
[round]

dorsal dominates:
[back]
[high]
[low]

2) coronal is usually non-distinctive in vowels, it is reserved for retroflex vowels

Clements and Hume's model

C-place and V-place are defined by the same set:

[labial, coronal, dorsal]

[labial] = rounded vocoids

[coronal] = palatal (front)
vocoids

[dorsal] = back vocoids

[no place] = central vocoids

coronal defines front vowels

In consequence, there are also a number of differences with respect to what phonological interactions can occur among the various classes of sound. The most important difference is in the connection between dorsals and vowels. According to Sagey, all vowels form a natural class with dorsals since all vowels have features which are dominated by Dorsal. However, according to Clements and Hume, natural classes fall out differently: front vowels form a natural class with coronals, back vowels with dorsals, round vowels with labials. Another point

of difference is that for Sagey dorsals are opaque, while for Clements and Hume they are transparent to spreading of vowel features. Furthermore, Clements and Hume's model dispenses with two features, [back] and [round], thereby assuming a simpler, that is more constrained, set of phonological primitives. Finally, Clements and Hume associate central vocoids with an empty place. This is summarized below:

(2.7b) Summary of the models

Sagey's model	Clements and Hume's model
1)	vocalic [back] and [round] features are superfluous (> more economical system)
2) all vowels form a natural class with dorsals, no other C classes define vowels on their own ([round] must combine with at least some features under Dorsal)	front vowels form a natural class with coronals, back vowels with dorsals, round vowels with labials
3) dorsal consonants are opaque to spreading of vowel features	dorsal consonants are transparent to spreading of vowel features
4) only dorsal can function as a single unit (in spreading, for instance) combinations like [back] + [round] cannot	all plain consonants (=major articulation) are transparent to rules spreading lip rounding with one or more vowel features
5)	[no place] describes central vocoids

Of course, (2.7a-b) above concentrate only on the points that are relevant for a comparison of velars and coronals. The most important difference between the two approaches is the relation of dorsals and vowels, and the possibilities of combinations this relation implies between the two sets of segments.

Overall, Clements and Hume's model seems to be essentially correct for a number of reasons. For instance, dorsal and other plain consonants tend to be transparent to the spreading of vowel features (for example, in vowel harmony

consonants are usually transparent), and when they are affected by such spreading vowel features (as in OE umlaut), it is velars that change, not coronals or labials; all vowel features can spread individually; central vocoids (such as a schwa or yer) are typically analyzed as having no place specification. And most importantly for the present discussion, according to the Clements and Hume model coronals have no really special status (contra the title of Paradis and Prunet 1991) since the [coronal] feature is shared with front vowels. Therefore, coronals are on a par with velars as for complexity: coronal place is shared with front vowels, velar place with back vowels. Their insights will be cited later as well in support for claiming frontness (or palatality) for coronals (although velars will not be associated with back vowels).

2.4 Kenstowicz on the coronal syndrome

Kenstowicz has made his views known in various places on what he terms the “coronal syndrome”. For example, in the Foreword to the 1991 Paradis and Prunet collection, he wrote the following about the specialty of coronals (1991:xiii): there is “an intuition shared by most phonologists: that dental (more generally coronal) is the unmarked consonantal point of articulation.” Nevertheless, he eventually closes this Foreword with this phrasing: “...no definite answer emerges...”.

In his *Phonology in Generative Grammar*, Kenstowicz basically draws on the work just mentioned, and summarizes the major observations with respect to coronality (1994:516-521). First, he enumerates the main pieces of evidence supporting the unmarked status of coronals:

- (2.8) Coronals
- (a) are the most frequent on a number of counts;
 - (b) are the outcome of neutralizations;
 - (c) are most commonly chosen in epenthesis;
 - (d) combine more freely;
 - (e) are more susceptible to place assimilations;
 - (f) are transparent to transconsonantal vowel-echo (complete assimilation) rules.

Views subscribing to the set of observations above will be labelled “traditional wisdom”. In such approaches, the properties in (2.8) can be captured by a default rule assigning Coronal to a consonantal place (1994:517):

(2.9) Place > Place (default rule)
 |
 Coronal

Nevertheless, Kenstowicz also expresses his doubts about the universal validity of coronal unmarkedness. He points out (1994:519) that “there is a slight inconsistency in the underspecification approach to the coronal syndrome: some properties require a bare Place node [...] while others seem to call for no Place specification at all.” For instance, CC clusters tend to be of two types, one where CC is a geminate (C_iC_i), and another, C_iC_j , where either C_i or C_j is coronal. Both these types can be described – believing in coronal unmarkedness – with maximally one Place specification in the underlying representation. Clusters of two non-coronal consonants are rare enough cross-linguistically. This requires coronals to have a bare but existing Place node so that they do not count. However, no Place node can be assumed at all in cases of vowel harmony spreading across coronals since otherwise it is hard to explain why the bare place node does not take on the spreading vowel specification (see next chapter and Huber 2006a:53-55 for a detailed analysis of this issue). These two interpretations of what “no place specification” really means, and the apparently strong arguments in favour of both at the same time, casts serious doubts on the *universality* of coronal underspecification.

Finally, Kenstowicz points out (1994:519), referring to McCarthy and Taub’s 1992 review of Paradis and Prunet, that a “more serious problem arises in the expression of dependent features.” The coronal syndrome should only be exhibited by segments with unmarked features (such as /s t n/) but not by /ts θ S tS/, for instance. Also, the status of liquids is problematic. Again, this situation is hardly compatible with the universality of the coronal underspecification claim since some coronals may be unmarked, but others obviously cannot. Moreover,

Kenstowicz in fact claims that underspecification approaches are probably wrong since rather embarrassingly they predict coronal underspecification even in languages where the dentals are clearly marked for place (1994:520).

To sum up, Kenstowicz claims that the evidence in support of universal coronal unmarkedness is not as conclusive as one would like to have it. This is taken as further encouragement for the present dissertation.

2.5 Government Phonology

2.5.1 The mainstream approach

The mainstream approach to the representation of coronals and velars in Government Phonology can be summarized as follows:

- (2.10) - velars are headed by the empty element
- labials have U
- coronals have R (Harris and Lindsey 1995, Harris 1994)

These properties of the representation of the differences among the three major places of articulation incorporate the two basic ideas proposed in this dissertation, namely that (a) velars are phonologically placeless, and that (b) coronals have a place specification. There have come to light a number of approaches as to the exact place element in coronals. These will be reviewed in the sections to follow.

2.5.2 Velars and empty-headedness

In government and licensing theories (Kaye and Lowenstamm and Vergnaud (KLV 1990), Charette (1992), Harris (1997), Cyran (1997), to refer to but a few) velars are usually considered to be headless consonants, that is, headed by the “empty element” @ (Harris and Lindsey (1995:67); but Scheer (1998), for instance, argues for coronals being placeless). Making velars and empty nuclei akin is a claim that has, even if realized, not been particularly well worked out in the government phonological literature. The empty element is problematic in itself for a number of practical and theoretical reasons, pulling velars with it. It will be

argued here that the velars–empty elements connection is a promising line of thinking, but some adjustments are needed to correctly interpret that connection.

This section reviews the status of @ as well as the problems it raises with respect to velars. It will be argued that the empty element @ is not in fact a necessary term in the element inventory, and that it is not part of the make-up of velar segments (nor of any other segment for that matter). This will also lead, following Backley’s line of thinking, to the reconsideration of “headedness” in velars as well, although this step of removing “heads” from phonological expressions leaves us with a number of tough problems, some of which will remain unresolved for the time being.

The ultimate conclusion is that velars can only refer to the place elements I and U for phonological operations, that is, only these elements can be evoked on occasion (in vocalizations and palatalizations, for instance), while any other independent velar place element is superfluous. It is important to point out that “placelessness” simply means *the lack of an independent place element* which should uniquely identify velars, and not, of course, that velars are not produced anywhere.

To account for velars do not become segments with the A element, it could be proposed that the simplest I- and U-containing segments, the glides /j w/, are more consonant-like than a low, open vowel, which is headed by A. One might refer to the sonority hierarchy: glides > high vowels > low vowels. This amounts to saying that I and U are different from A in this respect. The proposal actually implies that places of articulation also break up into more and less sonorous categories: non-velar > velar > glides > high vowels > low vowels. This will have to be refined in future research.

2.5.2.1 Velars and cold vowels in Charette’s account of Khalkha Mongolian velar phenomena

Charette (1992) is among the first to run into problems when discussing the government-licensing potential of velars in Khalkha Mongolian, and the solution she offers makes the case for kinship between empty nuclei and velars. Charette

defines government-licensing as the potential of an empty nucleus to give a preceding consonant the licence to govern a complement consonant: either the second element in an onset cluster or the coda of a coda–onset cluster (or both at the same time). In Khalkha Mongolian – which lacks branching onsets altogether, it has only coda–onset clusters – such an empty nucleus may or may not remain silent, that is, properly governed, as a function of the quality of the consonants surrounding the alternation site. The empty nucleus is interpreted – with its melodic identity determined by vowel harmony – whenever a consonant other than a liquid follows. The data below are customized with “@” standing for the empty element from Charette (1992:283) – in view of the interesting coincidence that all her data contain a velar /g/ either preceding or following the empty nucleus, it might be useful to be a little suspicious about the random nature of this distribution:

- (2.11a)
- | | | | |
|------------|-------------|-----------|-------------------|
| bömb@g-a: | > bömbögö: | *bömbgö: | ‘one’s own ball’ |
| önd@g-a: | > öndögö: | *öndgö: | ‘one’s own egg’ |
| xalb@g-a: | > xalb*ga: | *xalbga: | ‘one’s own spoon’ |
| oNg@ts-o:r | > oNgotso:r | *oNgtso:r | ‘by plane’ |

Conversely, when the consonant following the empty nucleus is either of the liquids /l, r/, the nucleus remains silent (note the identity of the /a:/ inflectional morpheme added in the first three examples with the first three items above):

- (2.11b)
- | | | | |
|--------------|---------------|-----------|---------------------|
| sand@l-a: | > *sand*la: | sandla: | ‘one’s own chair’ |
| bömb@r-a: | > *bömbörö: | bömbrö: | ‘one’s own drum’ |
| tas@lb@r-a: | > *tas*lb*ra: | tas*lbra: | ‘one’s own receipt’ |
| unt@ra:l@g@> | *unt*ra:l*k | untra:l*k | ‘switch’ |

However, when the potentially governing consonant is a velar (in the data

only /g/ occurs, though this may well be owing to a lack of more comprehensive examples) followed by a liquid, the empty vowel is interpreted just like in the *bömbögö*:-type of (2.11a) above:

(2.11c)	moNg@l	moNgolo:r	*moNglo:r	‘Mongolian’
	tuNg@l@g	tuNg*l*g	*tuNgl*k	‘transparent’

Furthermore, Khalkha Mongolian also has consonant clusters and licensed empty nuclei word-finally. While this word-final empty nucleus government-licenses the governing head, an interesting asymmetry is observed: there are no consonant + velar sequences, and words ending with a velar nasal seem to behave somewhat arbitrarily as revealed by the two sets below:

(2.12a)	ula:N ‘red’	ula:na:	‘one’s own red’
	xü:xeN ‘woman’	xü:xnes	‘from the woman’

(2.12b)	baiSiN ‘house’	baiSiNgi:N	‘house GEN’
	saN ‘treasury’	saNga:s	‘from treasury’

The difference between the two groups can be summed up as follows: in (2.12a) the nasal is licensed by the following empty nucleus and it has no governing work to carry out. On the other hand, in (2.12b) the nasal is followed by a velar stop which fails to be licensed by the word-final empty nucleus and consonant loss is observed. The claim that there is something following the velar nasal is further supported by the observation that in (2.12b) the preceding vowel is always short. This is much the same distribution as that found in Germanic languages where a velar nasal can only be preceded by a short vowel but never a schwa (or a long vowel), following a similar loss of /g/ (see 2.5.2.2 below).

To account for these data, Charette makes recourse to a constraint “made up”, so to speak, by Lowenstamm (1986): the so-called *cold-headedness constraint*, which turns out to be inadequate on closer inspection. The constraint

claims that “a segment having the cold element as its head cannot occupy two contiguous nuclear positions” (Charette 1992:285). She then proposes that “a cold-headed nucleus (*ie* empty nucleus or schwa) cannot government-license a cold-headed consonant”. This easily translates into saying that a segment having the empty element in head position cannot government-license a consonant having the empty element in head position. This makes for exactly what has been dubbed the velars–empty elements connection in this chapter.

However, the cold-headedness constraint does not explain anything in this form because it is arbitrary. Even though such a constraint makes velars special in a direct fashion, there are two objections against this cold-headedness constraint approach. One is that the nasal actually interpreted after the loss of /g/ is still a velar, that is, it should count as cold-headed as well as /g/ had been. This is a problem for both sets of words in (2.12) above, and it must be recognized that empty elements can still license velars when they happen to be nasals at the same time. It should not escape attention, however, that in (2.12a) the velar nasal appears only word-finally, word-internally it surfaces as a dental nasal [n], in other words, alternation is observed. This is an independent process. It can be assumed that in Khalkha Mongolian word-final nasals lose their place element and surface as placeless velars. This phenomenon is by no means unique to Khalkha Mongolian. In fact, a number of languages, such as Galician (Freixeiro Mato (2001:62)) and dialectal Spanish (Sobieski and Várady (1992:40), Menéndez-Pidal (1989)), also exhibit word-final (and preconsonantal) nasal reductions to a velar nasal, as the following Galician data illustrate: *chegaro*[ŋ] ‘to arrive’, *e*[ŋ]*saiar* ‘to try’, *irmá*[ŋ]*s* ‘brothers’. The problem, however, remains that velars, even if a nasal, are still licensed in final positions.

The other, more serious, objection against the cold-headedness constraint is that Charette does not explain how it is possible that it is the head which is lost instead of the complement, which is somehow still licensed. The empty vowel following the uninterpreted /g/ does not “know” whether or not the preceding velar should govern another (velar) element. Why is it not the case that – as could be expected – the velar stop /g/ is realized and the nasal is lost once it is the nasal

that is awaiting government? Indeed in Charette's theory it would be a logical step to delete a complement since, after all, that is the extra burden on the governor. One possible way out of this problem is to suggest that /g/ is not actually the governor in these cases (see VC Phonology later).

2.5.2.2 An excursus on English

Another case of interaction between empty vowels and velars is provided by Southern British English where there is a general ban on [E] + velar sequences. In unstressed word-final syllables a schwa is typically possible, for instance, before a stop as in *magnet* [m2gnEt -lt]. A regular exception are velar-final words, which simply do not have a [E] in this position. Examples include suffixed word in *-ic*, *-ing*, as well as quite a number of underived (or irregularly derived) words such as:

(2.13) *almanac, maniac, Buick, Cadillac*

In fact, only a minority of words have a reduced vowel before a velar, such as *bullock* [bUIEk]. No word contains a schwa before the velar nasal in English. Of the other Germanic languages German behaves similarly to English, although in Dutch reduced vowels freely occur before velars (but not before [N]).

2.5.2.3 Element theory as proposed by Harris and Lindsey (1995)

Harris and Lindsey (1995) argue for an elemental make-up of phonological representations in place of the mainstream feature-based approach most notably advocated in SPE. The main characteristics of such an element-based framework are the following (without detailed support here):

- (2.14) (a) the autonomous interpretation hypothesis (direct interpretability and perceptibility of elements);
- b) monovalency (privative as opposed to binary features: an element is either present or not, and no rule can refer to the absence of an

element);

- c) there is a direct relationship between the process and the environment in which it occurs.

The authors take *A*, *I* and *U* for vowel elements and for resonance elements in consonants (with the addition of a hypothetical *R* element for coronality). Consonants, in addition, possess manner elements: *h* (for “noise”) and ? (for “occlusion”), while voicing is accounted for in terms of *H* (voicelessness) and *L* (voice), the terms originally coming from “high tone” and “low tone”. To express differences in element weighings in compound expressions (where the same elemental composition is given, yet one of them is more prominent), they introduce the notion of *headedness*, marked by underlining in the representations. To account for ATR-differences in the vowel inventory, they further argue for a “canvass-element” which underlies each and every segment, but contributes to the realization only when in head-position: in other words, non-ATR vowels contain an active, rather than a recessive, empty element. To illustrate this situation, consider the following examples (where the *U* in /p, f/ have been uniformly given head status in deviance from Harris and Lindsey’s view on them):

(2.15) /p/ = {U, ?, h, H, (@)}

/f/ = {U, h, H, (@)}

/i/ = {I, (@)} ATR

/I/ = {I, @} non-ATR

/e/ = {A, I, (@)}

/3/ = {A, I, @}

/2/ = {A, I, (@)}

In their article, they make specific claims as for the expression of velars. “Vocalization of velars (...) typically results in reduction to zero, sometimes via F. This development is not unexpected, given the assumption that velar resonance is associated with the element [“@]” (Harris and Lindsey 1995:67). More

specifically, they add (*ibid*): “Independently, [ʔ] manifests itself as approximant *F* (non-syllabic *), but the lack of an active resonance component in this element is predicted to make it particularly likely to be eclipsed when not supported by other elementary material”.

By virtue of the fact that velars are headed by ʔ, the voiced velar fricative [F] will be the consonantal counterpart of the headless vowel segment [*], which also only contains the ʔ element as head. These two sound segments do not contain, it is claimed, any elements whatsoever, the difference between [F] and [*] is much the same as that between /i/ and /j/ or /u/ and /w/, it is merely the position they occupy in the skeleton: the fricative (or approximant) fills in a consonantal slot, while a reduced vowel is found in a vowel slot. The further distinctions among velars fall out as follows:

(2.16) The representation of velars

$$\begin{aligned} [F] &= \{ʔ\} \\ [x] &= \{h, ʔ\} \\ [g] &= \{ʔ, h, L, ʔ\} \\ [k] &= \{ʔ, h, H, ʔ\} \end{aligned}$$

Views differ widely with respect to the status and role of *h* and *H*, this difference has, however, no immediate impact on the present discussion here. Although there are differences among authors as to the exact notation and function of these elements, it is easy to see that while laryngeal and manner elements are present where relevant, the place-defining elements (I, U and A) are all missing from velars, only the institutionalized empty element is around. Velars lack a place of articulation phonologically.

The assumption of element theories that velars are headed by ʔ makes some intriguing predictions about lenition phenomena involving velars as pointed out by Szigetvári (1994:216), who represents coronals as headed by ? and not a place element. The changes revolve around the practice of head-switching with

the possibility that @ becomes the head in a consonant. Accordingly, the following changes are no less likely to occur in natural languages than a switch in [s] → [h]:

- (2.17) (a) [t] → [k] {ʔ h (@)} → {ʔ h @}
- (b) [p] → [k] {ʔ U h (@)} → {ʔ h @}
- (c) [k^w] → [p] {ʔ U h @} → {ʔ U h @}

These changes are rare. The first of these is exemplified by the development of Polynesian languages where Hawaiian did away with coronal obstruents with the exception of liquid /l/ and turned earlier /k/ into the glottal stop. As for the frequency of such a move, Hockett writes (in Greenberg 1963:27): “No phonological system has fewer than two contrasting positions of articulation for stops. The only attested cases with two are Hawaiian and a slightly archaic Samoan, with labial versus lingual [coronal in the present discussion]. (In contemporary Samoan a new apical-versus-dorsal contrast has developed.)” On the possible two-way communication between plain labials and labialized velars, as suggested by (2.17b) and (2.17c), see Chapter 7 (and Huber 2006b). On citing these strange lenition trajectories above, Szigetvári also acknowledges that velars might be ultimately the unmarked place of articulation, lacking a place element head (and coronals are not headed by a place element).

2.5.2.4 Eliminating empty elements from representations

The problem with velars in *elemental* approaches is really the status and interpretation of @. All authors stress that this is not an element proper because if it were then it could show signs of being an element, such as spreading or even being absent (!). On the contrary, authors stress that @ is the lack of an element, it is the canvas to which true colours are painted (Harris and Lidsey 1995, KLV 1985). This stance, however, does not make the situation any easier since there are a number of problems arising from the mere evocation of @. One such question

is: how can a non-element figure in an element theory? Although it could have been argued that @ is the “meaningful zero” in the theory, this connection has not been particularly emphasized. For another, although @ does not spread, velarity itself is shared in nasal + velar ([Nk]) as well as velar + syllabic nasal clusters ([kN] in *bacon*) – which is a situation not catered for by the elemental make-up and is a serious problem in itself. A further argument against @ as an element is that a separate mechanism is needed to exclude it from melodic manipulations which other elements readily undergo.

To account for this embarrassing state of affairs, a number of authors made recourse either to a more clear notation in representations such as _ instead of @, or to some velar element such as, say, *K* (as hypothesized in KLV 1985). While the _ notation is undeniably superior to the “element” sign in not suggesting elementness, it still sees it as a *trace of an element*. On the other hand, the trouble with introducing a new, and this time, real element would be that – besides enlarging the inventory of elements and creating one with no vocalic correlate (Szigetvári 1994:218) – no real break-through could be achieved with it: *K* remained an ad hoc invention to account for a handful of embarrassing cases, an unnecessary element in fact.

The possibility of relating [F] and schwa, however, is a promising step towards looking at velars from a new perspective. Harris and Lindsey (1995:60) argue that @ is a canvass element onto which all other “colours” can be painted to mix various vowels. Unless some other paint, such as A, I or U, has been carried on it, it will surface as [*E] or some other reduced segment. In much the same vein, it can be argued that [F] undergoes the same fate under a consonantal slot. They also argue that the @ is present in all vowels, which is seen when under phonological circumstances “fleshy” vowels are reduced to [E]. There is a slightly different approach to these reductions, though.

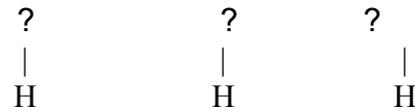
In government theories, sound alternations are analyzed as elemental

simplification under certain phonological circumstances (due to government and licensing). A consonantal alternation, for instance between a stop and its corresponding fricative, is the result of the suppression of the stop element ?. This element does not disappear altogether, without trace, but it is suppressed, <?>. The reduction of a vowel to schwa will also be the result of one or more of the three elements getting between angled brackets: <A> or <I> or <U>. When there is no alternation between a full vowel and [E], and only [E] surfaces, then any or all of the three can be posited to underlie the representation depending on the system in question. In much the same manner, it can be argued that in [F] all elements are suppressed. To account for the other velars, consecutively more elements are licensed until [k] is reached in which all but place elements are allowed: [k] has stopness and possibly an element for voicelessness, {H ?}. This line of thinking leads essentially to the approach advanced by Backley (1995). The advantage of Backley's analysis is that there is no need for recourse to empty elements at all. Moreover, the question of headedness is also resolved.

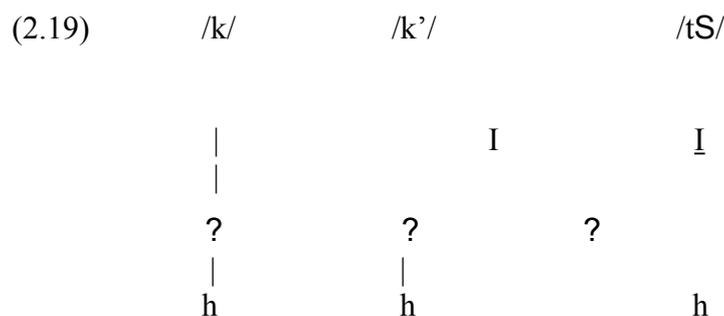
The problem of representing the empty element is rather overt when it is taken into account that the elements are assumed by Harris and Lindsey to occupy their own lines or melodic tiers. An empty element is hard to imagine to occupy any tier of its own, although a redundant tier for it might be assumed. If, however, no reference is actually made to that line, it is better to do away with it altogether: why keep a construct when it is never used? This is seen as a welcome step towards eliminating empty elements from representations. In Cyran (1997:193), for instance, a plain velar stop receives the representation below as opposed to /p/ and /t/:

(2.18)

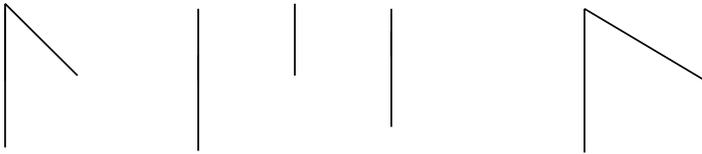
/k/	/p/	/t/
	<u>U</u>	<u>A</u>



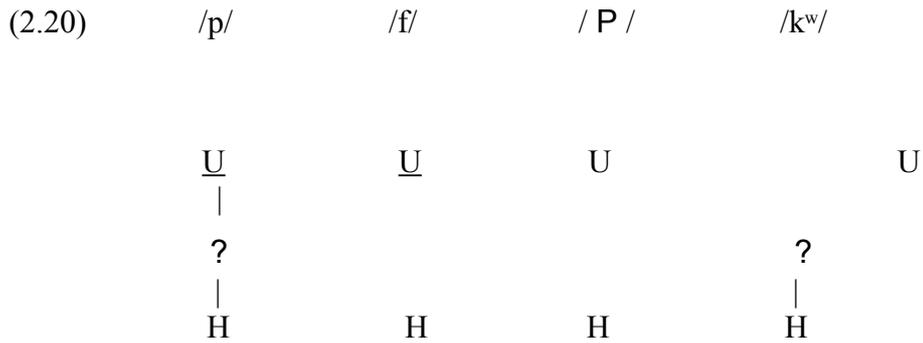
The difference between /p, t/ and /k/ above lies the absence of any place element in the representation of the velar. The concept that velars are empty-headed is still observed since there is really no head underlined in the expression of /k/ whereas the place-definers are marked as the head of /t/ and /p/ (for the concept that only place-definers are heads, see Scheer (1998:211); this was anticipated when U had been made the head of /p, f/ in (2.15) above). Such a representation is advantageous because it can cope with velar phenomena more adequately. When a velar palatalizes to an affricate, a segment containing the element I, is easily incorporated into the representation creating a contour structure, as shown in Cyran (1997:212; here he has h for reasons that are irrelevant now):



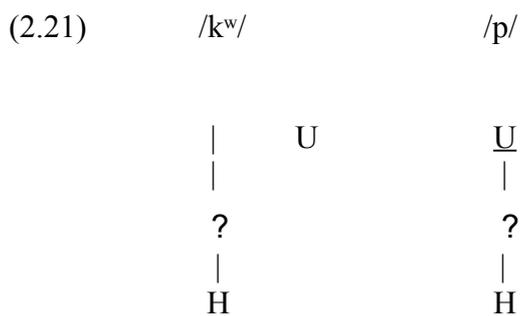
Affrication is then interpreted as a change where a headless structure splits under the pressure of the palatal element and it receives a head at the same time. It is an interesting by-product of this expression that not even /tʃ/ has a coronal place of articulation. If following Scheer in assuming that place-definers can only be heads in an expression, /f/ will also contain a head I while the unheaded



expression will be the representation of /P/. However, the need to accommodate an U element in labio-velars also requires an U in some position. One possibility to solve this paradox is to represent labio-velars as unheaded contour segments and not a single vertical structure (although this may be graphic fetishism):



The advantage of representing labio-velars as contour-segments is that now labial-velar interactions can receive a similar account to that of palatalization in (2.19) above. It can be proposed that the acquisition of an U head is enough to get a plain labial from the unheaded labio-velar:



There is yet another pair of segments to sort out, the velar fricative /x/ and simple /h/. It can be put forward, based on an intuitively stronger image of the velar fricative, that it is headed, while /h/ is not: /x/ = {H} and /h/ = {H}. This is a

problematic step, however, for a number of reasons. First, in neither of these expressions is there a place-definer head: H is not a place element. Second, there seems to be no mechanism to make /x/ headed when a /p/ reduces to such a /x/ as in Dutch *kopen – kocht* ‘to buy – bought’. There, it is argued, the U-headed /p/ loses its U element and is expected to lose its headedness with it. An *ad hoc* “solution” could be to stipulate that headed segments, like an U-headed /p/, pass their headedness down to what is left after the head element, U, itself disappears, that is, to make the element {H} the head of the expression. A further problem of how to make simple palatal /j/ a velar /k/ remains because these accounts above cannot create something out of nothing. Such a change does not have a local source and cannot be produced by this approach.

In this section the possibility of expressing velar segments with elements in government phonology has been presented. It is crucial that ultimately no recourse had to be made to empty elements. It is also important that headedness has been readily put to use in accounting for the distribution of headed and non-headed configurations.

2.5.3 Other views within GP

There are other views within GP, which can be divided into two groups based on how they represent coronals: those who argue against coronals having R (Backley 1993), and those who argue that coronals have an A “lowness” element (Broadbent 1991, Cyran 1997, Lee 1998). These approaches are presented and contrasted below.

2.5.3.1 Broadbent 1991

Broadbent (1991:299) analyzes r-intrusion phenomena in (West Yorkshire) English, and argues that coronals are headed by the A element. The basic idea is that “...r-formation [linking or intrusive-r] occurs when A is the head of a relevant segment [=the vowel preceding /r/].” Consider the following example where the vowel [a:] is represented by an A-head (underlined) and an empty (v) dependent to make it lax (this latter stipulation, of course, deviates from standard

assumptions on the role of the empty vowel):

(2.22)	O	N	O	N	O	N	
		\					
	x	x x	x	x	x	x	
		/					
	S	<u>A</u> >>>>>>>>>	_			v	
		v					
	sh	a h	(r)	of ...			“shah of”

In her analysis, A stands for coronality because there is r-intrusion (or linking) only when there is a preceding vowel which has A in its representation. In a footnote (1991:300, N21) she interestingly indicates that she intends this analysis as “evidence for coronal underspecification” because it is known that /r/ is coronal and it is not pre-specified for place before the spreading, and in r-intrusion, she claims, it is also seen that /r/ eventually has A. Where else could the coronality of /r/ originate, she asks? Her conclusion: from the A which spread into it from the preceding vowel. Coronality is A.

This analysis, however, raises some questions. It is not immediately clear when coronality comes into existence: has the empty, unspecified timing slot been already coronal before the spreading of A from the preceding vowel slot had taken place or has it become coronal by virtue of the spreading itself? The first option would mean all empty timing slots are coronal – not many seem to have considered the implications of this possibility. Apparently then, the empty timing slot becomes a coronal because of the spreading of A. It remains unclear then how general this representation is since other coronals, such as /t/ or even /s/, are not known to get inserted in the same or even similar environments in (any variety of) English. Where do these get their coronality?

What Broadbent does in fact is to subscribe to coronal underspecification simply on the grounds that the timing slot that will be realized as /r/ had originally been unspecified. But she eventually does propose an element, A, to dominate coronals since it is A that makes a coronal.

2.5.3.2 Backley 1993

Backley argues (1993: 301) in favour of the view that “coronal obstruents [!] lack an overt phonological place specification, thus rendering them inherently less complex than their non-coronal counterparts.” He points out a problem for the mainstream analysis, namely lenitions of the type /s/ > /h/. The problem is that if /s/ is represented as $\{R^0, h^0\}$ (as was the standard representation at the time) then there are 3 possible lenition trajectories:

$$(2.23) \begin{array}{l} /s/ \{R^0, h^0\} \\ \\ \end{array} \begin{array}{l} > \\ > \\ > \end{array} \begin{array}{l} /r/ \{R^0\} \\ /h/ \{h^0\} \\ zero \{0\} \end{array}$$

All three trajectories are attested. Backley brings up the following arguments against R (pp.306-307). First of all, the element R is not active in element harmony processes. Second, it does not figure either in short-distance assimilatory or spreading processes. For instance, he points out, coronal NC clusters like /nd nt/ “do not come about via any place assimilation process as such”. Third, there are no differences in R as head or operator, which makes it exceptional among the place-defining elements {I U A} since these do behave differently in head than in dependent positions. Furthermore, the system overgenerates since R does not combine with the other place-defining elements I, A and U, which in their turn do regularly and meaningfully combine. Finally, the only real-world “thing” corresponding to the realization of {R} in isolation is a tap [r], and it is not apparent in any other segment.

Backley (1993:309) therefore proposes the following representation for [s]: $[s] = \{h^0\}$. This element, $\{h^0\}$, functions as operator in obstruents and as head to specify stridents – which are coronal by default. Therefore, “we can make a direct association between stridency and the presence of coronality”. His representations (1993:310) then fall out as follows (last element is head of expression):

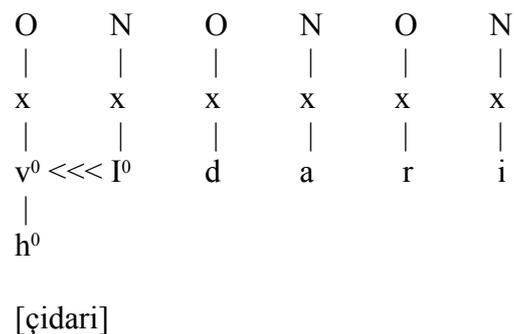
$$(2.24) \begin{array}{l} [s] = \{v^0, h^0\} = \{h^0\} \\ [f] = \{H^-, h^0, U^0\} \end{array}$$

$$[x] = \{h^0, v^0\}$$

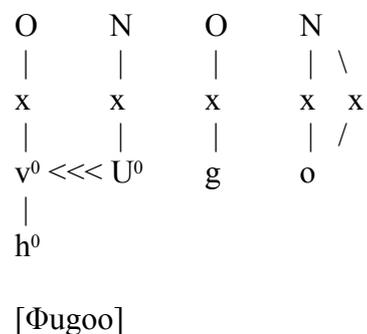
However, these representations lead to two problems (1993:312). First, what is lost in /s/ > /h/ changes if [s] = {h⁰}? In other words, what is the representation of [h] then? And second, why is there a difference between /s/ > /h/ (in syllable codas) and /s/ > /r/ /V_V (intervocally)?

He goes on to demonstrate the structure of glottal [h] using Japanese data. His claim is that “‘glottal’ indicates a lack of any lexically defined resonance property”. In this way, [h] can be assigned a representation such as {h⁰, v⁰}. Notice that this effectively means that glottals, or [h] specifically, are placeless. There being an empty head position ({v⁰}), the elements I, U can readily spread to it. These are indeed attested in Japanese (1993:315):

(2.25a) Japanese: [h] > [ç]



(2.25b) Japanese: [h] > [Φ]



Of course, since his representations above identify [x] and [h], “there must be no

language which displays a phonological opposition between a glottal and a velar fricative.” And he cites Irish as a possible counterexample, and he admits that the /h/ <-> /x/ opposition “indicates the need for more detailed investigation, and I shall leave the matter open.” Recall that this problem with the opposition of /x/ and /h/ has already been pointed out in the Introduction, in (1.16).

Although some problems still remain, Backley concludes that coronality lies in the headship of {h⁰}. What is particularly noteworthy is that {h⁰} is not even a place element (recall that Szigetvári (1994) also represented coronal /t/ as headed by a non-place element). This may be taken to mean that the assumed specialty of coronals might not actually lie in place specifications at all.

2.5.3.3 Backley’s tier geometry

As already introduced, Government Phonology operates with element tiers to host the elements, the privative units of representations. Backley (1995) offers a *tier geometrical analysis* of how elements are arranged under the C and V slots of the skeleton. If his description is combined with the skeleton as defined by VC phonology (see 1.2), a re-evaluation of lenition (and strengthening) can also be done.

Backley’s theory has two assumptions, as already introduced: one is that *all positions contain all melodic elements* (that are required by the system at hand) and the other is a mechanism of *tier-activation*. In his theory a melodic element is interpreted when it is *aligned* on its own active tier to the already live (aligned) element of an adjacent position (see also Backley and Takahashi (1998) for a more detailed presentation). It must be recalled that this approach is offered to give an account of vowel systems and no specific proposal is made for consonantal expressions. This will lead to problems that are problematic in connection with the representation of (affricate and labio-velar) contour segments, see the passage following (2.29) below.

Backley sets out from the hypothesis (1995:431) that “all melodic primes (while respecting language-specific tier configurations) are latently present at every position on the timing tier, and that in the event of an element being

them, another mechanism is needed.

Backley's second assumption is a process of *tier-activation* which is the function of the skeletal slot having a certain amount of power coming from somewhere outside/above the tiers to license tiers further below. He illustrates this mechanism on vowels when accounting for vowel systems in his framework. He argues that a tier is capable of activating elements on a tier below (called colour tiers) when certain licensing conditions are met. This comprises in "waking up" dormant elements on that tier. However, this is not enough to tell ATR and non-ATR vowels apart since they contain the same elements on the same tiers anyway. To make one tier "more prominent" than the others, Backley introduces a so-called *complement tier* and as he writes (1995:418): "...an active complement has the function of enhancing the saliency of a colour element by affording it 'depth', and not by inserting an additional plane into the melodic representation." He goes on to point out the difference between this complement tier and a separate colour tier (in his example an A-tier): "It should be noted, however, that the relationship between the colour tier and its complement is not identical to that existing between the colour tier and the [A]-tier. In the former association there is no new elemental material added to the structure when the complement is activated; instead, the same plane is merely expanded in another direction." This naturally implies that the colour tier must be active in order to be able to license a further tier of either of the two kinds and it has to be aligned (filled) in order to be able to license a complement tier. Also, more importantly, it means that expressions that contained a head of some kind are to be reinterpreted as 3D objects with an active and aligned complement tier. Since velars are not headed, this state of affairs does not affect them directly, but the objects with which they alternate, such as labials, glides and affricates, are severely constrained by this. There is a further important trait of Backley's tiers, namely that these tiers do not hang down from the skeletal slot, rather they hang down from the tier directly above. This is the reason why a distinction can be maintained between /k^w/ and /p/: /k^w/ is represented as a contour-segment without a complement tier as opposed to /p/ which is represented by U having a complement tier. This is in contrast with other geometrical

k--> c i f

There is, however, an important problem with this structure, namely, that it does not represent the split needed for a contour segment. A possible solution to the problem may lie in the observation that this structure is the expression of the pre-split stage, palatal stop [c], and a different process of splitting might be due to something else, probably it is due to the opening of the complement tier which then splits the structure. This possibility clearly requires further study. Similar hinderances are encountered in connection with the expression of the labio-velar / k^w/ since an already split structure should unite into a single column when a labial segment (with complement tiers!) emerges. Finally, there is one more point to make in connection with the expression above. It does seem to give an adequate representation of structures where [c] is historically the result of the palatalization of [k], like in Albanian or Latvian, where even spelling suggests a velar origin of the palatals. In other words, it is not a problem at all to have such a configuration.

Phenomena where labiality is acquired are more tricky. Two possibilities will be encountered. In English, velar fricatives in word-final position whereas in Rumanian velar stops in pre-consonantal as well as intervocalic position were affected. In English that position is neither governed nor licensed, consequently consonantal lenition is expected. Yet, there is an U element which gets interpreted despite the expectation to lose melody in this position. Fortunately, there is a source for this: this time it is the preceding U element which gets aligned. In the Rumanian data, both pre-consonantal positions and intervocalic positions are governed (and the latter only is licensed at the same time). Gaining melody is not expected under government.

Loss of velars is the result of their I/U-tier being unlicensed, when they cannot activate further tiers, namely the ?- and H-tiers. On the other hand, reductions to velars are cases where the melodic elements are suppressed through government, but the tiers themselves remain active and keep tiers below active as well.

2.5.3.4 Repercussion of the alternative views

The two lines of thinking above have found followers, and it can be said that the standard view cited in the beginning of this section is no longer strictly adhered to. Cyran (1997:167ff) adopts the view, and elaborates it in great detail using Munster Irish data, that coronals are headed by the element A. (Crucially, Cyran also represents velars as placeless.) Duck Young-Lee's (1998) work on Korean is mainly interesting for the present purposes because it discusses a coherent approach to phenomena from a language which is very often cited to show a range of phenomena of coronal underspecification. He gives no further justification for choosing A to represent coronals than simply referring to other works in this framework that have already adopted this view (for instance Cyran 1997).

By way of conclusion, it also has to be pointed out that while there are more candidates to head coronals, there are no serious proposals for an alternative element to head velars.

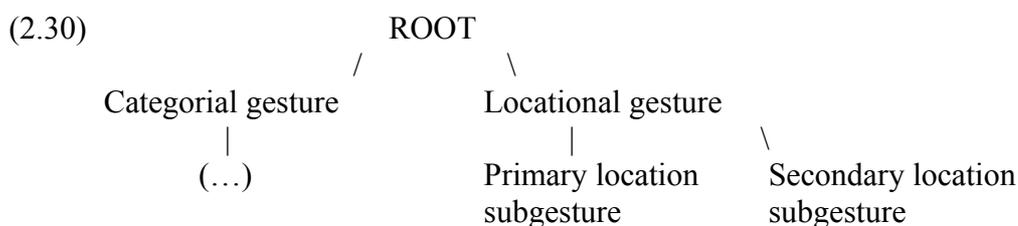
2.6 Dependency Phonology and Radical CV Phonology

Dependency Phonology, presented following van der Hulst (1995), bears close affinities to government phonology. There is not enough room to have a thorough analysis of the relationships between them, it is sufficient to point out that, similarly to government phonology, dependency phonology also operates with elemental units (called components) rather than features, and these components

are privative. Furthermore, they can contract a limited number of head–dependent relations among each other, similarly to the governing relations. However, DP does not claim that these components can be interpreted, that is pronounced, on their own, unlike the elements assumed in government phonology.

Radical CV Phonology gets its name from radically constraining the set of components that can combine in dependency relations. There are only two components, C and V, which have a range of interpretations according to the position they occupy in a given structure. “C denotes articulatory events which are referred to as *closure*, *stricture* or *contraction* (and their acoustic effects). The phonetic interpretation of V involves [...] a relative high degree of *sonorancy* (van der Hulst, 1995:94).” The basic set is the following: [C], [C_V] (read: C dominates V), [V], [V_C] (read: V dominates C). These also determine the place specifications of consonants and vowels.

Van der Hulst (1994:450-473) gives a detailed description of the location gesture in Radical CV Phonology. He distinguishes the primary location subgesture from secondary location subgesture (the equivalents of the “major” and “secondary” articulation of phonetics).



The location gesture is a sister of the categorial gesture which hosts subgestures Stricture and Phonation, as well as the adjunct Tone (these are not represented above). Also, van der Hulst claims that the Locational gesture is dependent on the Categorial gesture (1994:452; although each of his diagrams fails to convey this dependent relationship graphically, unless a left-to-right reading of the labels under a given node is taken to mean that), and in consequence the secondary subgesture can only have simplex combinations of C and V, and no dependents. (The rest of the architecture is of no concern to us here.)

Van der Hulst assumes the following interpretation of the basic structures, listed in the preceding paragraph, to represent the various place distinctions (1994:455):

(2.31) [C]	=	stricture in oral cavity	=	coronals
[C _v]	=	stricture outside oral cavity	=	labials
[V]	=	broad outflow of air	=	low vowels
[V _c]	=	narrow outflow of air	=	high vowels

According to van der Hulst, location space is divided into consonant subplace, [C] and [C_v], and vowel subplace, [V] and [V_c]. From the point of view of the present discussion, it is remarkable (a) that velars are not encoded by basic combinations, and (b) that velars are not made akin to vowels. Van der Hulst also makes the claim that coronals and low vowels are unmarked since they are the simplest structurally. Indeed, he claims (1994:458) that coronals can accommodate more subtypes since they have only [C].

Velars (dorsals he calls them) enter the scene when he assumes that primary location may be empty, which defines high-central vowels (such as yer) and dorsal consonants (1994:455). Note the similarity to the government phonology view that velars are placeless. Furthermore, the distinction between empty primary location and the total lack of primary location is responsible for the distinction between velars and laryngeals (also, central vowels lack the primary location subgesture altogether), like in government phonology (see 1.1 in the Introduction). Incidentally, he justifies his representation of velars by drawing attention to the fact that “dorsal place often forms the last phase in reduction processes before total debuccalization occurs, or the easiest target for weakening”, actually characterizing dorsal “as the weakest place of articulation” (1994:458). This is essentially identical to the claims made in this dissertation.

The representations for the major places of consonantal articulation in radical CV phonology fall out as follows (1994:457):

(2.32) Primary location subgesture

C	C _v	-	C
			V
coronal	labial	velar (dorsal)	coronal posterior

Note that laryngeals do not have a primary location subgesture at all.

As for the representation of the secondary location subgesture, [C] defines palatality, [V] defines pharyngealization, [C_v] defines labialization (1994:460; [V_C] in this subgesture is excluded for reasons that are irrelevant now). Emphatics and pharyngeals have a secondary [V], labialized consonants have [C_v], and palatalized consonants have [C] in the secondary location subgesture. Palatalized consonants are represented as below:

(2.33) Consonants with secondary palatality

Locational gesture	Locational gesture	Locational gesture
\	\	\
C C	C _v C	- C
palatal(ized) coronal	palatal labial	palatal velar

Of course, it would be interesting to know how palatalizations can be modelled in this framework: how does an empty primary subgesture acquire a C, that is, “stricture in oral cavity”? Van der Hulst provides no answer to this, but there is one possibility that cannot be excluded: the primary location C can be due to the spread of the secondary location C since they have similar acoustic correlates, “stricture in oral cavity” and “palatality”, the latter of which can be taken to mean “*extreme* stricture in oral cavity”. Incidentally, the same can be said of the rise of plain labials from labio-velars: secondary C_v, “labiality”, gets reinterpreted as “labial”. These are given below:

(2.34a) Palatal coronal from palatalized velar



(2.34b) Labial from labialized velar



At this point it becomes clear that radical CV phonology does not quite have the same predictions for the two processes. Notice that in palatal coronals there remains a secondary [C], but no [C_v] remains in labials under the Secondary subgesture. No immediate solution offers itself for this problem in this framework. This would hint at the possibility that palatal coronals do not emerge by the spreading of secondary C to the primary location position.

As to what relevance these representations have for the markedness issue of coronals and velars, van der Hulst claims (1994:458): “It may seem that central vowels are the simplest of all, but I would like to suggest that empty structure is not at all unmarked.” This statement can be taken to mean that markedness and structural simplicity may not go hand in hand, as is the claim of the present dissertation.

2.7 A further candidate for coronals: frontness / palatality

In the final section of this chapter a further candidate is presented to characterize coronals: frontness. The idea is in fact not new at all, it was alluded to by Clements and Hume (see (2.7a-b) above) and also by Kenstowicz (1994:464-5). These considerations are based on the observation that coronals often interact with

front vowels in many phonological systems: take palatalizations of coronals by a front vowel, or occasional fronting of non-coronals after front vowels. Clements and Hume (1995) propose that [coronal] characterizes front vowels.

There is indeed some evidence for such a claim from a number of languages. Take the following data from Ancient Greek as an example (data are included here only for $*k^w > t$, more examples are cited in Huber 2006b):

(2.35) Ancient Greek developments of IE labio-velars

(a)	$*k^w$	> t			
	$*g^w$	> d	/	_____ [+front]	
	$*g^{wh}$	> t ^h			
(b)	$*k^w$	> t	$*k^{we}$	> t _e	‘and’
			$*k^{wis}$	> t _{is}	‘who?’
			$*k^{wet^w}ores$	> t _{ettares/t_{essa}res}	‘four’
			$*penk^{we}$	> p _{ente}	‘five’
	$*g^w$	> d	$*\eta-g^{wen}-$	> a-/d/en-(os)	‘gland’
				(see Lat. in-/gw/en ‘hips, waist’)	
	$*g^{wh}$	> t ^h	$*g^{wh}en-je/jo-$	<thematic impf. of ‘kill’>	
			$*t^{h}en-jó$	> 1sg. /th/einó	
			but: $*g^{wh}on-o-s$	> /ph/onos ‘murder, killing’	

In Ancient Greek, IE labio-velars turned into dentals before front vowels. The change only affected the place of articulation, voicing and aspiration properties remained constant. The most accepted and most likely course of events was as follows: the secondary labial articulation became a front (coronal/palatal) secondary articulation, that is, [j]. This [j] palatalized the velar to a palatal stop (or affricate), which later *simplified* to a plain dental stop. Rix (1976:87) has the following chronology for $*k^{we} > te$: $[k^{we}] > [k^{wye}] > [k^ye] > [k^s_e] > [t^s_e] > [te]$. Although this may not be the only logical possibility (and the reduction of a palatal affricate to a plain stop is slightly problematic), one different approach at least can be refuted. It could be argued that in this change the labio-velars lost their labiality first and then palatalized, as is often the case diachronically (see satem languages where IE plain velars and labio-velars merged into plain velars), and it was these palatals that simplified to plain dentals /t d t^h/. There is an

objection against this course of events, namely that plain velars did not palatalize before front vowels (Ancient Greek is not a satem language; see Beekes 1995:110). That is, only the labio-velars show the phenomenon above, plain velars do not. There would be no way to keep these sets apart. This Ancient Greek change is a true case where a plain dental incorporates palatality.

Henderson (1985:20) cites a change from Vietnamese dialects which is similar enough to what has been presented from Ancient Greek, this time at the end of words, however. “In Southern Vietnamese the fronting of the [final] velar appears to have carried it all the way to merge with final –t, while there has been marked centralization of the vowel itself...” This indicates a process where a final velar became “front” (that is, dental/coronal) with concomitant centralization of the preceding vowel. Unfortunately, it does not appear from her description whether this process is restricted to velars after front vowels only or it is rather a general change to all final velars irrespective of the preceding vowel. Of course, if it is so restricted, then there is direct motivation for the fronting. If, however, there is no motivating environment, it would be hard to explain why a velar has started to become front. This scenario is, therefore, less plausible: velars fronted after front vowels.

It might be interesting to note that the typical change in many Mandarin varieties (such as Kunming Chinese) where retroflex sounds turn into alveolars is described as fronting. For Kunming Chinese, Gui (2001:72) describes a change where retroflex initials in Old Kunming Chinese become alveolars in contemporary Kunming Chinese, and he uses the feature [back] for retroflexes and [front] for alveolars. Also, retroflexion itself can be described as a strengthening alternative to palatalization: Lapesa (1981:96) mentions the fortition of initial Latin /l/ to retroflex [ɭ, ʎ•] in certain (southern) Romance varieties to which a palatal lateral [ç] corresponds in others.

These examples merely intended to show that there are cases beyond simple palatalizations where coronality can meaningfully be analyzed as frontness (palatality). The aim was simply to draw attention to these phenomena and to

encourage further investigation in this area.

2.8 Conclusions

This chapter intended to review some theories as for what they hold about the representations of segments, especially coronal and velar segments. First, it was pointed out that the essential insight for the view the velars lack a place defining element of their own can be found in classical generative distinctive features. Then it was shown that Clements and Hume's feature geometry model is not incompatible with the view that "coronality" is not unique to consonants and, in particular, that coronals can be meaningfully associated with frontness. Finally, government phonology was reviewed as for its claim that velars are "empty" and that coronals actually have some place defining element. One view is that coronals are headed by {h} which is not even a place element. The most widespread view within government phonology, however, is that coronals have something to do with A, "lowness". It is right to conclude that there is no universal agreement that coronals universally lack a place of articulation. Lowness or even frontness, for instance, seems to be a suitable feature to represent coronals.

Chapter 3

Velars and markedness – On the special status of velars

3.1 Introduction

3.1.1 *Problems of markedness among places of articulation*

Paradis and Prunet (1991:3) claim that for most contributors to their volume, “the special status of coronals lies in the fact that they lack specifications for place features in UR.” This chapter argues precisely that there is no causal connection between the lack of a phonologically relevant place of articulation and the unmarked status of coronals – as opposed to the widely accepted view. In other words, the lack of a relevant place of articulation does *not* imply the unmarkedness of coronals. The generally accepted view is expressed below:

- (3.1) (a) consonants that have no relevant place of articulation are unmarked
 (b) coronals have no relevant place of articulation

Below, arguments will be presented that there is no reason to believe that there is a causal connection between the two statements in (3.1). The two statements above are two separate issues, which are unnecessarily and unwarrantedly merged. Statement (3.1a) is a tenable statement (a definition) since in a given opposition the unmarked term is the one which is not specifically marked for a value. Consequently, among places of articulation, the unmarked member is the one that has no relevant place of articulation. (Nevertheless, the possibility will also be raised that markedness relations for places of articulation are not based on a lack of place specifications in fact, but on implications rather). Therefore, it remains to be seen that it is not coronals that have no relevant place of articulation, but velars. It has to be proved that (3.1b) is false. (3.1b) can prove

false since it is an empirical question: arguments that coronals have no relevant place of articulation should be provided by their phonological behaviour. But their behaviour does not provide any. Somewhat curiously, this chapter, in defying its title “Velars and unmarkedness”, is more about why coronals are not placeless.

If coronals are still unmarked (or “special”, as Paradis and Prunet phrase it), it must follow from some other property, not from their lack of a place specification. Velars, on the other hand, seem to lack a place specification exactly because they seem to have no place specification that could be referred to by the phonology. Therefore, it seems that the special status and behaviour of coronals are wrongly derived from their lack of a place specification. The issue of markedness between coronals and velars, and the lack of a place of articulation are two separate problems, which are typically merged in general phonological thinking.

In this chapter the speculative nature of some of the arguments in favour of coronal unmarkedness and the theoretical inconsistencies of these arguments will be pointed out. It will be shown that there are no sweeping arguments for the unmarked status of coronals on grounds of their lack of place specifications. Also, the arguments for positing velars – as opposed to coronals – as the “special” place of consonantal articulation will be examined. It will be argued that the criteria singled out in the literature, and particularly in Paradis and Prunet (1991), to support the specialty, hence the unmarked status, of coronals do not actually mark out this place of articulation any more special than the labial or velar places. The underlying argument, to which other criteria can be reduced eventually, is the undeniably high frequency and variety of coronals in the world’s languages – which is empirically true.

The frequency of occurrence and the range of variation of coronals is automatically taken to mean that they do not have a specified place of articulation, and hence that they are the unmarked consonantal place of articulation. This chapter proposes specifically that there is no direct causal link between frequency and placelessness, and, therefore, the coronal unmarkedness hypothesis fails on this account. The frequency of occurrence and the range of variation coronals

show, thus, do not imply that coronals *lack* a phonologically relevant place of articulation because there is no necessary causal link between the facts and the theoretical conclusion arrived at on the basis of these facts. For instance, it does not answer the question why it cannot be the other way round, coronals being the most (or at least more) complex (varied) place of articulation once they are so frequent and numerous across languages. In other words, speciality, a vague term anyway, and lack of a place of articulation must be kept strictly apart. It seems equally reasonable to assume that coronals are so various and occur so often that these facts *cannot* be attributed to an *empty* place of articulation.

It is argued here that any conclusion as to what is unmarked or marked should be based on phonological behaviour rather than on pure statistical data. The reasoning in this chapter will be indirect: the usual arguments, presented in section 3.1.3 below, will be (re)considered. It will be refuted that it is coronals which lack a phonologically relevant place of articulation – without discussing whether or not this makes them “special”. In particular, the importance of implications will be emphasized. Ultimately, arguments will be presented in favour of a view, proposed by Nasukawa and Backley (2004), that there might in fact be a double markedness relationship among the major consonantal places. According to this view, coronals are unmarked in one specific opposition, while velars are unmarked in another opposition. This formalizes the observation that coronals are the unmarked consonantal *melody*, which explains their frequency and variation, while velars are unmarked *structurally*, which explains why they behave phonologically as placeless.

3.1.2 *Markedness in phonological theory: a brief overview*

A brief summary of the history of markedness is in order at this point, to emphasize that underspecification, as in Paradis and Prunet (1991), is by no means the only possible theoretical formulation of markedness relations. In Jakobson and Halle’s early feature system, as well as in SPE proper, markedness was not encoded formally: all segments were marked for each and every feature in the underlying representation. This is also conspicuous in Jakobson and Halle

(1956) where the authors do not mention markedness or “more natural value” at all when introducing the individual features (see 2.2 for the features themselves). The closest one gets to unmarkedness is in phrasings like “the optimal consonant is voiceless and the optimal vowel is voiced” (1956:56). It is noteworthy that they stress the importance of the “labial stage” of language acquisition, the /pa/ phase, in shaping the phonemic patterning in language acquisition.

Radical underspecification, which “is essentially a theory of markedness”, “holds that only one value of a feature, the unpredictable value, is present in UR” (Paradis and Prunet (1991:5); for further references see there). With respect to place of articulation, they claim that “the Coronal articulator is the unmarked (predictable) articulator. In other words, labials have a Labial articulator and velars have a Dorsal articulator, but coronals have no Coronal articulator in UR” (1991:6). Furthermore, they also claim that often coronals do not even have a place node either (for a treatment of this inconsistency, see 2.4). The representation of glottals lacks a supralaryngeal node altogether, which would dominate the place node (1991:5). It is not quite clear how one member can be uniquely assigned the unmarked status among non-binary oppositions such as place specifications (for a detailed presentation of this problem, see section 3.9 below). Nevertheless, radical underspecification holds on to coronals having no coronal articulator node.

Kenstowicz (1994:62) discusses the so-called default feature values: “Generative phonologists encode the marked–unmarked distinction by supposing that for each feature exhibiting such a distinction, there is a UG rule assigning the unmarked value”. To determine the marked–unmarked distinctions concerning a particular feature in generative phonology, the following three asymmetries are usually cited (based on Kenstowicz 1994:62):

(3.2) The unmarked value

- (a) appears in all grammars
- (b) is the first to emerge in language acquisition and the last to disappear in linguistic disorders such as aphasia
- (c) emerges in neutralizing contexts

(Note in passing that in Jakobson and Halle (1956:38) the criterion on (3.2b) was decisive for implicational relations.) Based on (3.2), among consonantal places it is [coronal] which is “the most popular choice”, although “there is a debate as to whether a particular value should be singled out as unmarked, and if so which one” (1994:65). It is, namely, not unequivocally the case that coronals behave according to the criteria enumerated above.

In connection with the acquisition of consonantal places, Jakobson and Halle (1956) claim that [p] is the earliest consonant, followed by [t] and then by [k]. Moreover, they do not claim that this has anything to do with the acquisition of *place*, rather they refer to acoustic and articulatory contrasts being acquired. This approach and the acquisition of [p] first are hard to reconcile with coronal unmarkedness. They would be equally difficult to reconcile with velar unmarkedness, too. This is why this dissertation asserts that velars are placeless, rather than unmarked, because the placelessness of velars, has nothing to do with whether they are marked or unmarked.

As a final remark, Hume (2003) traces the history and changes of the term markedness in phonological theory. She draws attention to the fact that Trubetzkoy (1939), who first used this term, intended markedness as a language-specific notion “identifying and classifying the relations between sounds in a language” (2003:1). Then under Jakobson and Greenberg’s quest for universals, it came to be a univally valid diagnostic for relations between sounds. And this universalist approach found its natural niche in generative grammar: markedness is innate, and markedness relations have a predictive power. The symptoms of this innateness are the criteria in (3.2), among others. However, Hume argues that based on the received body of criteria, any place can be unmarked in individual languages – and lots of references can indeed be enumerated for each major place as the unmarked (see references therein). She therefore draws the conclusion “that markedness considerations do not provide compelling evidence for *constructing theories* of phonology [emphasis mine]” (2003:3).

3.1.3 *Arguments for coronal placelessness*

McCarthy and Taub (1992) in their review of Paradis and Prunet (1991) enumerate the following points, emerging from the volume under review, which is assumed to indicate the unmarked nature, hence placelessness, of coronals:

- (3.3) (i) their appearance in epenthetic environments;
 (ii) their frequency and freer distribution in the lexicon and in corpora;
 (iii) their being assimilation targets; and
 iv) their possible transparency in vowel harmony systems.

The reviewers word their opinion carefully as for the uncontroversial and universal applicability and validity of these criteria, and draw attention to some problems. Here more problems will be presented to see that the criteria above do not prove the placelessness of coronals (and what they prove about unmarked status and specialty is a different matter). It will be shown that the unmarked status of coronals based on these (and similar) criteria is not so straightforward. Unmarkedness is not necessarily the result of underspecification. It is more convincing to analyze the phonological behaviour of the various places of articulation to establish markedness relations. Interestingly, these tend to support the placelessness of velars, rather than coronals. The following sections examine the above criteria one by one, investigating the content (and implications) of each, pointing out possible problems and flaws in the argumentation presented by Paradis and Prunet (1991).

3.2 Cases of consonantal epenthesis as argument for coronal unmarkedness

As for the first point, “occasional appearance via epenthesis” (McCarthy and Taub 1992:363), velars also figure in epentheses (Szigetvári 1994:199). Epenthesis, however, is a very heterogeneous concept and it tends to have fairly vague interpretations. On a loose interpretation, any segment is epenthetic which had not been in that position earlier. However, a stricter, and more phonologically based, typology is set up by Lass (1984). Lass distinguishes true epenthesis from fake epenthesis. The most important conclusion to be drawn as to the behaviour of coronals and velars is that actually neither of them is truly epenthetic, while both may appear in fake epenthesis. Incidentally, the cases to be enumerated are all instances of such fake epenthesis. The major point in this section is, in fact, that the place of articulation is not relevant for susceptibility to (true) epenthesis, it is only a matter of simplicity (elemental composition) and phonotactic motivation. Therefore, no straightforward markedness relations can be established for coronals and velars since segments that are different from a glottal stop do not emerge in true epenthesis (see Lombardi 2002 for an excellent discussion).

First of all, the examples of coronal epenthesis are reviewed. Paradis and Prunet (1991:21) refer to, rather than actually cite, cases of coronal epenthesis. Such a case is mentioned from Gokana, with no data. In another case from Amharic, the epenthetic /t/ is “demonstrably not part of the [biradical] root”, and it “also appears in other skeletal patterns to fill in a consonant slot when the root does not have enough consonants” (*ibid.*), they summarize. These statements are clearly no analysis in any sense. Even if [t] is not part of the root in Amharic, why is it necessary that it must be epenthetic then? This phenomenon in Amharic is absolutely worth investigating in greater detail because exactly such details are missing. Incidentally, Lombardi (2002) analyzes these processes, and claims that they are all morphologically restricted, therefore they do not constitute purely phonologically-driven cases of coronal epenthesis: “All of the cases [here, above] are restricted to particular morphological situations; they are never the general epenthetic consonant of the language” (2002:235). As for Gokana, there is regular

glottal stop insertion, in Amharic the /t/, claimed to be epenthetic, is analyzed as a floating segment (2002:236, 241).

Scheer (1998:212) argues for the unmarked, that is, placeless, nature of coronals, and he cites in support that [t, d] arise in certain morphological environments. Consider the following cases from French, which are supposed to underline the placelessness of coronals:

- (3.4) a il dit --> a-t-il-dit 'has he said?'
 tableau + in --> tableauin 'small picture, painting'
 bijou + ier --> bijouier 'jeweller, goldsmith'

Scheer (1998:213) also cites examples from German *Dentalwuchs* ("dental growth"), where a dental stop /t/ or /d/ is added to the end of some words in the transition from Middle to Modern High German. What is remarkable and what makes Scheer attribute the special status to coronals is the undeniable fact that [t, d] may attack/attach to labial [f] and even velar [x, g], not just to coronals like [s, n, r], although he himself notes that attachment to non-coronals is (extremely) rare. This is meant to reveal that dentals are not sensitive to the preceding place of articulation and freely combine with other places of articulation. The effects of this change can be seen in the following words for instance:

- (3.5) *irgen*[t]- 'any-'
jeman[t] 'somebody; nom.' – *jeman*[d]*em* 'somebody; dat.'
wesen[t]*lich* 'important' see Du *weselijk*
sons[t] 'otherwise'
Obs[t] 'fruit'
-schaf[t] '<nominal suffix>' see E *-ship*/Du *-schap*

All these examples, of course, lend a rise to frequency figures for coronals in German. Nevertheless, this dental growth is highly lexical and far from being predictable at any event. For instance, [t] does not attach to the [ks] cluster of *Fuchs* 'fox', *Ochs* 'ox', *sechs* 'six' and *Wuchs* 'waxing, growth', although it did to *Ax*[t], as a comparison with its English cognate, *axe* < OE *æcs*, reveals. Incidentally, in certain cases there is loss of a final dental: MiddleHG *zand* > ModHG *Zahn* (see English *tooth*, Dutch *tand*). A further case of coronal

epenthesis is provided by the *linking-* and *intrusive-r* in English and *s-liason* in French – cases that are far too well documented in various frameworks in the literature to necessitate a detailed discussion here. The major conclusion for Scheer is the high probability of coronal epenthesis.

As for the frequency of coronal epenthesis, Starčević (2001:37) remarks that “not all languages fill their empty onsets with the prototypical stop *t*.” Indeed, it is more common and regular to insert a glottal stop before a word-initial vowel in Czech, German and Arabic (see Lombardi 2002, too). One short remark is in order here, though: glottal stop insertions are active processes in the languages whereas *Dentalwuchs* is phonologically quite arbitrary and lexicalized in its incidence. (This statement might eventually be modified once the concept of epenthesis is revised; see section 3.3 below) Finally, the occurrence of coronals as epenthetic consonants might be in fact much more related to the second criterion: their being frequent in general.

While cases of coronal epenthesis are possibly more frequent and various in languages, velars (and labials) also crop up occasionally in “unetymological” positions – this being a common interpretation of epenthesis. The well-documented and frequent appearance of [g] before *w+V* sequences is attested in Romance languages like Spanish, Galician, Italian and French. In words borrowed from Germanic languages, a voiced velar stop was inserted when the original sequence started with a labio-velar glide [w] + vowel, a process traditionally called *w-reforzada* or *velar fortition of glides*. Subsequent loss of lip rounding before a front vowel (sometimes before back vowels as well) resulted in *g + V* sequences as the following Spanish examples show:

- (3.6) *guerra* [ge-] < **werra* (see E *war*)
guisa [gi-] < *wisa* ‘wise, manner’
 Sp *guadañar*/
 Ga *gadañar* < **waidanian* ‘to scythe’
 Sp *guardar*/
 Ga *gardar* < *wardon* ‘to guard’ (see E *warden*, G *warten*, etc)
guindar [gi-] < *windan* ‘to wind up, to heave’
 (these examples are from Ferreiro 1999)
guante ‘glove’ (see Dutch *want* ‘glove’)

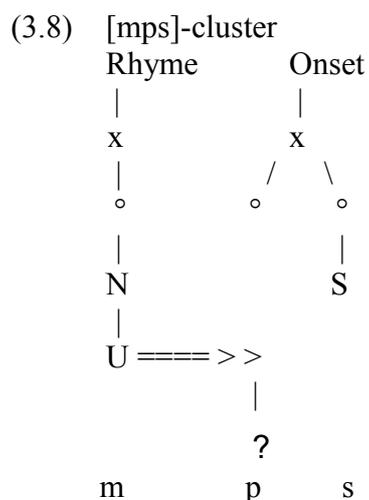
In Spanish, this process also often extends to epenthesis in morphological situations where the same velar quality appears before a [w], with the result that the dental [n] of the masculine indefinite article *un* optionally becomes [ŋ] before a following [gw]: *un̄gwew̄bo* or *un̄ wew̄bo* ‘an egg’ (Menéndez-Pidal 1989:111).

Szigetvári (1994) draws attention to cases of stop epenthesis where [k] regularly pops up, together with [t] and [p], between a nasal and a following fricative [s] or [f, θ] in foot-internal position:

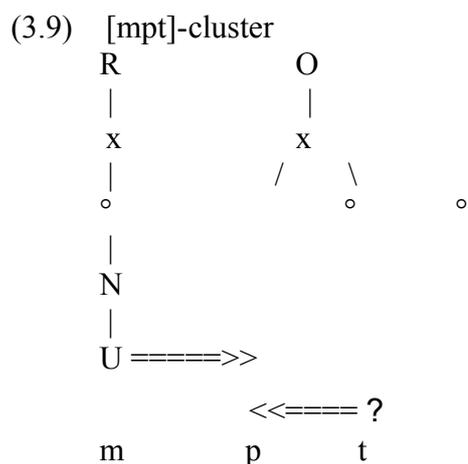
(3.7) *Am[p]sterdam, trium[p]ph, war[mpθ], prin[t]ce, stre[ŋkθ]*.

It must be hurriedly added that the –θ ending is historically a non-analytic ending in *strength, depth, etc.* (but not in *tenth*), that is, it does not betray its suffixhood and behaves as if it has always been there (see Kaye 1995:308ff on irregularity in morphology). A rather convincing explanation for this insertion is worked out in Cser (1998:19). Cser claims that there is a tendency in languages to eliminate obstruent sequences of [+continuant][+continuant] and [–continuant][–continuant] clusters in favour of [+continuant][–continuant] clusters: [pt] and [θf] sequences will regularly turn into [ft] and [θp] sequences, respectively. For sequences of nasals and obstruents, however, the opposite seems to hold: [+continuant][–continuant] clusters are assimilated to [+continuant][+continuant]. Either the fricative itself will turn into a stop: [mv] > [mb], or a [–continuant] segment is inserted between the nasal and fricative, for instance in A[ms]terdam > A[mps]terdam. The major problem with this explanation, also admitted by the author, is that there is no representational correlate with the empirical facts. However, it can be argued that these processes are all too phonetic to warrant an inclusion in a phonological model. Furthermore, nothing caters for the homorganicity observed between the nasal and the inserted stop, and the question remains why it is not the following fricative that determines the place of the stop to yield **warm[t]θ* or **stre[ŋt]θ*.

Based on Szigetvári (1994), the representation of such a cluster would be with U-spreading from the nasal:



A more interesting case of insertion occurs after a nasal and before a stop [t] (also before /d/?). It will be assumed here that *all* nasal + homorganic stop + [t] clusters involve exactly such an epenthetic stop, thus also in *em[p]ty*, *prom[p]t* from L *prom[p]tus*, L *pu[ŋk]tum* (see Szigetvári 1994:206). Subsequent changes blurred (though spelling retained) the original setting in words like English *assum[p]tion* (compare *assume*). In such a constellation the identity of the epenthetic stop is made up by the two flanking consonants, as it were: the nasal supplies the place while the dental stop lends it (voiceless) stopness:



The same mechanism is assumed to apply to [ŋ] + [k] + [t] sequences from [ŋt] clusters. Since [ŋ] is also placeless just like [k], there is no place element to spread. Yet, a very important question remains: does it make sense to talk about

markedness at all in these cases where all places are involved? An answer in the negative seems justified.

Let us take some further examples for vowel epenthesis to gain a better perspective on epenthesis. In a number of languages an empty vowel is realized as a reduced vocalic segment in phonotactically motivated places. For instance, in Arabic it will be typically a yer-type vowel, in the English *girl* [gɜːrɪl] type epenthesis it is a schwa, in still others it will be [a]. From these it could be concluded that a simple (=mono-elemental) vocalic segment or one without any elemental content will be the epenthetic vowel. The epenthesis in Spanish, e+sC, is interesting in that there is no sense in which this [e] can be regarded as simple. Incidentally, this open front vowel appears in a number of languages, including many Romance languages. It has two elements, I and A. Moreover, there would be simpler vowels readily available in Spanish: *i*, *u*, or *a*. If this vowel-epenthesis is considered an epenthesis, as it is in the literature, then a natural conclusion seems to be that unmarkedness and simplicity do not go hand in hand as regards epenthesis since occasionally even more complex segments may be inserted.

On closer inspection of the data so far, however, there are a few observations that may after all turn out to be theoretically important. It is conspicuous that:

- (3.10) (a) no other coronals but the “simplest” ones occur ([t s r]);
 (b) there are among them some of the primes of Government Phonology (r), and simple, 2-element segments (s, t);
 (c) from among the velars, also the simplest occurs
 (d) (labials are less common in general)

It is obvious that in all cases examined so far, only a restricted set of coronals played a role from among the coronals. Why don't we have epenthetic /θ/, or /S/, or even /tS/? The most popular ones are those that are taken to be simple – to formalize this statement: they either consist of one element (or none) or are composed of two elements only. However, this is also true for the epenthetic

and/or morphological “explanations” for the identity of the epenthetic segments even in the true type, the difference seems to lie in the observation that true epenthesis creates structures that are unmarked (filling in, say, an onset position), while fake ones create superheavy structures, that is, marked structures. (It is questionable whether this difference correctly accounts for the breaking up of final /lm/ cluster in [fləm].)

The consequence of the above typology is that apparently coronals participate in true-type epenthesis just like velars. The conclusion then is that the place of articulation is not relevant for susceptibility to (true) epenthesis, it is only a matter of simplicity (elemental composition) and phonotactic motivation. At this point it can be added that clearly further examination will have to be carried out as to the nature and phonological status of epenthesis – an area largely neglected in current theoretical orientations/discussions.

3.3 On the theoretical status of epenthesis in linguistic theory

3.3.1 Introduction

This section looks in more detail at the nature of epenthesis (sound insertions) from a phonological theoretical perspective. Much of the discussion that follows centres then around questions such as: What is considered epenthesis and why? How can it be formally defined? Also, why is this concept needed in phonological theory? In other words, what role does it play (descriptive, expository or otherwise) in phonology? And ultimately, do all theories recognize these phenomena as something special? To anticipate a little, by beginning to answer the above questions, the answer to the last one will be in the negative: not all phonological theories recognize the specialty of this set of phenomena.

My contention is that the term *epenthesis* is far too loose in the terminology of “traditional” grammar inasmuch as these phenomena do not seem to be anything homogeneous, which could be given a unique formal description.

What is traditionally treated as epenthesis ranges from segments which are simply “not represented in the orthography” of the language through segments that were “added”, so to speak, to the phonological shape of words in the history of the language, to clear cases of phonetically and/or phonotactically motivated sound insertions. This is indeed a fairly heterogeneous set of phenomena to be covered by the same descriptive term. In 3.3.2 data are cited from a number of languages to illustrate what is considered epenthesis. The aim of this section is to point out that all these phenomena are not of the same sort. In fact, four groups can be isolated:

- (3.13) (a) some of them are purely lexical incidences in the synchronic state of the language, about which nothing should be said
 (b) others are best handled by morphology
 (c) still others are purely (?) phonetic in nature
 (d) while clearly there are phonologically motivated cases as well

3.3.3 probes into the theoretical problems which are raised by treating all the above phenomena uniformly as epenthesis. These problems include: why to treat some ostensibly morphologically conditioned sound insertions as phonological?; why and to what extent to include in the synchronic description of a language information from its history?; and most interestingly, why to analyze them as *processes* in the first place – are there no alternatives? An affirmative answer to the last problem leads to the next sections.

My intention in 3.3.4 is to restrict the concept to phonotactically motivated, that is, *true epentheses* in the sense of Lass (1984). This is needed to get a better descriptive grasp. This step, of course, leaves fake epentheses to be matters for the lexicon. However, phonological theories recognizing empty skeletal slots (Government Phonology in general) and not recognizing derivational devices (such as multiple layers, cyclic rule application and rule ordering) simply cannot assign the concept a theoretical status since cases of epenthesis will all be regarded as the (default) realization of such an empty skeletal slot, and not a *process of insertion* at all. Epenthesis does not create structure, it is merely the interpretation of positions already in the structure –

cases of epenthesis are morphological or vowel–zero alternations or static phonotactic restrictions. This can be handled rather easily by GP (and derivatives, VC Phonology in particular).

Moreover, a historical aspect can also be added: epenthesis phenomena cannot be used as expository devices for derivation as they were in Classical Generative Phonology, because in these theories there are no derivations. This is discussed in 3.3.5. My conclusion is that it is possible to do away with epenthesis as a theoretical term in such non-derivational theories because phonotactically motivated epentheses are merely well-formedness (=phonotactic) constraints, and can be read off from the representation itself. They are in fact the norm, not the special cases. However, it must be pointed out here that most of the discussion that follows is couched in the framework of Government Phonology – in Optimality Theory, epenthesis receives a different interpretation. In OT, epenthesis is a repair strategy and it is indeed referred to as a process of sound insertion (Rebrus 2001:99: “epenthesis is a process whose application is minimal”), and this repair strategy does actually have the power to create structure (in fact it doesn’t do anything else).

3.3.2 *The data*

First, some typical, oft-cited examples for epenthesis are described and analyzed to see how these systems function and what they reveal about epenthesis in general. The majority of these data come from Scheer (1998) unless otherwise indicated. Some of these phenomena have already been touched upon in 3.2.2.

3.3.2.1 French

The following insertions from French illustrate lexical or morphological specification:

(3.14) a il dit	>	a- <u>t</u> -il-dit	‘has he said?’
verra on	>	verra- <u>t</u> -on	‘will we see’
tableau + in	>	tableau <u>t</u> in	‘small picture’
bijou + ier	>	bijou <u>t</u> ier	‘jeweller’

les + amis > lezamis 'the friends'

Depending on the order of the morphemes, some specific consonant appears between the morphemes. The identity of the inserted consonant is determined either lexically or by the morphemes between which it is inserted. Both cases are actually historical incidence and morphosyntactic since the consonant in question is only interpreted in the appropriate morphosyntactic environment. Moreover, it is important that between given morphemes only a specific consonant is inserted, for instance after the conjugated verb form when the subject pronoun follows, only [t] can be inserted, not [s] or [z], for instance. It follows that the identity of the would-be epenthetic consonant is morphosyntactically determined and its appearance depends on morphosyntactic factors rather than anything else. In fact, Tranel (1995) in his concise and elegant overview of current phonological issues in French, specifically concerning the fit between liaison and their theoretical account, makes no reference whatsoever to consonantal place as playing any role in this phenomenon.

3.3.2.2 German

Two phenomena from German will be considered. The first one is referred to as the Middle High German Dentalwuchs: a coronal stop appeared at the end of morphemes, typically after a dental nasal, but also after /s/, occasionally even after non-coronal fricatives as well:

- | | |
|------------------------------------|---|
| (3.15) -following a dental nasal: | <i>irgen</i> [t]- 'any-'
<i>jeman</i> [t] 'somebody'
<i>wesen</i> [t] <i>lich</i> 'important' |
| -following a coronal fricative: | <i>Obs</i> [t] 'fruit'
<i>sons</i> [t] 'otherwise'
<i>Ax</i> [t] 'axe' |
| -following non-coronal fricatives: | <i>-schaf</i> [t] (see E <i>-ship</i> / D <i>-schap</i>)
<i>Saff</i> [t] 'juice'
<i>Werf</i> [t] 'shipyard (see E <i>warf</i>)'
<i>Habich</i> [t] 'hawk' |

Although the major tendencies can indeed be drawn up, it remains a fact from a synchronic point of view that no general rule can be formulated. Therefore, the best place to give a description of these insertions is the lexicon: these words contain a [t] just like they contain a particular stressed vowel, etc, and that's all.

The other phenomenon is the well-known epenthesis of a glottal stop in “vowel-initial” words such as *?Adler* and *?Eva*. This is basically to satisfy a well-formedness constraint in German.

3.3.2.3 Arabic

Arabic also illustrates phonotactic motivation for the insertion of a glottal stop (data from Rebrus 2001:99). A glottal stop is inserted to create well-formed structures, much like in the second German phenomenon:

(3.16) /al-qalamu/ -> [ʔalqalamu] ‘the-book’

3.3.2.4 Spanish

Three sets of data will be discussed from Spanish, which all illustrate phonotactic motivations in connection with consonants. In order of their treatment, they are: **#wV*, **CC#*, and **#sC*.

The first phenomenon is the well-known [w] > [gw] (> [gV]) change: **#wV*. Consider the following examples from Germanic:

(3.17) Old Germanic *#we-*, *#wi-*, *#wa-* words in Spanish ([ge-], [gi-], [gwa-])

<i>guerra</i> ‘war’	< <i>*werra</i> (see E <i>war</i>)
<i>guindar</i> ‘to wind up’	< Gmc <i>windan</i> ‘to wind up, to heave’
<i>guisa</i> ‘manner’	< <i>wisa</i> ‘-wise, manner’
<i>guadañar</i> ‘to scythe’	< <i>*waidanian</i> ‘to scythe’
<i>gualda</i> ‘dyers’ greenweed’	< Gmc <i>walda</i> (Du <i>wouw</i> , E <i>weld</i>)
<i>guante</i> ‘glove’	see Dutch <i>want</i> ‘glove’
<i>guardar</i> ‘to guard’	< Gmc <i>wardon</i> ‘to guard’ (E <i>warden</i>)
<i>guarecer</i> ‘to provide shelter’	< Gmc <i>warjan</i> (see OE <i>werian</i>)
<i>guarnecer</i> ‘to equip’	< Gmc <i>warnjan</i> (see E <i>warn</i>)

Contrary to common belief, not only Germanic common nouns exhibit the phenomenon, but loans from Arabic as well as Germanic or Arabic proper names:

- 3.18) *Guillén/Guillermo* ‘William’
Guimara/Guimarez < Gmc Wimara
Gales ‘Wales’
Guadalquivir < Arabic *Wad al-Kebir* ‘the Great River’

Based on the above examples, it could be argued that these are just as historical and lexical as are the German data in 3.3.2.2. However, the following, clearly much more recent examples look like a general well-formedness constraint:

- (3.19) Much more recent loans from Aztec, Quechua and English

<i>huacal / guacal</i> ‘type of basket’	< Aztec <i>uacálli</i> (1571)
<i>huaca / guaca</i> ‘Indian tomb’	< Que <i>uaca</i> ‘family god’ (1551)
<i>huasca / guasca</i> ‘whip, lash’	< Que <i>uaskha</i> (1599)
<i>guacho</i> ‘orphan’	< Que <i>uájcha</i> (1668)
<i>guanaco</i> ‘huanaco, wild llama’	< Que <i>uanácu</i> (1554)
<i>guano</i> ‘guano’	< Que <i>uánu</i> (1590)
<i>huachimán / guachimán</i> ‘watchman’	< E <i>watchman</i>
<i>güelfar</i> ‘welfare’	< E <i>welfare</i>
<i>güinche, guinche</i> [g(w)i-] ‘winch’	< E <i>winch</i>
<i>Guasington</i>	<i>Washington</i>

In fact, it seems that the pattern has generalized to *-VwV-, as the following data show:

- (3.20) *nogüey* ‘no way’
jaigüey ‘highway’
jagüey ‘watering place’ < Mayan ja+aui ‘water+over there’
aguacate ‘avocado’ < Aztec auacatl (1560)

The constraint seems to imply that Spanish does not allow diphthongs in word-initial position of the wV type, so that there is no #*we*, #*wa*, #*wo*, #*wi* and #*wu*. Indeed none are found with #*wu* or #*wo*, which is not phonologically surprising. The others, *wi*, *we*, *wa*, occur nevertheless. While [wi-] does not appear in words

of Latin or Germanic origin, at least the following two loans from Nahuatl have it: *huipil* ‘type of clothing without sleeves’ < Nahuatl *huipilli*, and *huisache/huizache* ‘species of plant’ < Nahuatl *hitzli* + *ixachi* (but note *güinche*, with [gwi-]). These Nahuatl words are clearly best regarded as exceptions, and they are words of low frequency anyway, probably these are not Spanish words for most native speakers. Initial [we-] on the other hand is absolutely frequent. It is the regular result of the early Castilian breaking of Latin stressed short open [O]. This breaking applied across the board in the language (*cuénto–contámos* ‘I count–we count’ and others), not skipping word-initial vowels either (where orthographic <h> has *always* been silent):

(3.21) Regular breaking (diphthongization) word-initially in Spanish

Spanish	Galician (for comparison)	
<i>hueco</i> ‘empty, void’	<i>oco</i>	< L <i>occare</i> ‘to rake over’
<i>huelga</i> ‘strike’	<i>folga</i>	< VL <i>follicare</i> ‘to blow’
<i>huella</i> ‘trace’	?	< L <i>fullare</i> ‘to trample on’
<i>huérfano</i> ‘orphan’	<i>orfo</i>	< L <i>orphanus</i>
<i>hueso</i> ‘bone’	<i>óso</i>	< VL <i>ossu</i> < L <i>os</i>
<i>hueste</i> ‘army’	<i>hoste</i>	< L <i>hostis</i>
<i>huésped</i> ‘guest’	<i>hóspede</i>	< L <i>hospes–hospitis</i>
<i>huerto</i> ‘orchard’	<i>horto</i>	< L <i>hortus</i>
<i>huevo</i> ‘egg’	<i>ovo</i>	< L <i>ovum</i>

The crucial point about these words is that they do not have [gwe-] forms. But an interesting dialectal epenthesis must be also cited. In the very words above, after the indefinite article *un* a [g] can occur before [we]: [uŋ gweBo] for ‘un huevo’ (Menéndez-Pidal 1989:111). But (3.19-20) also has examples for recent loans where such [we] sequences become [gwe] sequences. As for [wa-], it appears in late loanwords, mainly from American Indian languages, but observe in the words in (3.19-20) that they *all* alternate with a form in [gwa-]. In conclusion, remnants of the original Western Romance constraint *wV still linger on in contemporary Spanish: while [we] is fine (except in some dialects and recent loanwords), there exists a strong synchronic constraint *wa in Spanish since in all instances of this

group it is (or can be) preceded by a C, specifically [g]. – It was important to point out that this phenomenon is a phonotactically motivated constraint.

The second phenomenon is a less examined constraint, observed at the end of words: *CC#. To my knowledge, Aronoff (1994:67-68) is one of the few authors (on morphology) to analyze these cases as epenthetic. The following examples happen to be grammaticalized alternations in Spanish:

(3.22)	gran – grande	‘great’
	san – sant <u>o</u>	‘saint’
	lor – lord <u>e</u> s	‘lord’

The adjectives take their short form before nouns (in premodifying cases) that begin with a consonant and their full form before vowel-initial nouns. What is peculiar about them is that in the short form not only is the final vowel deleted, but also the post-nasal consonant. The same pattern is illustrated in the English loanword *lordes*. Only in the plural is the full consonant-cluster preserved, in the singular, that is when the plural suffix *-es* is not there, the final consonant must be deleted, too (this illustrates government-licensing effects; see 2.5.2.1).

Now, it is generally true for Spanish that no word-final consonant clusters are allowed. This is show below for sonorant–obstruent clusters:

(3.23a)	*-rt, *-rd:	<i>part<u>e</u></i> ‘part’, <i>fuert<u>e</u></i> ‘strong’, <i>suert<u>e</u></i> ‘luck’
	*-nt, *-nd:	<i>guant<u>e</u></i> ‘glove’, <i>fuent<u>e</u></i> ‘fountain’, <i>puent<u>e</u></i> ‘bridge’, <i>duend<u>e</u></i> ‘dwarf’, <i>restaurant<u>e</u></i> (but also <i>restorán</i> like <i>gran – grande</i>), <i>hond<u>o/a</u></i> ‘deep’
	*-lt, *-ld:	(<i>de</i>) <i>balde</i> ‘(in) vain’, <i>sueld<u>o</u></i> ‘salary’, <i>suelto</i> , <i>esbelto</i> ‘slender’, <i>vuelto</i> ‘turn; noun’

Similarly for obstruent–liquid clusters:

(3.23b)	*-tr, *-dr:	<i>padre</i> <L <i>patre(m)</i> , <i>madre</i> <L <i>matre(m)</i>
	*-kr, *-gr:	<i>tigre</i> <L <i>tigre(m)</i> (see E <i>tig[ə]r</i>), <i>suegro</i> (see G Schwieger, H <i>sógor</i>)
	*-pr, *-br:	<i>pobre</i> ‘poor, pauper’ <L <i>paupere(m)</i>

and even for certain single consonants:

- (3.23c) *-k: bloqueé
 *-b: clubeé

It is truly noteworthy that in a surprisingly large number of words the word-final vowel is expected to be –e. The presence of a final –e and the presence of either an offending cluster, (3.23a,b), or an offending single segment, (3.23c), seem to go hand in hand – which can be interpreted to mean that this vowel is only there to avoid a phonotactic constraint violation. It is also conspicuous that, while an –e is not the only possible vowel word-finally, an -o/-a vowel always indicates gender. This means that a final -o/a vowel is a morpheme, but –e is present for phonotactic reasons. This is also shown in the data above.

Finally, for the well-known restriction in many Romance varieties, *#sC, which triggers the epenthesis of /e/: *estilo, estudio, estándar*. What is remarkable about this constraint is that there is a surprisingly close correspondence between the identity of the inserted vowel, /e/, and the environment _sC. It seems that the two imply each other, but for details, see 3.3.3 later.

3.3.2.5 English

The following cases illustrate phonetic motivation (see Szigetvári 1994:206).

- (3.24) *Am[p]sterdam, trium[p]ph, warm[p]th, prin[t]ce, stre[n]k[th]*
em[p]ty, prom[p]t < L prom[p]tus

Here, the identity of the inserted consonant is made up from the place of the preceding nasal and the closure of the following stop. This is often interpreted as a time-lag between the end of the nasal articulation and the closure for the stopness. The distribution of the plural morpheme in English is phonotactically motivated (Durand 1990):

- (3.25) plural (-es): bus[l]s, wish[l]s, garag[l]s, match[l]s, bridg[l]s

3.3.2.6 Dutch

The data below show effects of phonotactic motivation for breaking up some consonant clusters by a schwa in Dutch (data from Booij 1995:127-8). It can be observed that all non-homorganic liquid + stop clusters and all sonorant clusters are broken up:

(3.26)	kal[ə]m	‘quiet, calm’
	ar[ə]m	‘arm’
	hel[ə]p	‘help’
	har[ə]p	‘harp’
	her[ə]fst	‘autumn’
	el[ə]f	‘eleven’
	mel[ə]k	‘milk’
	wer[ə]k	‘work’
	al[ə]g	‘alga’
	er[ə]g	‘very’
	ur[ə]n	‘urn’
	ker[ə]n	‘core’
	hoor[ə]n	‘horn’
	toor[ə]n	‘anger’

Incidentally, /rn/ is the only (dental) sonorant–sonorant cluster which is broken up this way; /rl/, for instance, is always broken up “historically”: *kerel* [ke:rəl] ‘guy’ (see G *Kerl*), *wereld* [we:rəlt] ‘world’. (This can be taken to mean that [rl] is worse than [rn].) On the other hand, homorganic sonorant + stop clusters are not broken up: *hart* ‘heart’, not *har[ə]t, *hals* ‘neck’, not *hal[ə]s. Although, both sonorant–sonorant and homorganic sonorant–stop clusters naturally contain only coronals, it is worth noting here that there is an asymmetry between their behaviour. While sonorant clusters are broken up, the homorganic clusters never are.

3.3.3 Some theoretical problems in the treatment of epenthesis

After describing and analysing the data above, this section poses some theoretical questions that emerge in connection with the data.

It is fairly conspicuous that quite a number of the cases mentioned above are intimately related to the history of the language concerned. It seems then natural to ponder about just how much language history should be allowed into a

synchronic phonological description? The question itself is, of course, nothing new in phonological thinking, and neither is an answer in the affirmative nor in the negative so straightforward – no conclusive answer is intended here either. To mention but one reflection of this debate, Ségéral and Scheer (2001) on virtual (=historical) geminates is an excellent exposition of the arguments in favour of abstract analyses only with the proviso that they yield “neater” solutions. Probably it is then safe to say that “historical clues”, so to speak, can be effectively used to support a synchronic analysis. But what can be the point in arguing for insertion in words like Spanish *guardar*, *guerra* once no synchronic conclusions can be obtained? Similarly for the Middle High German data with Dentalwuchs, should it matter from a synchronic point of view that they didn’t use to have a coronal final consonant? Today they do, and that’s all. Moreover, in the synchrony it is not even a matter of analysis at all why they end in a coronal stop.

Another question is, in what sense are epenthesis processes at all? It does seem to be the case that these are not processes of any kind *in the synchronic state* of languages. They are rather phonotactic constraints. They do not seem to be any more a process than is the reduction of unstressed vowels. I think an experiment with nonce words, which is a good test of phonotactics in a language, also support that these patterns are phonotactically based and there are no transformations whatever.

Take Spanish, for instance. There is a phonotactic constraint **#sC*, and it is also the case that all these words have /e/ before them. While examples for /e*sC*/ are numerous, it is interesting that there are only a handful of examples where /sC/ is preceded by a vowel other than /e/ (<h> is silent):

(3.27) /a*sC*/: *ascender* ‘to ascend’, *asceta* ‘ascetic’, *asco* ‘disgust’, *ascua* ‘ember’, *asfalto* ‘asphalt’, *asfixia* ‘suffocation’, *asma* ‘asthma’, *asno* ‘ass, donkey’, *astrología* ‘astrology’, *hasta* ‘until’, *hastiar* ‘to make feel sick’

/i*sC*/: *hispano* ‘Hispanic’, *hispido* ‘thorny’, *histeria* ‘hysterics’, *historia* ‘history’, *isla* ‘island’, *islam* ‘Islam’, *ismaelita* ‘Muslim’, *israelita* ‘Israelite’

/osC/: *hoscoso* ‘rough’, *hospedaje* ‘accommodation’, *hostia* ‘host, wafer’,
hostil ‘hostile’, *oscilar* ‘to oscillate’, *osco* ‘Oscan’, *ostensible*
‘ostensible’, *ostra* ‘oyster’

What is even more striking is that the reverse also holds true: #es- does in fact imply that then there *must be a C following*, there are only a handful of words where this is not the case. They are:

3.28) *esa* ‘that; fem.’, *ese* ‘that; neut.’, *esencia* ‘essence’, *esófago* ‘oesophagus’,
esotérico ‘esoteric’, *hesitar* ‘to hesitate’

In conclusion, *sC (and *CC#) are synchronic constraints in Spanish and the theory does not need to say anything about how or whether they are avoided, or even how they came about. (This is debated in OT, though.)

Again, there is no sense in talking about a process of insertion in the German data in (3.5). It is not strictly systematic (actually far from it), therefore it is a matter of the lexical specification of the individual lexical items whether they have [t] or not. As for the glottal stop in (3.16), it is absolutely predictable (because it is phonotactic) and is always met. Similarly, Spanish *guachimán* simply starts with [g], it does not “come from” anything in any reasonable sense.

A third problem that emerges is just what segments are found in such epenthetic positions at all? “Something simple” could be an informal answer, and indeed no more will be said here since a detailed discussion of this problem would lead further afield. It should be observed, though, that those segments that are potentially epenthetic are typically those which are found as “purely” phonotactical place-fillers elsewhere in the language, such as a schwa, yer, [e] or a glottal stop. Why then maintain any theoretical difference between them?

And finally, are there any patterns where epenthesis occurs in a string? There are, and this exactly will be the key to narrow down the concept.

3.3.4 *Lass on epenthesis – phonotactically motivated epenthesis in Government theories*

3.3.4.1 True *versus* fake epenthesis

As already introduced, Lass (1984) makes a distinction between *phonetically* and *phonotactically motivated* epentheses, calling the former *fake epenthesis*, the latter *true epenthesis*. Although Lass does not make his position clear on just what is purely phonetically and what is obviously phonotactically motivated, it seems that a distinction can be drawn in the following terms. “Phonotactically motivated” does not mean that the epenthetic segment cannot (or does not) have a phonetic “back-up” from the actual environment. The crucial difference between the two types, it emerges from his examples, is that phonetically motivated epentheses create “heavy”, more marked structures. In OT terms, phonotactically motivated epenthesis has a functional load, whereas phonetically motivated epenthesis lacks such goals.

(3.29a)	German:	irgen -> irgend	extra heavy final syllable
	English:	prince -> prin[t]se	extra heavy monosyllable

whereas

(3.29b)	Dutch:	warm -> warəm	breaks an illicit cluster
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I should think *film* belongs to this latter category, *contra* Lass. Moreover, it is not always clear how the markedness is measured of a structure: it can be argued that the original [ns] is also marked, how does inserting [t] save it? Or consider that _CC may be better than _C#: [ənd] in English is fine, while *[əb] and *[əg] are not, or in Spanish (3.23) above.

However, in phonological theories recognizing empty skeletal slots, the concept *epenthesis* cannot be assigned a theoretical status because these cases will be straightforwardly regarded as the realization of an empty, but lexically given, slot. This means that phonotactically motivated epentheses will be relegated to phonological representations, that is, they are not processes of any kind, but simple well-formedness constraints on a string (much like the rest of the phonotactics of the language) that can be directly read off the representation. Below is an example of a possible VC based treatment:

(3.30) in VC Phonology:

$$\begin{array}{cccc} v_1 C & v_2 C & \leq VC & \leq Vc \\ | & | & | & | \\ _ s & _ t & i l & o \end{array}$$

Since there is nothing that would make v_1 silent (v_2 cannot govern it being empty), it will be pronounced on its language-specific default value [e], and v_2 is governed by /i/. Take a German example now:

$$\begin{array}{cccc} (3.31) & VC & v_1 C & v_2 C & v_3 C \\ | & | & | & | & | \\ i & r & _ g & _ n & _ d \end{array}$$

In this word, it is assumed, the only unpredictable vocalic segment is word-initial /i/: it must be lexically specified. The last two Cs create a burial domain, therefore, there is nothing to mute v_2 . It will be realized as schwa. (v_1 is also in a burial domain.) As can be seen, the representation assumes that final /d/ is specified. Notice that the realization of the empty vowel preceding /n/ crucially does not depend on whether there is a final /d/ or not: it will be realized because anyway since there is nothing to mute it.

Now consider the representation of some Dutch examples for (3.26):

(3.32) Representations for Dutch vowel-zero alternations

$$\begin{array}{cccc} v_1 C & \leq VC & v_2 C & \\ | & | & | & | \\ w & a & r & _ m \end{array}$$

$$\begin{array}{cccc} v_1 C & \leq VC & v_2 C & \\ | & | & | & | \\ h & a & r & _ t \end{array}$$

In the latter only can the two Cs flanking v_2 bury it (they are homorganic), in the former the empty vocalic segment cannot be governed so it must be realized and it is realized as schwa.

3.3.4.2 The problem of the synchronic status of epenthesis

On the one hand, there are cases like German *irgend* which are simply lexical just like the rest of the idiosyncratic properties of the word in question. On the other hand, there are across-the-board realizations of empty segments like in Arabic or Dutch. Clearly, these epenthetic segments are not specified in the lexicon because they are predictable. It seems then that without epenthesis the structure will be ill-formed. This is pretty much like the rest of the phonotactics – epenthesis does not stand out as a phenomenon.

But then what is the difference between the result of epenthesis and the result of mere lexical specification? If in Arabic or German there is a constraint $*\#V$, then of course all well-formed words will start with a C – how can we then tell whether it is epenthetic or lexically given? After all, the lexicon is also expected to contain some already well-formed structures. Also, as was pointed out, epenthesis does not create structure, it only interprets already existing positions – which can be effectively done by government and licensing.

In some cases it is not obvious whether it is a case of epenthesis or the realization of a lexically given segment. Should the Spanish cases below be treated as lexical or as epenthetic (the same applies to /esC/-words)?

$$\begin{array}{l}
 (3.33) \quad v_1 C \leq V C \quad v_2 C \quad v_3 c \quad < \text{-----} > \quad v_1 C \leq V C \quad v_2 C \leq V_3 c \\
 \quad | \quad | \quad | \quad | \quad & \quad | \quad | \quad | \quad | \quad | \\
 \quad p \quad a \quad r \quad _ \quad t \quad _ & \quad p \quad a \quad r \quad _ \quad t \quad e \\
 \\
 \quad v_1 C \leq V C \quad v_2 C \quad v_3 c \quad < \text{-----} > \quad v_1 C \leq V C \quad v_2 C \leq V_3 c \\
 \quad | \quad | \quad | \quad | \quad & \quad | \quad | \quad | \quad | \quad | \\
 \quad p \quad a \quad d \quad _ \quad r \quad _ & \quad p \quad a \quad d \quad _ \quad r \quad e
 \end{array}$$

In terms of VC phonology, Spanish final consonants in C-C# clusters need a licence to govern, otherwise they fail to be realized. One option is to add a [vc]

edge unit to provide the licence to the final C. The vowel of this final [vc] unit is realized as [e] since nothing mutes it. Or one can assume that all these words end in a lexical vowel, [e]. It cannot be settled since in either case the vowel, either v_3 or V_3 , is realized. Worse, in Spanish, after voiceless stops (voiced ones only appear in clusters) a vowel is always realized even when it is not part of a consonant cluster, recall (3.23). This would favour an analysis as phonotactically motivated epenthesis, but it would not settle the issue of representations.

3.3.4.3 A proposal: on the role of peripheral units

On deriving the definition of the minimal word, Dienes and Szigetvári (1999:9-10), and Szigetvári (2001:68-69) make reference to peripheral units, which languages normally use to indicate the edges of a word. They are: [vC and [vc at the beginning of word, and Vc] and vc] word-finally (where [and] mark the left and right edges, respectively). The constraint a content word of languages having a minimal word constraint must satisfy is the following:

(3.34) A content word cannot consist solely of peripheral units.

This means that the following strings are ill-formed for a content word: [vC – Vc], [vc – Vc] (both of them exclusively contain peripheral units), while these are well-formed: [vC – VC, [vC – Vc – Vc], VC – vc] (they contain a non-peripheral unit as well).

This constraint can be used to analyze the Spanish data above. The problem in (3.33) above was that if the representation ended in vc], there would be nothing to mute the vowel between the consonants. As a first approach, it can be said that Spanish only uses [vC and Vc] units to mark word-edges (although this is not compulsory since VC-VC sequences are permitted, with no peripheral units, that is). Moreover, one can propose that Spanish does not tolerate vC units at the right periphery: *vC#. All these units are followed by a Vc] unit. This approach would favour the right-hand representation in (3.33) above, that is, the one with final lexical [e]:

$$(3.35) \quad v_1 C \leq V C \quad v_2 C \quad V c$$

$$\begin{array}{cccccc} | & | & | & | & | & | \\ p & a & r & _ & t & e \end{array}$$

However, this solution fails to recognize that there is in fact no need to silence the vowel between the vowels: it is in a burial domain, so it is silenced anyway. If it was said that Spanish uses both [vC and Vc] as well as vc] units to mark word-edges, an interesting distribution can be observed.

$$(3.36) \quad v_1 C \leq V C \quad v_2 C \quad v_3 c$$

$$\begin{array}{cccccc} | & | & | & | & | & | \\ p & a & r & _ & t & _ \end{array}$$

The last vowel, v_3 , cannot be muted, so it surfaces. Although this approach cannot explain yet why after some vC units, such those with voiceless stops, there *must* be a vc# as well. – This will be left unanswered here.

3.3.5 *Why epenthesis was needed in theoretical accounts? (Epenthesis in the history of phonology)*

In this section the position is presented that there are intimate relations between a given theory and the range of linguistic data it puts more emphasis on. In other words, theories tend to favour some set of data over others for expository purposes. It then follows that a given set of data may not be considered so illustrative in other theories. Here, it will be shown that epenthesis has been exactly such a “pet” phenomenon in classical rule-based (derivational) theories – with the consequence that these phenomena will not necessarily be considered so special in other frameworks. Of course, it must be made clear that these theory-preferences must not have any impact on the actual explanatory power of any theory, in other words, any set of data should ideally be described by any theory.

Looking at derivational linguistic descriptions, it does not take too long to see that epenthesis phenomena have been considered important in rule-based theories. Kenstowicz (1994:79-81) is quite explicit on this: epenthesis “[is] one

more example to motivate the dual-level model of phonological representation”. In the following paragraphs his illustration is presented, in order to point out some characteristics implicit in the derivational approach.

3.3.5.1 Epenthesis in Modern Icelandic: a case study

Consider the following partial paradigms from Icelandic (cited from Kenstowicz 1994:79-80).

(3.37)	nom.sg.	dag-ur	hest-ur	bæ-r
	acc.sg.	dag	hest	bæ
		‘day’	‘horse’	‘farmhouse’

As can be seen, the nominative suffix has two allomorphs depending on whether the stem to which it is attached is vowel- or consonant-final: *-r*, *-ur*. It can be shown that the *-ur* allomorph has an inserted, that is, not lexical vowel, the underlying form of this suffix is a simple *//-r//*. The following three independent language-specific arguments are now considered for its being not underlying:

- (3.38) (a) $*V_1V_2$
 (b) behaviour of *Cj* and *Cw*-clusters
 (c) *u-umlaut* effects (eg, in dat.pl).

In V-V sequences, the first vowel is normally deleted in Icelandic. But in the allomorphy here, the second member of a potential V-V sequence would be deleted since in this allomorphy always the stem-final vowel surfaces, never the suffixal *u*. (Unfortunately, Kenstowicz provides no illustration for this situation.) This indicates that there is no second vowel at all in the nominative suffix.

As for the second argument, the paradigms below show the behaviour of *Cj* and *Cw*-clusters:

(3.39)	nom.sg.	lyf-ur	beđ-ur	söng-ur
	acc.sg.	lyf	beđ	söng
	gen.sg.	lyf-s	beđ-s	söng-s
	dat.pl.	lyfj-um	beđj-um	söngv-um
	gen.pl.	lyfj-a	beđj-a	söngv-a

‘medicine’ ‘bed’ ‘song’

As the dat.pl and gen.pl forms show, lexical Cj/Cw-clusters have their glide on the surface when a vowel-initial suffix follows. The acc.sg form has no suffix, in gen.sg there is a single -s. The only form where there is no glide even though there is a following vowel is the nominative again: the glide is expected to surface there as well, yet it does not. This is captured by ordering a deletion rule before epenthesis:

(3.40) [j, v] -> 0 / C ____ {C, #}

This also means that, in consequence, the nom.sg. must be analyzed to contain only [r], otherwise [j, v] should appear.

Below is an illustration of *u-umlaut* effects in Icelandic.

(3.41)	nom.sg.	hatt-ur	dal-ur	stað-ur
	acc.sg.	hatt	dal	stað
	dat.pl.	hött-um	döl-um	stöð-um
		‘hat’	‘valley’	‘place’

The analysis of these forms will be essentially different here from that presented in Kenstowicz. The paradigms illustrate, Kenstowicz argues, that in the dat.pl the stem vowel becomes palatal under the influence of the following *-um* ending. If the nominative also contained a vowel-initial suffix, it would also be expected to cause umlaut. In fact, the nominative is the only suffix in Icelandic which regularly fails to umlaut a preceding stem vowel. This supports the view that it only contains a consonant.

It seems, however, that the phenomenon is slightly more complex than that presented above. Although Kenstowicz is simply talking about a “following vowel” *u*, obviously it is the historical /j/ which actually causes the palatalization in *höttum*, *dölum* and *stöðum*. It would be strange from a Germanic language to have umlaut without there being any yod “somewhere” around. In fact, Icelandic is no exception either. By comparing the two sets (3.37, 3.39) above, it appears that the palatal glide is deleted in dat.pl only when it was capable of overtly

palatalizing the stem vowel: (*dalum* >) *dölum*, but *bedjum*. It is by no means a coincidence that this /j/ is deleted exactly in this environment. This leads, however, to the reinterpretation of the function of *u* in this language: it can be shown to be inserted in the dat.pl as well (Gussman (2002) remarks: #ur# is [^{*}r], a reduced central vowel). When the yod is either deleted (incorporated, so to speak, in the stem vowel as a palatal element) or not, two consonants come to stand next to each other anyway. When yod is deleted, it is the stem-final C and the ending *-m*, when it is not deleted, then obviously yod and the suffix come to be adjacent. Both cases in fact make the *u*-insertion necessary to break up the sequence of two consonants. And *u* does indeed appear in all those cases. Now an account has to be given for the fact that although in both the nominative and the dative a single consonant is the suffix, still they do not behave the same: in the nominative the yod is deleted before it could palatalize, while in the dative it gets deleted only later. This calls for a cyclic application of the same deletion rule. An alternative approach would be to say that the yod does not get deleted before the suffixes, it can cause umlaut. When there is no suffix, for instance in the accusative, the yod is deleted. This is why in the nominative it is also deleted, however, a suffix is added later.

The discussion above meant to show is that such cyclic rule applications were favoured in derivational approaches. However, in GP there are no derivations, only representations. But then one of the prime motivations for assuming epenthesis as a phonological phenomenon is removed.

3.3.6 *Conclusions*

This section examined a number of phenomena traditionally subsumed under the heading epenthesis. First, a descriptive typology was presented recognizing four types of cases including morphosyntactically or lexically established insertions, phonetically and phonotactically motivated cases. Then recognizing only phonotactically motivated insertions as relevant for phonological investigations, an attempt was made to show that these in turn are nothing more than the result of

interpreting the skeletal slots. In other words, phonotactically motivated epentheses are mere phonotactic restrictions which generally hold in the language. There is, therefore, no need for epenthesis to be recognized as a phonologically unique phenomenon since (a) these cases can be shown to be the consequence of phonotactic constraints and should indeed be treated as such; moreover, (b) they served as expository means to support a dual-level model of phonology; however, Government Phonology does not operate with two levels. The importance of this for issues of markedness among places of articulation is that epenthesis is not a direct indicator of consonantal placelessness.

3.4 Frequency in affixes and in the Lexicon

The second piece of evidence that would support the primacy of coronals is their high frequency in the lexicon and in corpora. Following McCarthy and Taub (1992:368 N4) it has not been proved “whether the prevalence of coronals in a corpus or the lexicon of English is a direct consequence of [coronal] underspecification or instead a side-effect of some other property: the frequency of coronals in English functional categories, the relatively free distribution of coronals, or the richness of the coronal phoneme system.” Indeed, it is argued in this dissertation that the distributions in English presented in Paradis and Prunet (1991) and similar distributions in general are not due to coronal unmarkedness, but indeed they are a side-effect of the history of the languages. The following discussion makes reference, therefore, to the history of the languages concerned. First, the frequency of coronals in functional categories will be critically examined. Then a number of coronal distributions are investigated, which are cited in Paradis and Prunet (1991) to show the unmarkedness of coronals in English, and it will be pointed out that these distributions do not prove the placelessness of coronals.

3.4.1 Coronals and non-coronals in grammatical markers

Indeed, the accumulation of coronals in grammatical markers is quite remarkable in Germanic and Romance languages: for instance, regular noun plurals, regular and often even irregular past tense/past participle forms, comparatives and superlatives often have a coronal exponent. Some examples are listed from Germanic (English and German) and Romance (Latin, Spanish) varieties that illustrate coronal inflectional endings, either simple or in clusters (the occasional surrounding vowels are omitted):

(3.45) [t]	3 Sg in German:	<i>geht</i> ‘(he) goes’
	3 Sg in Latin:	<i>laudat</i> ‘(he) praises’
[d]	regular past in English:	<i>loved, minded</i>
[s]	plural allomorph in English:	<i>cats</i>
	2 Sg Present in Spanish:	<i>cantas</i> ‘you sing’
	plural in Spanish:	<i>perros</i> ‘dogs’
[z]	plural allomorph in English:	<i>dogs, buses</i>
[θ]	plural imperative in Spanish:	<i>cantad</i> ‘sing!’
	3 Sg, all plural Present in OE:	<i>ferap</i> ‘they travel, they go’
[n]	infinitive in German:	<i>arbeiten</i> ‘to work’
	3 Pl ending in Spanish:	<i>cantan</i> ‘they sing’
[r]	comparative in English, German:	<i>nicer; kürzer</i> ‘shorter’
	passive in Latin:	<i>amor</i> ‘I am loved’
	infinitive in Spanish:	<i>cantar</i> ‘to sing’
[st]	superlative in English, German:	<i>nicest, most, least</i>
[nt]	3 Pl in Latin:	<i>laudant</i> ‘they praise’
[nd]	gerund in Spanish:	<i>cantando</i> ‘singing’

Notice, for instance, that /l/ is rare, at best, in Germanic or Romance inflectional morphology (although /l/ is the 3sg ending in Romany dialects, for instance; Fodor (2000)). In addition, in most inflectional systems the endings above can be augmented by non-coronal endings: Latin has *-m* for 1 Sg, Spanish imperfective may have *-aba*, the English gerund suffix is *-[lN]* (or *[lɪn]*).

In other languages, coronals may not predominate inflectional morphology. In Russian, for instance, the nominal, though not the verbal, paradigm shows velar–labial consonant endings (ignoring actual case specifications):

(3.46) *-om, -ov, -ev, -am(i), -ax*

In Hungarian, a Finno-Ugrian language, quite a number of personal endings in the verbal paradigm contain a velar (or sometimes a labial) rather than a coronal. The nominal plural marker in Hungarian is *-k* (or *-i* when possession is indicated), again a velar rather than the *-s* and *-n* of Germanic or Romance. More suffixes from Hungarian in velars (or labials) include:

(3.47) [k]	nominal plural:	<i>madarak</i> ‘birds’
	1 Sg present indef.:	<i>látok</i> ‘I can see’
[Nk]	1 Pl present indef.:	<i>látunk</i> ‘we can see’
	1 Pl possessive:	<i>barátunk</i> ‘our friend’
[ig]	terminative case:	<i>a vonatig</i> ‘to the train’
[m]	1 Sg present def.:	<i>látom</i> ‘I see the...’
	1 Sg possessive:	<i>barátom</i> ‘my friend’
[v%]	past participle:	<i>lopva</i> ‘(having) stolen’
[v%l]	instrumental case:	<i>könyvvel</i> ‘with a book’
[b%]	illative case:	<i>a könyvbe</i> ‘into the book’
[b%n]	inessive case:	<i>a könyvben</i> ‘in the book’
[b:]	comparative:	<i>kedvesebb</i> ‘kinder’

Nevertheless, *-t* also occurs in many functions such as the accusative marker, one allomorph of the past tense marker. From the data in (3.45–3.47) above, it can be safely established that coronals do not predominate universally in inflectional morphology: in some languages they do, in others, they do not.

The distribution of coronals and non-coronals in derivational morphology is looked at next. Velars in derivational suffixes might add to the frequency data in some of the languages where coronals were more dominant in the inflectional morphology. The German diminutive suffix *-chen* [çen] and its Flemish counterpart *-ke(n)*, a number of Spanish and Galician suffixes, such as *-ico/a*, as well as the diminutives in Slavic languages, definitely increase, mainly through lexicalization, the incidence of velars in the lexicon as well as in corpora. Nevertheless, there are some derivational endings that start with a coronal in English: the adverbial suffix *-ly*, and the by now non-productive *-th* as in *breadth*, *depth*, *length*, *spilth*, *strength*, *tilth*, *warmth*, *wealth*, *width*.

What has emerged from the above endings is that it is rather a matter of chance, from a phonological perspective, whether a language has more coronal or non-coronal endings. No conclusions can be deduced from these observations as to which place is unmarked. It is simply false that coronals, when they happen to dominate in a particular language, are invariably due to coronal unmarkedness. To underline this point, the following changes may be alluded to. In English quite a number of [t, d]'s used to form part of what used to be a perfective suffix: *kind* 'type, species' (related to stems like *kin*, *can* and *know*) from OE *gecynde* where *ge-* and *-de* together formed a past participle (like in modern German or Dutch). While this aspect of the meaning in *kind* has, no doubt, since disappeared, the presence of [d] in this word is obviously not due to coronals being unmarked or placeless, but to this particular suffix. And it would not be very convincing to maintain that this suffix has a coronal because coronals are unmarked. In another change, a sequence of two fricatives dissimilated into fricative–stop sequences (for an illuminating presentation see Cser (1998) already referred to). The coronal fricative [θ] strengthened into [t] as in *[hi:xθ] > [hi:xt] 'height'. This, again, is not because [t] is the most unmarked stop but because there is a ban on two consecutive fricatives (and notice that [θ] is coronal anyway). English, furthermore, borrowed a high number of words from Latin ending in *-ate*, which had been a perfective suffix (similarly to the OE examples mentioned above): *create*, *consecrate*, *motivate* and a range of others. It is hardly the case that the Latin *-tus* ending, to which *-ate* goes back to, contains /t/ because of coronal unmarkedness, or that English liked this "learned ending" because of its unmarked place of articulation. Again, while it is handy that this ending had [t] in Latin so it can form the [kt pt] clusters in *ruptus* 'broken' and *factus* 'done' which most phonologists prefer to [tk tp], there is no sense in which the [t] of this ending *had to be* coronal in order to form these well-formed clusters. It *could* have well been something else. In another process, namely the palatalization of velars in OE, coronal affricates resulted directly from velars: *church*, but German [k-] *Kirche*. Similar arguments can be made for the German Dentalwuchs cases cited in (3.5, 3.15). As in other Germanic languages, in Middle High German *-st*, *-ft*, *-nd*, *-nt*

endings were frequent even in non-derived, that is, lexical morphological environments (no doubt, quite a number of these were lexicalized derived forms). If such words happened to dominate in the lexicon, this could favour transforming words which did not have such endings, but *-s*, *-f*, or *-n*, to conform to the *-st*, *-ft*, *-nd*, *-nt* endings. All this need not (and probably must not) have any bearing on their current analysis. Nevertheless, it should be driven home that many coronals, cross-linguistically, originated as (parts of) suffixes or are the result of historical processes, which happened to favour the accumulation of coronals in general – but none of these processes is due to the unmarked status of coronals. All in all, the frequency of coronals in affixes and other formatives is not universal and is not evidence for the unmarked status of coronals (nor for that of velars, of course).

3.4.2 *Some phonotactic constraints concerning coronals*

So far, the distribution of coronals as opposed to velars has been considered in affixes of various types in various languages. As for the frequency and variety of coronals in the lexicon, they show such richness and variety that more dependent features are needed (eg sibilant, lateral). It is argued here, however, that these dependent features in fact “expand”, so to speak, the feature [coronal], and the representation of these segments becomes just as complex as those for velars and labials. McCarthy and Taub (1992) draw attention to the fact that coronals show an ambivalent behaviour with respect to underspecification. For instance, in rules (3.48a-c) from American English it must be explicitly stated that the consonant is coronal, while in (3.48d) only alveolars, a subclass of coronals, are allowed:

- (3.48) (a) *#tl-, *#dl-
 (b) aw+[coronal]: mouse, town, mouth, couch, *trouk, *troup
 (c) *#[coronal]+/ju:/
 (d) choice, adroit, coin, boil, *coith, *coich, *coip, *coik

Besides the inconsistency of [coronal] and its dependent features, a few additional problems arise in connection with the distributions themselves. Are there any phonological or phonotactic motivations for any of these patterns which can be clearly connected to the placelessness of coronals?

As for (3.48a), it is curious to cite this constraint in connection with coronal unmarkedness or underspecification for at least two reasons. First, this is a co-occurrence restriction (quite general across languages) banning two adjacent coronals. In fact, this explicitly refers to their being coronal. This constraint is not exclusive to coronals, but it applies generally, to all adjacent segments. Second, #sl- and #tr-/dr- clusters are possible initial clusters: why is /s/ and /r/ not a coronal? There is indeed the theoretical possibility that neither /s/ nor /r/ are coronals (at least in this environment). Nevertheless, the first objection, co-occurrence restriction, is still valid: *#tl-, *#dl- are disallowed not because of the coronality of /t d/.

As for (3.48b), it is an idiosyncratic property of coronals that only they can follow /aw/. Claiming that this phonotactic pattern has to do with the unmarked status of coronals, fails on the account that it does not provide a plausible explanation for what /aw/ has to do with coronals. What is it in coronals that makes them suitable to follow /aw/? Or alternatively, what is it in /aw/ that makes it tolerable only before coronals (and word-finally)? (In fact, it is not clear at all whether the coronals or the /aw/ is really the odd-man-out in this distribution.) First of all, this pattern is perhaps best viewed as accidental in the synchronic phonology of English. Namely, it is by no means common across languages, even in related Germanic languages, that /aw/ is allowed only before coronals. In German, for example, /aw/ can be followed basically by any consonant:

(3.49) <i>Bauch</i>	‘stomach’
<i>Rauch</i>	‘smoke’
<i>Lauf</i>	‘run’
<i>Laub</i> -[p]	‘leaf’
<i>Glaube</i>	‘belief’
<i>Gaumen</i>	‘palate’
<i>Strauss</i>	‘bouquet of flowers’
<i>Braut</i>	‘bride’
<i>braun</i>	‘brown’
<i>faul</i>	‘foul, bad’

Furthermore, note that the other wide diphthong, /ai/, does not behave like /au/ at all: it is freely followed by non-coronals as in *like*, *lime*, *ripe* or *type*. Similarity

could be expected since they both break similarly before /r/, for instance.

The synchronic pattern in English has to do with the history of the stressed vowel in these words. It seems that /u:/ was shortened to /u/ before the Great Vowel Shift (GVS) before non-coronals, for instance, /-u:k/ > /-uk/, /-u:p/ > /-up/. /aw/ itself is the result of the GVS, which turned ME /u:/ > /aw/ (although /aw/ could come from later borrowings, of course). Therefore, there is nothing interesting in modern /aw/ + coronal sequences *per se*. What is interesting, and what is never actually asked, is why /u:/ shortened before non-coronals in the first place. Has this anything to do with coronality? Well, apparently it does not. Quite the contrary, the phonologically relevant generalization is that /u:/ was shortened before labials and velars. Consider the following examples (collected from Hall's dictionary of OE):

- (3.50) (a) *brū* > brow G *Braue*
 cū > cow G *Kuh*
 hū > how
 nū > now
 sū > sow (pig) G *Sau*
- (b) *brūn* > brown *braun*
 hlūd > loud *laut*
 hūs > house *Haus*
 lūs > louse *Laus*
 ūle > owl *Eule*
- (c) *brūcan* 'to use' see G *brauchen* 'to need'
 būc 'stomach' see G *Bauch* 'stomach'
 crūc 'cross'
 crūce 'pot, pitcher'
 dūce > duck see G *tauchen* 'to dive, submerge'
 lūcan > to lock
 pūca 'goblin'
 stūc 'heap' see G *stauchen* 'to heap; to plug'
 sūcan > to suck
- būgan* > to bow see G *beugen*
 mūga 'heap of corn'
 smūgan 'to creep' see G *schmiegen* 'to bow to'
 sūgan 'to suck' see G *saugen*

<i>fūht</i>	‘moist’	see G <i>feucht</i> ‘moist’
<i>rūh</i>	> rough	see G <i>roh</i>
<i>trūht</i>	> trout	
<i>brūh</i>	‘pipe’	
<i>ūht</i>	‘twilight’	

- d)
- | | | |
|---------------|-------------------------|---------------------------------|
| <i>plūme</i> | > plum | |
| <i>rūm</i> | > room | |
| <i>slūma</i> | ‘slumber’ | see G <i>Schlummer</i> |
| <i>sūmnes</i> | ‘delay’ | see G <i>Versäumnis</i> ‘delay’ |
| <i>þūma</i> | > thumb | see G <i>Daumen</i> |
| <i>ūma</i> | ‘weaver’s beam’ | |
| <i>dūfan</i> | ‘to dive’ | |
| <i>hūfe</i> | ‘covering for the head’ | |
| <i>scūfan</i> | > to shove | |
| <i>þūf</i> | ‘tuft, banner’ | |
| <i>þūft</i> | ‘thicket’ | |
-
- | | | |
|---------------|------------------|--|
| <i>slūpan</i> | ‘to slip, glide’ | |
| <i>ūp</i> | > up | |
- e)
- | | | |
|-------------|--------|--|
| <i>dūst</i> | > dust | |
| <i>rūst</i> | > rust | |
| <i>tūsc</i> | > tusk | |

As can be seen, when it survived until ME, OE /u:/ shortened before velar and labial consonants (and before fully coronal clusters due to being in a “closed syllable” of the traditional terminology). But it was retained word-finally and before coronals. The shortening, however, is not exceptionally aberrant phonologically. It must also be mentioned that (3.50c-d) are practically all the examples, whereas the (3.50b) set can be expanded considerably. That is, it seems to be the case that in OE /u:/ tended to be followed by coronals (dentals), rather than by any other consonant (more on the relevance of this presently). As for the individual velars, it has to be pointed out that those containing intervocalic /F/ vocalized during the Middle English period, just like the [x] in [xt] clusters – in other words, they had long ceased to be velars when the Great Vowel Shift started! We are then left with only a couple of words having [k]. The import of this discussion of the /aw/ + coronal pattern is that this distribution has nothing to

do with the special status or otherwise of coronals, but is the result of a phonologically-based change, which shortened all Middle English /u:/ sounds before non-coronals (and in clusters) before the Great Vowel Shift could turn them into what came to be modern /aw/. One could think of reversing the conclusion: it is only before coronals that long vowels did not shorten. But then good reasons must be found to explain what coronality had to do with it.

Now, for the /ju:/-words in (3.48c). Even a rough word-count shows that /kju:/, /gju:/, /pju:/, /bjju:/, /fju:/, /mju:/ clusters all occur, and with the exception of /gju:/, they tend to appear in more lexical items than the corresponding cluster with simple /u:/: /ku:/, /pu:/, and so on. Historically, the change is clearly from /ju:/ > /u:/ before coronals in Americal English. At any event, it is not clear what the lack of place specification in coronals has to do with not tolerating /ju:/. Clearly these problems must be addressed in a well-founded argumentation – unfortunately they are not, the mere fact of the distribution serves as the explanation. It might crop to one's mind that yod is not tolerated because of general principles such as the OCP. But any such explanation conspicuously ruins the speciality of coronals: Which other segment could the yod come into conflict with? The obvious candidate would be the coronal before it. This, however, means that coronals do not actually lack a place feature – they do have *I*, the palatal element, on which see the previous chapter. While this alternative approach, namely, that coronals already contain palatality, faces the serious problem why other varieties of English, or indeed all languages, do not have this very constraint, the usual account in terms of underpsecification is not any better either.

Let us turn to the last distribution in (3.48) above. Contrast (3.48c) and (3.48d), repeated here:

- (3.51a) aw+[coronal]: mouse, town, mouth, *trouk, *troup
 (3.51b) oi+[dental]: choice, adroit, coin, *coith, *coich, *coip, *coik

In the case of *oy* only a subset of coronals, alveolars are allowed (although *coif* also exists, which effectively ruins the assumed distribution!). In this way,

however, it is less apparent that these sounds are any simpler (unmarked). In these cases it is a subset of coronals, namely alveolars or sibilants, and not coronals as a whole which stand in opposition with other groups such as velars. It can also be remarked that here labials and velars pattern as all other non-alveolar consonants: they do not appear in this context.

3.4.3 *Conclusion*

Lexical incidence does not thus secure primacy for universal coronal underspecification. An investigation into the distribution of non-suffixal consonants might, however, modify these propositions. Furthermore, an interesting proposal was introduced in the course of the argumentation: what consequences does it have if coronals are considered the norm, that every consonant should behave phonologically like them? This would not select coronals special, on the contrary, they would be nothing special. Moreover, this would have nothing to do with their being marked or unmarked. This line of thinking might well be worth pursuing.

3.5 **On the validity of the frequency argument**

The frequency argument does not constitute in itself proof of unmarkedness since frequency in other cases of statistical observations does not or at least does not directly go hand in hand with unmarkedness. To this end, first the markedness relationships of fricatives and stops, then the markedness relationships of nasal and oral vowels will be considered. Paradis and Prunet (1991:11) carefully distinguish three types of frequencies: inventory, typological and occurrence frequency. My objections are mainly directed against frequency in general. Moreover, even the editors themselves do not take sides as to which type of frequency is the most decisive in matters of markedness.

Let us take first the case of fricatives within an individual language, and across languages to see the markedness relations with stops. (Affricates may

safely be left out of the discussion since they are the most marked among obstruents.) Looking at a number of languages and at the IPA chart, the following observations can be made:

- (3.53) (a) there is an implicational relationship with stops:
 if the phoneme inventory has fricatives, it will also have stops
 b) in a fair number of languages there are more or just as many
 fricatives as there are stops:
 eg, English, Spanish, French, German, Hungarian
 (c) number of IPA (1993) symbols (expiratoric):
 there are 22 fricative symbols, which is more than in any other row
 or column

Now, if conclusions can be drawn from frequency (3.53b, c above), then it is that among obstruents fricatives are unmarked since they are both frequent and numerous (and, to boot, this is the only manner of articulation that can be produced at all the places of articulation). Notice, however, that still these do not matter: the markedness relations are established on the basis of the implication in (3.53a). Stops are considered unmarked because the presence of fricatives in a system presupposes the presence of stops. (At this point, it will not be considered what would follow if fricatives were indeed assumed to be the unmarked set.) In connection with (.53c) above, it could be correctly objected that all those many fricatives do not appear contrastively within a language. This is true. But this is equally true for coronals as well: at most two minor places usually contrast (typically alveolar as opposed to alveo-palatal).

It may be interesting to note here that in Government Phonology (Harris and Lindsey 1995) fricatives do indeed have fewer elements, so they are less complex. They only have an h element, responsible for friction, while released stops also have a stop element in addition. Based on this, fricatives could be argued to be unmarked. It is truly noteworthy that even this approach takes only implication into account, not frequency or complexity – although Government Phonology keeps silent about matters of markedness.

Or let us take another example for the relationship between frequency and markedness: that of nasal and oral vowels. Nasal vowels are marked and orals are unmarked, says the established universal. Accordingly, French nasal vowels are

marked. However, this markedness situation is not typically defended in terms of frequency (even if it could be). Furthermore, it is equally irrelevant when native French children acquire nasal vowels in comparison with oral vowels. In French, and crosslinguistically, nasal vowels are marked because the presence of nasal vowels presupposes the presence of oral vowels in the system. Moreover, they contain one gesture more (nasality) – in other words, they are more complex. Notice the role complexity plays in government phonology, however. Fricatives are less complex than stops, nasal vowels are more complex than oral vowels, yet they are both marked: complexity is not decisive in matters of markedness.

But there is more to this issue. Even if nasal vowels, in French, were demonstrably more numerous than oral vowels, they would still be marked because they have a nasality gesture which oral vowels lack, and their presence presupposes that of oral vowels. Sticking to French, the issue of “how frequent is it?”, depends on what exactly is measured for frequency. If textual frequency is examined, then French has “very many” nasal vowels – but this is clearly no argument in this form. If stressed as opposed to unstressed syllables are investigated, then nasal vowels can appear in both. If, however, it is examined how varied the two groups are, then clearly there are less types of nasal vowels than orals. So, which method of counting is to be chosen?

Analogous arguments can be brought forward in connection with velars as opposed to coronals:

- (3.54) (a) there is an implicational relationship between the two places of articulation:
if there are velars in an inventory, there will be coronals as well
(except for the Hawaiian stop system)
- (b) in a number of languages there are more coronals than velars:
eg, English, Spanish, French, Hungarian
- (c) number of IPA (1993) symbols (expiratoric):
there are 19 coronal symbols (excluding palatals and retroflexes),
which is more than at any other place of articulation

In exact parallel to what has been established above, the implicational relationship must take precedence over considerations of frequency since

implications alone have linguistic, phonological relevance. In establishing markedness relations for coronals, arguments based on (3.54b) and (3.54c) above cannot play a role. Then, it has been found that only the implicational relationship support the view that coronals are unmarked. This had to be pointed out.

Nevertheless, it has to be noticed that this implicational relationship does not say that coronals have no place of articulation, only that they are unmarked. This is a very delicate point. It is premature to conclude from this implication that coronals are placeless. It is important to realize that the problem of velars contra coronals is exactly that the implicational relationship does not point at the same direction as the lack of place specifications. Why this can be so, why it is important and how to interpret this situation, will be discussed later.

3.6 Assimilations and behaviour in harmony systems

3.6.1 Assimilations

With the third and fourth criterion of (3.3) above, an important difference between coronals and non-coronals is arrived at. While coronals tend to be assimilation targets, that is, likely to be affected by lenition phenomena, velars exhibit a dual behaviour. Either they are the result of lenition or are the result of the strengthening of a palatal/labial glide. In the history of Dutch, for instance, labials show reduction to velar [x] before a suffixal *-t*. The reduction of preconsonantal [l] to [ɫ] – in fact, a vocalization towards [w] – is also well-documented and often attested (Polish, Brazilian Portuguese as well as Cockney). The inclusion of this process is only warranted by the observation that the result of this velarization often yields the same result as the vocalization of a velar. Often, the backing of [r]-type sounds, for instance in German or French, is described as a reduction to a velar or uvular sound [X x F]. While these processes illustrate reductions (lenitions), velars often emerge from glides as in the case of certain Spanish irregular verbs or in Cypriot Greek, dialectal as opposed to standard Hungarian and so on.

Szigetvári (1994) summarizes a number of assimilation phenomena where coronals lose coronality to take on a non-coronal place of articulation. Velars, on the other hand, while undergoing expected $k/g \rightarrow x/ F$ alternations, are rather the reduction point where other consonants reduce to. A different kind of machinery is needed, though, to account for Szigetvári's assimilation data. The problem lies in the fact that coronals are prone to assimilate to labials and velars across a word boundary as in *goo[b] boy* and *tha[k k]up*. The underspecification explanation is roughly the following: The coronal, being unspecified for place, takes on the place of the following segment: final [d] becomes [b] before *boy*, and final [t] becomes [k] before *[k]up*. On the other hand, [b] or [k] will not assimilate to a coronal. However, there is another possibility supposing that coronals do in fact have a place specification. All that has to be said is that coronals seem to lose their place element and either it is filled through spreading of U or it is not and then it surfaces as the velar reflex. While there are admitted problems with this disjunct explanation, it has also to be pointed out that another remarkable feature of velars is their ability to take on a coronal quality when they palatalize. This would indeed suggest an empty position where coronality can spread into.

Paradis and Prunet (1991:8) support the placelessness of coronals by claiming that coronals are more prone to assimilations than other places of articulations. When one looks in more detail at the data they present and some additional data, this statement is empirically false. If it were true that coronals tend to assimilate to other places of articulation, then the following changes should not only be natural, but they should also occur frequently and in many languages:

- (3.55) (a) -kt- or -kt# > -kk- and -kk#
 (b) -pt- or -pt# > -pp- and -pp#
 (c) -ks- or -ks# > -kk- and -kk#

That is, for instance, in intervocalic or final clusters having a coronal as second member, the coronal member should assimilate to the place of the preceding consonant. No doubt, such changes may appear, either synchronically or

diachronically, but these would not count as natural and unmarked processes according to received phonological theory. The changes in (3.55) are marked exactly because the direction of weakening and assimilation do not point in the same direction.

From the above clusters, however, the following are frequently attested diachronic changes:

- (3.56) (a) -kt- > -tt-
 Latin *la[kt]e* > Italian *la[tt]e* ‘milk’ (Tamás 1978:67)
 Lat. *no[kt]e* > It. *no[tt]e* ‘night’, Lat. *fa[kt]u* > It. *fa[tt]o* ‘fact’
 Latin *se[pt]e* > Italian *se[tt]e* ‘seven’ (Tamás 1978:67)
 Lat. *ca[pt]ura* > It. *ca[tt]ura* ‘capture’
- (b) -ks- > **S**, s and -ps- > s
 Latin *co[ks]a* > Italian *coscia* /ko**SS**a/ ‘thigh’ (Tamás 1978:68)
 Latin *ca[ps]a* ‘case’ > It. *ca[ss]a* ‘cash desk’ (Tamás 1978:68)
- (c) (-ćv- >) -śv- > -sv- > -s-
 Proto-Iranian *śv > Old Persian -s- (Fodor 2000:603)
 (-ćv- >) -śv- > -śś-
 Proto-Iranian *aśva > Saka *aśśa* ‘horse’ (Fodor 2000:604)
 -sk- (> -sx-) > -sj- > -**S**
 West Gmc.: OE *æsce* > Eng. *ash* /æ**S**/, German *Asche*

In connection with the processes in (3.56a) and (3.56b), it can be objected that in such clusters of obstruents the direction of place assimilation is regressive anyway, so it is not extremely surprising that the coronal assimilates to itself the preceding consonant. But for (3.56c), the same objection does not hold. There, too, the coronal remains unchanged, even though the direction of assimilation is progressive. The progressive assimilation is the unmarked direction in clusters where [v] or [j] come later in the string. The examples in (3.56) all show that the unmarked direction of assimilation does not favour the retention of coronals. It is noteworthy that morpheme-internal -tk-, -tp- clusters – where a non-coronal

would follow the most typical coronal – are fairly infrequent in languages (although they do appear, as in Hungarian *atka* ‘mite, acarus’), and they tend to be bogus clusters (see Harris 1997). In such cases, it could be seen that the coronal disappears through assimilation, and these would constitute good evidence for the view that coronals are placeless. It could be argued that such clusters are missing precisely because they cannot make it to the surface, so to speak, since they had already assimilated to an adjacent place of articulation. However, such processes should be visible, in some form. Latin **peds* ‘foot; nom.’ > *pes* (but *pedem* ‘foot; acc.’). Curiously, this only happens to coronals, and only before coronal /s/. But such words are interestingly rare in languages. Why are exactly those cases missing that would unequivocally support the placelessness of coronals?

The standard reference for the view that coronals tend to assimilate neighbouring segments to themselves is Kiparsky (1985), as Steriade (1995:126-128) points out. Kiparsky made a correct statement about the assimilation properties of nasals when he claimed that dental [n] is the nasal most ready to assimilate, and that NC clusters are expected to be homorganic. This is empirically solid. But comparing the data below in (3.57a) with those in (3.57b) show exactly that nasals interact differently with obstruents (so in NC clusters) than with sounds of a similar sonority profile. What (3.57b) shows is that nasals behave among themselves exactly as obstruents among themselves:

- (3.57) (a) -nt#
 -np# > -mp#
 -nk# > -ŋk#
- (b) Latin *colu[mn]a* > Italian *colo[mn]a* ‘column, pillar’
 Latin *ca[pt]ura* > Italian *ca[tt]ura* ‘capture’

The statement Kiparsky made cover NC cases in (3.57a), but not those in (3.57b). the difference between the two is in the sonority relations, as was pointed out. In (3.57a), in clusters of different sonority, the members can go back to different places of articulation (for example, dental [n] és labial [p]). Here, the nasal loses its place specification and assimilates to the obstruent. In (3.57b), however, the second member can hardly be anything but coronal – this is strikingly similar to

the lack of morpheme-internal -tk- and -tp-. It follows from this that assimilations of nasals to obstruents are determined not by their place of articulation, but their nasality (their sonority), that is their manner of articulation. The assimilation of [n] in (3.57a) does not illustrate the assimilation properties of a coronal sound, but that of a nasal since there [n] does not assimilate as a coronal, but rather as a nasal. On the other hand, it behaves as a true coronal in (3.57b), and it assimilates the preceding nasal to itself. Therefore, assimilations in NC clusters cannot be brought in as evidence to decide markedness relations of places of articulation since they are not a function of their respective places, but their manner.

In addition, Hungarian provides verb pairs, where one member clearly shows stem-final /m/, the other, suffixed with -t/, shows assimilation of the nasal: *rom-lik* ‘to get spoiled’ – *ron-t* ‘to spoil’, *bom-lik* ‘to get untied’ – *bon-t* ‘to untie’, *him-lő* ‘smallpox’ – *hin-t* ‘to spray over’ (E. Abaffy 2003:110). Also, the same happens to /m/ before -k g/ in e[Ng]em ‘me; acc.’, mi[Nk]et ‘us; acc.’ (E. Abaffy 2003:312). Clearly, in these examples the labial nasal /m/ loses its place, becomes nasality and then it comes to be homorganic with the following obstruent. Such cases provide evidence for the view presented in the previous paragraph, namely that nasals do not assimilate based on their place of articulation, but rather they lose place completely and whatever obstruent follows will impose its place on nasality.

In summary, it can be established that coronals tend to assimilate adjacent segments to themselves, and they tend to be stable in assimilations. Also, assimilation in NC clusters are irrelevant for a discussion of markedness of coronals.

3.6.2 *Neutralizations*

Neutralizations into the coronal place are also important empirical arguments in the literature. The Korean processes which Paradis and Prunet (1991:9-10) cite, but do not illustrate, do not show such neutralizations in fact. According to one such cited phenomenon, tense and aspirated stops in coda position are realized as

simple stops – a process which obviously does not involve places of articulation. It is therefore not at all clear why they should figure in the presentation of markedness issues of places of articulation (1991:9). Consider the data from Lee (1998:34), (3.58a), and from Yu Cho (1999:16), in (3.58b):

(3.58a)mit-ko	>	mitk'o	/ mikk'o	'believe-and'
us-ki	>	utk'i	/ ukk'i	'laugh-(nominative)'
sot ^h -pota	>	sotp'ota	/ sopp'ota	'pot-more than'
os-p'un	>	otp'un	/ opp'un	'cloth-only'

(3.58b)kas	>	kat	'hat'
cis+ta	>	citta	'to build + ending'
mit+so	>	misso	'to believe + ending'

Note that both stops and fricatives neutralize to [t], and that there are alternative forms across a morpheme boundary.

Another Korean phenomenon is a regular consonant lenition in coda position: palatals become dentals. Again, Lee (1998:34) provides some scanty data for this:

(3.58c)nac-k'aci	>	natk'aci	or	nakk'aci	day time-till
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The major problem with presenting this change as relevant for coronal underspecification is that it is customary to regard palatals as coronals. Although for Hungarian, the two are not lumped under the same major place; see Siptár 1998:328). If palatals and dentals are both coronals, then this neutralization equally does not affect a place of articulation: palatal affricates become dental stops in the coda.

Although Paradis and Prunet do not, then, treat relevant processes, there are still a number of considerations to be examined. Instances of true neutralizations into a coronal could be the following:

- (3.59) -k# > -t#
 -p# > -t#
 -f# > -s#

That is, in final positions non-coronals weaken to coronals. Moreover, one would expect such processes to be frequent, in a range of languages, not just sporadically. The trouble is that such processes do not occur regularly. On the other hand, the processes below are indeed attested:

- (3.60) -k# > -ʔ#
 -p# > -ʔ#
 -t# > -ʔ#

That is, any stop at the major places of articulations can weaken to a glottal stop in final positions. Incidentally, such changes are especially frequent with /t/ and /k/, as in certain varieties of English, and in general in Finnish: Common Finnish *-k# > Finnish -ʔ#, where *-t# does not change (Bereczki 2000:41, 42). All in all, it can be claimed that neutralization mainly affects complexity (manner of articulation especially) in codas, rather than the specifically coronal place.

In Indo-European languages, for instance in Latin and Ancient Greek, a tendency can be observed that in word-final position (but only there!) exclusively coronals are allowed – a feature which even some Romance languages inherited from Latin. However, to use this tendency as evidence for coronal unmarkedness is a slightly objectionable Indo-European bias, especially because this feature is a historical accident in the modern languages (see Chapter 6). Moreover, even in Latin, m- was possible at the end of a word-form, the precise phonetic identity of which may be subject to debate (see Tamás 1978:74), but its IE reflexes do testify to its original existence. Consequently, this coronal tendency is far from being common IE heritage: Germanic, Slavic and Indic languages do not have such restrictions, and even in Romance there is a finer picture.

In Spanish, to take but one example, there are signs of such a coronal tendency, since only the following consonants may appear in codas:

(3.61a) /s θ D n l r/

(3.61a) shows that only [+anterior], that is, dental coronals are allowed. This could be taken as evidence for the unmarked status of dentals. What is surprising, however, is that the most typical coronals, /t d/, are missing. One should account for this gap, and also for why /tS/ and /ϕ/, which exist in Spanish, are banned from this position.

Furthermore, the above curious coronal tendency is not met in word-medial positions, where homorganic non-coronal clusters freely occur:

(3.61b) *ho*[mb]re ‘man’, *sa*[ŋg]re ‘blood’, *ca*[mp]o ‘field’, *tro*[ŋk]o ‘trunk’

In other words, not only the pure coronal *-nd-*, *-nt-* and *-ld-*, *-lt-*, *-rd-*, *-rt-*, *-rs-*, and *-rθ-* clusters are allowed, but *any* NC cluster, which can obviously be non-coronal codas, [m ŋ]. No general statement can be formulated as far as the Spanish coda is concerned. One has to see that, even though Spanish seems to show at first blush the role of coronal unmarkedness, it does not have much to do with coronality. It inherited from Latin (the “historical accident”) that only coronals have been retained (and that /D/ could appear). The point is that it was not their being coronal that favoured their retention since, on the one hand, that would have favoured the retention even of /t/ (which could have been inherited from Latin, by the way), and on the other, besides dentals, perhaps palatals could become licenced.

To cite another example, in Thai (Smyth 2002) only nasals, /m n ŋ/, glides, /j w/, and unreleased stops, /p t k/, are allowed in coda position. Again, this pattern is not sensitive to places, but to manners of articulation in codas. Mandarin Chinese (Duanmu 2002:62) is similar: only glides /j w/ and nasals appear, but there is no *-m#. On the hand, it is striking that there is no labial nasal in the coda, but there is velar nasal and /w/, non-coronals, that is. On the other hand, there is no coda /l/, which is coronal and which is a phoneme word-initially.

To summarize: it can be stated that consonantal neutralizations in coda positions are not sensitive to the place of articulation, but rather to the complexity of the manner of articulation. Furthermore, it does not strike me as general that in codas coronals are more favoured by languages.

3.7 What does transparency mean?

3.7.1 Transparency

The last piece of evidence in McCarthy and Taub (1992) is the possible transparency of coronals in vowel harmony systems. It simply amounts to the claim that coronals do not interfere with their neighbouring vowels and do not show any harmony: these processes sort of skip them. If so, then it is not quite clear how they do not have a head since such an empty position seems to be just the perfect place for a neighbouring element (from, say, a vowel) to spread into under certain conditions, of course. If no spreading is observed, then it seems correct to conclude that the position is already occupied, in other words coronals are not without a place element. Instances of vowel–velar consonant interaction can be named, though: for instance, the various strengthenings observed in Rätö-Romansch or I-mutation in Germanic languages including Old English. Here velar [x] and [F] somehow open up their I-tier to yield [c], later [tS] for [k] and other palatal reflexes for [F]. This conclusion is in contradiction with the claim of the previous criterion, coronals being assimilation targets because they do not have a head.

3.7.2 *On transparency as a theoretical problem*

According to Paradis and Prunet (1991:10), coronals are often transparent consonants. This means that “a segment allows a feature to spread across it” – the segment itself does not change during the process, nor does it block the process. It behaves as if it were not there. The editors do not provide extensive examples for this phenomenon. In what follows, some of plausible scenarios are presented. These possibilities are:

- (3.62) (a) /ate/ > [ete] / [æte] palatality spreads leftwards
 (b) /ate/ > [etje] / [etSe] / [ætje] / [ætSe]
 (c) /atu/ > [otu] / [utu] labiality spreads leftwards
 (d) /atu/ > [opu] / [upu]

Let us consider the consequences of these scenarios. In (3.62a) and (3.62b), the palatality ([+front], I element, etc) of the second vowel, /e/, while in (3.62c) and (3.62d) the labiality ([+round], U element, etc) of the second vowel, /u/, spreads leftwards to the first vowel. Based on transparency and the lack of place of articulation two possibilities offer themselves. If transparency dominates, the intervocalic /t/ remains intact during spreading, so that (3.62a) and (3.62c) are the results. The lack of a place of articulation, however, does not exclude the possibility that the intervocalic /t/ changes since it falls within the range of spreading. If /t/ is truly placeless, then (3.62b) and (3.62d), that is /tS/ and /p/, is also expected since what could stop palatality and labiality from spreading into an empty (place) slot? The major point, however, is that no matter how /t/ actually behaves – whether it changes or not during spreading – it must behave differently from the other non-coronal places of articulations within that phonological system. So if /t/ does not change because it is transparent, then non-coronal consonants, such as the velars, do. And conversely, if /t/ behaves as a placeless consonant and gets to host palatality or labiality, then non-coronals do not change in a similar fashion. Otherwise markedness distinctions do not make much sense. It is, however, fairly doubtful that coronals behave like placeless

Therefore, coronal harmony is the only possible consonantal harmony system. However, the cases of such harmony processes, from Chumash and Tahtlan (1991:140-152), involve cases where it is not all coronals, but some subclass of coronals, sibilants and non-alveolars, participate in the process. These harmonies are better treated as sibilant harmony, for instance (and this is not merely a question of naming). Crucially, such harmony occurs in systems where coronal must be specified, and the underspecified alveolar (or dental) coronals do not participate. While these consonantal harmony processes are important, they fail to show unequivocally that they are due to coronals having no place specifications.

3.8 Velars, coronals and the “ideal consonant”

In this section the view will be sketched that the unmarked status of coronals is better captured by the notion ideal consonant than by their lack of a place of articulation: coronals have a very distinctive marked consonantal melody in fact. An analogy with vowels may serve to illustrate this idea. It is a well-known observation that among vowels there are vowels which are more vocalic than other, that is, some vowels are more ideal vowels. In general, low vowels of an /a/ type are more vocalic, more sonorous than either high /u/ or a “reduced” central /ə/. This view of the /a/-type low vowels is also confirmed by their phonetic as well as by their phonological properties. Now, exactly the analogous idea can be proposed for consonantal melody.

Although data and theoretical arguments will be put forward to illustrate that velars behave indeed as if they had no place of articulation, the frequency and variety coronals show may actually indicate that coronal consonants have an air unmarkedness around them. This unmarkedness has little to do with the lack of a place of articulation, rather it means the presence of a distinctive consonantal place of articulation. It will be proposed, therefore, that coronals have the

unmarked consonantal melody, without this automatically assigning placelessness to coronals.

There is an important observation that is not often used in the arguments about the markedness relations of the places of articulation: coronals are produced by a moving articulator (the tongue body) while labials and velars are produced by non-moving articulators, the lips and the velum. Based on this, it can be assumed that the markedness relations among the places of articulation are based on multiple relations rather than a simple one. On the one hand, it can be assumed, sounds produced by a moving articulator are opposed to sounds produced by a non-moving articulator – it appears to be reasonable to assume that the former, coronals, are unmarked *in this opposition*. On the other hand, there is a further markedness relation among sounds that produced by a non-moving articulator, that is, between labials and velars – velars being unmarked in this opposition, where coronals play no role at all.

As for velars, this double markedness means that they are marked, together with labials, against coronals, while they are unmarked against labials. There happens to be evidence for this in terms of natural classes: in certain languages there is an opposition, either synchronic or diachronic, between coronals and non-coronals. These oppositions are based on melody. In certain other languages there is opposition between the two unmarked sets (coronals and velars) and marked labials: for instance, coronals and velars can both palatalize, labials tend not to. I am not aware of processes, either synchronic or diachronic, where coronals and labials would pattern together leaving velars unaltered.

Nasukawa and Backley (2004, conference handout) proposed an analysis, quite independent in spirit from what was presented above, with two functionally distinct unmarked places of (consonantal) articulation: coronal and velar. The essence of their analysis is that empty structures appear as phonetically as default melody: such as velarity or coronality in consonants, or as [ə] in vowels. They distinguish resonance elements, <A; I, U>, and edge elements, <?, h; L, H>, which stand in a dominance relationship, and there is a dominance relationship

among their members also. Within the edge group, the actual edge elements <?, h> dominate the laryngeal <H, L> elements. Within the resonance group, the actual resonance elements <I, U> dominate the fundamental element <A>. Both groups are present in the melody of all segments, vowels and consonants alike. Moreover, they can be empty. The difference between vowels and consonants is due to the difference in dominance relations: in consonants, edge elements dominate resonance elements, in vowels it is the other way round. In the analysis of Nasukawa and Backley, coronality is empty resonance dominated by edge, while velarity is empty fundamental dominated by resonance (which are dominated of course by edge). In other words, velarity is the lack of <A>, while coronality is the lack of all of <A, I, U>. Although this analysis underlines the primary importance of the unmarkedness of coronals, it definitely breaks with the idea that markedness and lack of a place of articulation since it posits two unmarked places of articulation. On the one hand, velars have no fundamental, on the other, coronals are the default consonantal melody. This idea is more than worth thinking on.

3.9 Conclusions

The aim of this chapter was to look at some arguments for the underspecification of coronals, and point out flaws in the argumentation. The source of the misunderstandings and misinterpretations is the unwarranted confusion (or rather, equation) of two distinct terms: markedness and specialty. These do not go hand in hand, and probably have nothing to do with each other. The four criteria were analyzed in detail and conclusions were drawn. There is no direct relationship between the susceptibility to true epenthesis and places of articulation since on the one hand both velars and coronals may appear in epenthetic environment, and on the other, none of these cases is true epenthesis. Therefore, epenthesis cannot be an argument in deciding either in favour of coronals or in favour of velars being unmarked. The second argument, the variety of coronals, would point to more

complex segments; their frequency in endings and in the lexicon is neither general, nor is it due to the unmarked status of coronals. As for the third criterion, there seems to be a contradiction between the tendency to be assimilated and various harmony phenomena. In neutralizations and place assimilations coronals do not behave as if they were placeless: on the contrary, they act as a firm place of articulation to which other places assimilate. As for coronal harmonies, these rare phenomena seem to involve harmony among a subclass of coronals such as sibilants where another subclass appears to be unspecified. Therefore, none of the traditional criteria for coronal underspecification seem to support coronal unmarkedness.

Chapter 4

Velars in the history of Old English

4.1 Introduction: what velars did to OE

There are a number of crucial phonological processes in the history of English, especially in the Old English period, that involve the velar obstruents [k g x F]. It can even be claimed, and it does not seem to be theoretical prejudice, that in the history of OE the most comprehensive consonantal changes which are related to a specific place of articulation involve the velar place rather than other places of consonantal articulation. Campbell (1959:163-198, especially 170ff) describes various voicing or manner assimilations, dissimilations, doublings (such as the

West Germanic Gemination), cluster simplifications and metatheses – none of these revolves around a specific place of articulation. However, the velar processes, it will be shown, support the hypothesis proposed in this dissertation, namely that velars behave as if they had no place of articulation: they tend to be easily deleted, or are more prone to the influence of the environment as in vocalizations and palatalizations. Therefore, OE provides a fertile ground for investigations concerning the phonological behaviour of velars.

This chapter intends to cover all major processes involving velars in English, both from a historical and a phonological perspective. Moreover, it will be shown that a number of adjustments can be made to the views held by (historical) phonologists concerning these phenomena, especially in connection with nasal loss before voiceless fricatives (in section 4.2), and the compensatory lengthening following the loss of /x/ in certain environments (in section 4.4). Although these modifications in themselves may seem minor, they are important from a theoretical point of view.

The changes that involve velars in OE can be conveniently divided into two groups according to the 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/ (commonly 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-geþungen* ‘to thrive; inf.–past participle’), while the loss of /x/ between a vowel and a sonorant introduced allomorphy to nominal stems (e.g. *wealh-wealas* ‘foreigner; nom. sg.–nom. pl.’). It will be pointed out that /x/-deletion in these two phonological environments, intervocalic and following a liquid, must be strictly differentiated. In another change, Gmc */x/ became 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: *wrāh-wrigoŋ* ‘to cover; past 1/3 pers. sing.–past plural’. Further, the various palatalizations and

vocalizations of original velars belong here: these also introduced alternations to the paradigms: *cēosan* [tS-] – *curon* [k-] ‘to choose; inf.–past plural’, or *dæg* [-j] – *dagas* [-F-] ‘day; nom. sg.–nom. pl.’. 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 + sonorant clusters and plain sonorants in initial positions.

While the general tendency to eliminate clusters of velars and especially the voiceless fricative /x/ is rather prominent all through the OE period, there is a second group of processes, namely those that are triggered by velars. These include the very early deletion of nasals before /x/ (already in Common Germanic times), and the general breaking of front vowels before /x/ (and some other sounds) in nearly all OE dialects. An attempt is made in the following sections to provide a phonological explanation for both processes. Especially the first process is in need of clarification since virtually no attempt had been made to account for why nasal loss is first observed before /x/.

The chapter is organized as follows. Section 4.2 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 and in all the Germanic dialects. Section 4.3 offers a detailed presentation of the general breaking of front vowels before /x/ (and in certain other environments). An analysis of this process in CV phonology will be given. This is followed, in section 4.4, by a discussion of the loss of /x/ between sonorants, where it will be argued that, for a certain, well-defined class of words, the traditional analysis (for instance, in Campbell 1959) assuming compensatory lengthening is unwarranted and is not phonologically tenable. Sections 4.5 and 4.6 analyze the effect of umlaut on velars and the various palatalizations coming from [sx sk] clusters. A presentation of the reduction of the numerous velar clusters will follow in section 4.7, where a possible explanation will also be offered for why there is a difference in the later development of words like *what*, *when*, *where*, *wheel* with initial [w-] as opposed to *who* with initial [h-]. Finally, 4.8 gives an overview of Middle English changes.

Most of the data and their analyses are based on Campbell's classic (1959) *Old English Grammar*, and important grammars of OE have been reviewed. For the analyses Hogg (1992) and Lass (1994) have also been consulted.

4.2 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, and notice that it is legitimate to ask it only with theories of representation in mind. The question is inevitably related to a comparison of theories of representations since the mere question does not make sense otherwise (see Chapter 2). 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 offers itself: the velar fricative, lacking a phonological place of articulation, is too weak to perform its governing duties over a preceding nasal, which then becomes associated with the preceding vocalic slot (nasalization). Furthermore, it will also be argued below that the loss of nasals before the other fricatives in OE and Old Frisian is essentially the continuation (spreading further) of the nasal deletion before /x/.

In most grammars and readers of Old English, such as in Bright's OE Grammar and Reader (Cassidy and Ringler 1971/74:22), the change is mentioned briefly, usually with some examples and an indication of compensatory lengthening, sometimes even with comparative data. No further explanation is given, though. Sweet's Anglo-Saxon Primer (Davis 1980) does not even mention the phenomenon. This scanty treatment of nasal loss before fricatives is probably due to the relative insignificance of the change on synchronic morphological alternations in Old English. At least, this opinion is confirmed by the observation that even when the change is mentioned it is not in connection with verbs of the *think–thought* type, which would illustrate it, but it is lumped under headings like

“early changes”, which it is. Here are some words that show loss of nasals before /x/:

(4.1)	*-iŋx	*þiŋxan > *þīhan > þēon	‘to thrive, inf.’
	*-uŋx	fūht	‘moisture’
		ūhte	‘dawn’
	*-aŋx	*faŋxan > fōn	‘to take, inf.’
		ōht	‘persecution’
		þōhte	‘he thought’

4.2.1 Loss of nasals before /x/

Following Campbell (1959:44,47), Primitive Germanic is assumed to have the following nasal + voiceless fricative clusters (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:

(4.2) Nasal + voiceless fricative clusters in Primitive Germanic

-mf, -nθ, -ns, -ŋx

Two terminological remarks are in order. First, note that it is possible that a fricative after a nasal could not be but voiceless in Germanic, since the voiced fricatives /B D F/ – theoretically produced by Grimm’s law from IE */b^h d^h g^h/ – either developed voiced stop allophones, [b d g], in this position, or they had never been fricatives [B D F] at all after a nasal. Either way, [b d g] would still be allophones of the voiced fricative /B D F/ phonemes at this time, as Lass (1994:77) points out. (This, however, is immaterial to the representations of the segments.) Therefore, a phonemic contrast between voiced and voiceless fricatives is assumed, so it is correct to go on speaking of “loss of nasals before voiceless fricatives”. Second, the clusters in (4.2) 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). Original */-iŋx, -uŋx, -aŋx/ thus became nasalized long */-ĩ:x, -ũ:x, -ã:x/ sequences. Subsequently, */ĩ:/ and */ũ:/ must have lost their nasal quality since they developed just like non-nasal long */i:/ and */u:/ . The third vowel, nasalized */ã:/, however, developed into and along with non-nasal long /a:/ in Gothic, North Germanic, Old High German and Old Saxon (thus, developing no differently from */ĩ:/ and */ũ:/). But it became long /o:/ in Old English and Old Frisian, probably because it remained nasalized, */õ:/, for a longer time, as Campbell assumes (*ibid.*). Lass (1994:38) mentions that in fact every pre-nasal /a:/ was so affected in Ingvaeonic: OHG *māno* but OE *mōna* ‘moon’. These pre-nasal vowel developments can be seen in the following group of words (OE, OS, OHG data from Campbell 1959:44, with modern Dutch added; OS <th> is [θ], /x/ is represented by <h> or <ch> depending on the variety):

(4.3)	Prim.Gmc	OE	compare	gloss
	-iŋx	*þīhan > þēon	OS <i>thīhan</i>	to thrive
	-uŋx	fūht	Dutch <i>vocht</i>	moisture
	-uŋx	ūhte	Dutch <i>ocht(end)</i>	dawn
	-aŋx	ōht	Dutch <i>acht</i>	persecution
			Old High German <i>āhta</i>	
	-aŋx	þōhte	Dutch <i>dachte</i>	he thought
			OS <i>thāhta</i>	

This change, that is loss of nasals before the 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 weakened (lenited) to a velar fricative before another consonant, such as the weak past tense ending *-t*, as in (4.4a) 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 stop [g] after nasals), as in (4.4b): this caused allomorphy in the conjugations. The following verb forms show these alternations as compared to some Old Saxon forms (data from Campbell 1959:44):

(4.4a)	OE Infinitive		OE Past tense		OS Past tense
	*-ŋk-	versus	*-ŋxt-		
	þyncan [-ntS] < *-ŋk- to seem		þūhte < *-ŋxt- < *-ŋk+t- it seemed		
	þencan [-ntS] < *-ŋk- to think		þōhte < *-ŋxt- < *-ŋk+t- he thought		thāhta
(4.4b)	OE Infinitive		OE Past participle		OS Infinitive
	*-ŋx-	versus	*-ŋF-		
	þēon < (*þīhan <) *þiŋxan to thrive		geþungen [-ŋg-] < *-ŋF- thriven		thīhan
	fōn < *faŋxan to take		gefangen [-ŋg-] < *-ŋF- taken		fāhan

More on these and similar verbs will be said later when discussing contracted verbs (see section 4.3.3, 4.4.2).

There are two conclusions at this point. First, the nasal, but not its nasality, was eventually lost before a voiceless velar fricative in Primitive Germanic. Second, the different development of *-aŋx in OE and Old Frisian as opposed to the other West-Germanic varieties is noteworthy. Although these facts have been known for a long time, I am not aware of explanations as to why the nasal was deleted in all Germanic languages only before a (voiceless) velar fricative. This issue will be dealt with in 4.2.4 below.

4.2.2 Loss of nasals before /f θ s/

Much the same deletion applied later to nasal + non-velar fricative clusters in the West Germanic languages, except in Old High German. The clusters underwent

the same development as when deletion happened before the velar fricative: nasalized */i:/ 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 (although 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 some additional Modern High German and Dutch cognates):

(4.5a) Deletion of nasals before /s θ f/ in OE

OE >	English (or gloss)	OHG >	Modern HG	Dutch
_s	dūst dust		? Dunst	
	fūs (ready)	funs		
	gōs goose	gans >	Gans	gans
	hōs (company)		? Hans <name>	
	hūs house, Eucharist			
	Ōs- (god) <in names>	Ans-	Ans-	
	ōsle ousel, ouzel		(see (4.5b) below)	
	ūs us		uns	ons
_θ	cūþ (known)			
	cūþe (he knew)			
	gūþ (war)		(Kuni)gund	
	hrīþer (head of cattle)		Rind	rund
	līþe (gentle)	lindi >	lind	
	mūþ mouth	mund >	Mund	mond
			Münd(ung)	muid
	mūþl (horse's bit)			
	ōþer other	(ander)>	ander	ander
	sīþ (journey)			
	sōþ soothe-			
	sūþ south		(Süd < LowG)	zuid
	swīþ (strong)		? geschwind 'fast' ?	gezwind
	tōþ tooth	zand >	Zahn	tand
	ūþe (he granted)			
	ūþ- <intensive prefix>		? ent-	ont-
	see Go unda-			
_f	fif five	fimf >	fünf	vijf
	fifel (monster)			

sōfte soft samfto > sanft zacht < *zaft

Wright and Wright (1914:41) have the following cognates in addition and further examples from OE:

(4.5b) hōs ‘company’ Gothic, OHG hansa ‘band, escort, multitude’
 ōsle ousel, ouzel OHG amsala ‘blackbird’ > Amsel

wōs ‘moisture’ (> ooze)
 smōþe > ‘smoothly’
 þrōstle > ‘throstle (thrush)’

Some morphological consequences of these deletions have to be added, namely that the nasal was also lost in endings before fricatives. For instance, the present indicative plural *-ap* ending goes back to Prim. Gmc. **-anþi* (through **-anþi* > **-ōþ* > *-ap*, the vowel change in the last phase due to the ending being unstressed). Similarly, the accusative plural endings *-ōs*, *-ūs*, *-īs* all go back to Prim. Gmc. forms **-ans*, **-uns*, **-ins*, respectively (Campbell 1959:140).

4.2.3 *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 (for instance, 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 process affecting only pre-/x/ nasals. 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 from the North Sea area (Ingvaenic), but this later spread 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 later losses could happen anytime before the first written records in a Germanic language other than Gothic.

In support of this course of events, recall the different behaviour of **-/aŋx/*

in the various West-Germanic varieties. 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 (the nasal raised /a:/ to /o:/), then it does not seem to be forced to assume that this was actually the trigger for the deletion of nasals before all voiceless fricatives exactly in these varieties, OE and Old Frisian. It is, namely, an unstable system where nasalized vowels, */ĩ: ũ: õ: (ã:)/, occur only before /x/, and non-nasal vowels, */i u a (o)/, occur before clusters of the other voiceless fricatives, /mf nθ ns/. There are two options: either the nasalized vowels before /x/ are denasalized to /i: u: a:/ (in OHG and Gothic), or all vowels occurring before all nasal + fricative clusters are nasalized first, to be lost eventually (OE, Old Frisian). Notice that either option is directly triggered by the loss of nasals before /x/, which created an unstable situation among nasal + voiceless fricative clusters.

It can be added that in OE nasals seem to exert a raising influence on preceding vowels, or at least favouring the retention of high vowels before nasals, as Campbell (1959:43-44) notes: OE *cuman* ‘to come’ (see Gmn *kommen*, Du *komen*), *sumor* ‘summer’ (see Gmn *Sommer*, Du *zomer*), *wind* ‘wind’ (see Latin *ventus*), and alternative spellings like *man/mon* ‘man’ all through the OE period. A meaningful causal link can then be established between the deletion of nasals before all voiceless fricatives and the development of */-aŋx/ to /o:/ since they occurred in the same linguistic area, the Anglo-Frisian area.

This observation explains why it is from the OE and Old Frisian 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 voiceless fricatives, while some later rules must assume that this nasal deletion had already applied (namely, those affecting long /i: u: a:/). Nasals were, then, affected in consecutively broader environments: in Gothic, an East Germanic language, 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 voiceless fricatives disappeared. This is

summarized below:

(4.6) The interrelatedness of nasal loss $_x$ and later loss $_s, \theta, f$

processes	OE / Old Fris.	OS / OHG / Gothic
*-iŋx > -ĩ:x >	-i:x	-i:x
*-uŋx > -ũ:x >	-u:x	-u:x
*-aŋx > -ã:x > -ō:x	-o:x	-a:x
*VN{s, θ, f}	yes	no

4.2.4 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 it does not seem to constitute common knowledge to include in “practical grammars” of OE either (although the alternations themselves in (4.4) above are mentioned). Of course, the fact that nasals are deleted before fricatives is not unusual (see Latin *institutionem* > Italian *istituto* ‘institute’, Latin accusative plural *-ans, *-ons > -ās, -ōs), and that is not the problem. The problem is why it is before velars that nasals came to be lost first.

Notice that no immediate theoretical explanation offers itself in featural terms. The reason for this process cannot lie in /x/ being a voiceless fricative, and it is not obvious how the *velar* place specification of /x/ is responsible for the change. A promising line of thinking would be to assume that nasal loss before /x/ involves complexity, meaning that velars have a different complexity than other places of articulation. (It is deliberately not claimed whether velars are less or more complex than others, to remain neutral.) Theories directly encoding complexity include government theories. 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 establish 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 is earlier (hence, common) than nasal loss before, say, /f/ or /s/.

This complexity problem is especially interesting if the following representations are assumed for the Germanic clusters of (4.1) above (based on Harris 1994:126, with heads underlined>):

(4.7) Germanic nasal + fricative clusters expressed in elements

<p>(a)</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">C</th> <th style="text-align: center;">v</th> <th style="text-align: center;">C</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"> </td> <td></td> <td style="text-align: center;"> </td> </tr> <tr> <td style="text-align: center;">N</td> <td></td> <td style="text-align: center;"><u>h</u></td> </tr> <tr> <td style="text-align: center;"> </td> <td></td> <td style="text-align: center;"> </td> </tr> <tr> <td style="text-align: center;">?</td> <td></td> <td style="text-align: center;"> </td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;"><<</td> <td style="text-align: center;"> </td> </tr> <tr> <td style="text-align: center;">—</td> <td></td> <td style="text-align: center;">U</td> </tr> <tr> <td style="text-align: center;">m</td> <td></td> <td style="text-align: center;">f</td> </tr> </tbody> </table>	C	v	C				N		<u>h</u>				?				<<		—		U	m		f	<p>(b)</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">C</th> <th style="text-align: center;">v</th> <th style="text-align: center;">C</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"> </td> <td></td> <td style="text-align: center;"> </td> </tr> <tr> <td style="text-align: center;">N</td> <td></td> <td style="text-align: center;"><u>h</u></td> </tr> <tr> <td style="text-align: center;"> </td> <td></td> <td style="text-align: center;"> </td> </tr> <tr> <td style="text-align: center;">?</td> <td></td> <td style="text-align: center;"> </td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;"><<</td> <td style="text-align: center;"> </td> </tr> <tr> <td style="text-align: center;">—</td> <td></td> <td style="text-align: center;">R</td> </tr> <tr> <td style="text-align: center;">n</td> <td></td> <td style="text-align: center;">s</td> </tr> </tbody> </table>	C	v	C				N		<u>h</u>				?				<<		—		R	n		s
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It can be said that these clusters are undesirable because the segment to be governed, that is the nasal stop, is always more complex than or just as complex as the following fricative which should govern it. This situation is most difficult 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 of articulation. This better

brings out the intended place assimilations: the place of the (governing) fricative spreads (indicated by <<) into the place slot of the nasal, thereby satisfying its governing duties. Again, the problem of the velar cluster is that there is no place in the velar to spread. Spreading cannot take place, and the cluster is unstable because of complexity reasons: 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 and nasalizes the vowel in the first step.

There is, however, an alternative analysis, which would argue that nasals do not have the stop element in the first place. Notice that although this analysis would make the nasal in [mf, ns, nθ] clusters less complex (therefore more stable), it would not make the pre-velar situation any better. Even on this reading the velar cluster would be the least phonologically stable, exactly because no place specification is assumed in velars.

If this analysis in terms of complexity 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 because the velar does not have a place specification to share with the preceding nasal. In addition, this phenomenon can be taken to provide further evidence for the view that velars lack a phonologically relevant place specification. (The later losses in OE and Old Frisian are due to phonemic asymmetries in the pre-fricative vowels, as explained in 4.2.3 above.)

4.3 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 itself also be /x/, of course). The general rule can be sketched like this:

(4.8) Breaking in OE

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

Evidence for breaking comes partly from comparison. Wright and Wright (1914 / 1945:33) illustrate the phenomenon with the following cognates (they use the orthographic symbols in discussing these examples):

(4.9) Comparative evidence of Breaking

	OE	Gothic	OHG	gloss
æ > ea	ceald healdan bearn heard eahta weaxan seah	kalds haldan barn hardus ahtáu wahsjan	sah	cold to hold child hard eight to grow (he) saw
e > eo	meolcan sceolh eorþe heorte cneoht seox seoh (imper. of <i>seon</i> 'to see')		melkan scelh erda herza kneht sehs	to milk oblique earth heart boy six
i > (io) > eo	liornian, leornian miox, meox		*lirnōjan *mihst	to learn manure
æ: > ea	nēah	nēhw		near
i: > (io) > eo	lēoht wēoh	leihts [-i:-] weihs [-i:-]		light holy

(Long /e:/ does not feature in this discussion because, according to Campbell (1959:54, N2), in OE /e:/ and /æ:/ are merely dialectal variants of Primitive Gmc /

æ:/. Nevertheless, he mentions (1959:38) that “Prim. Gmc. \bar{e} 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 phonologically interesting. These are discussed first.

4.3.1 *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. Long /i:/ was also broken before single /x/ – it is not made clear by him 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:

(4.10a) /i/ broken to <io>, later <eo> (Campbell 1959:57)

___/x/C	<i>tiohhian</i>	to consider
	<i>Peohtas</i>	Picts
	<i>meox</i> /-xs/	manure

(4.10b) /i:/ broken to <īo>, later <ēo> (Campbell 1959:58)

___/x/(C)	<i>betwēoh</i>	between
	<i>lēoh</i>	light (in weight)
	* <i>wēoh</i> (pl. <i>wēos</i>)	idol
with loss of /x/	<i>fēol</i>	file
	<i>lēon</i>	to lend
	<i>sēon</i>	to sieve
	<i>tēon</i>	to accuse
	<i>þēon</i>	to thrive
	<i>wrēon</i>	to wrap

(for the loss of [x], see section 4)

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 appears to be 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 umlaut environment. – The important observation is that both high front vowels were broken before /x/ when followed by another consonant. A second 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 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; Davies 1980:5). Long /æ:/ appears to be broken only before single /x/, although this is probably due to the paucity of examples rather than to a phonotactic constraint (see later). The following are typical West-Saxon examples from Campbell:

(4.10c) /æ/ broken to <ea> (Campbell 1959:55-7)

___/l/C	<i>eall</i>	all
	<i>healdan</i>	to hold
	<i>healf</i>	half
	<i>sealfian</i>	to anoint
	<i>wealh</i>	foreigner
	<i>weall</i>	wall
___/r/C	<i>bearn</i>	child
	<i>heard</i>	hard
	<i>hearg</i>	temple
	<i>mearh</i>	horse
	<i>wearm</i>	warm
___/x/(C)	<i>eahta</i>	eight
	<i>weaxan</i> /-xs-/	to grow
	<i>seah</i>	he saw
	<i>hleahtor</i>	laughter
	<i>seax</i> /-xs/	knife

	<i>meaht</i>	might
	<i>neaht</i>	night
with loss of /x/	<i>ēa</i>	river
	<i>ēar</i>	ear of corn
	<i>slēan</i>	to strike
	<i>lēan</i>	to blame
	<i>þwēan</i>	to wash
	<i>tēar</i>	to tear

(4.10d) /æ:/ broken, in West-Saxon only, to <ea> (Campbell 1959:58)

<u> </u> /x/	<i>nēah</i>	near
with loss of /x/	<i>nēar</i>	nearer

(4.10e) /e/ broken to <eo> (Campbell 1959:57)

<u> </u> /lx/	<i>eolh</i>	elk
	<i>seolh</i>	seal
	<i>sceolh</i>	oblique
<u> </u> /r/C	<i>eorþe</i>	earth
	<i>weorðan</i>	to become
	<i>weorpan</i>	to throw
	<i>eorl</i>	warrior
	<i>sweord</i>	sword
	<i>steorra</i>	star
<u> </u> /x/(C)	<i>feoh</i>	cattle
	<i>eoh</i>	horse
	<i>feohtan</i>	to fight
	<i>cneohtas</i>	boys
with loss of /x/	<i>fēolan</i>	to press on

A few thoughts have to be said about the environments /x/+C, /r/+C and /l/+C because some points need clarification. These environments can naturally include geminates /xx/, /rr/ and /ll/. Campbell (1959:54, N3) indeed notes that <ll>, <hh> and <rh> (!) 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 the following 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 Geminatio. Although /r/ could not be geminated by this rule (this is noted by Campbell *ibid.*), nevertheless there are examples

for /-rr-/, from original Gmc geminate /rr/ according to Campbell (1959:163, 165). Breaking does take place before /rr/: *steorra* ‘star’ and *fierr* ‘farther’ (with umlaut). Campbell does not seem to take note of these in connection with breaking, though.

As for geminate /ll/ 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 */æ/ are in fact attested before /ll/ in West-Saxon, as in *eall* ‘all’, *weall* ‘wall’, although Campbell does not recognize the existence of broken vowels before /ll/ at all. 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/. 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 (perhaps as opposed to other cases of /ll/?). 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 and what *palatality* itself had to do with the change. (After all, “backness” seems to be involved in the process: see modern English [fi;Eɪ] *feel*, [seɪEɪ] *sail*, [faɪEɪ] *file*, [bOɪEɪ] *boil*, on which more later). Nevertheless, the view has to be corrected that before /ll/ there is no breaking, see *weall* and *eall*. Quirk and Wrenn (1957:145) clearly make the distinction that only /ll/ due to Gemination did not cause breaking: “No diphthongisation took place before ... the *ll* produced by West Gmc consonant-lengthening [...] as in *sellan* ‘give’ and *tellan* ‘count’ (Go *saljan*, *taljan*)”. This view also confirms that breaking did not happen before /ll/ from gemination because the original vowel preceding *-lj- was /a/ in all cases, which is not expected to undergo breaking since it is back.

To summarize the observations in the discussion so far, the distribution of the broken vowels is tabulated below where ‘+’ expresses that the vowel is affected (with the ? sign indicating an accidental gap):

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

vowel before:	/x/	/x/+C	/rx/	/lx/	/r/+C	/l/+C
æ	+	+	+	+	+	+
æ:	+	?				
e	+	+	+	+	+	
i	?	+	+			
i:	+	+				

It can be seen that the voiceless velar fricative had the most wide-spread effect. Crucially, /x/ affected practically all front vowels, either on its own or before another consonant, and it affected most front vowels even when either liquid preceded it. Importantly, neither liquid caused breaking of vowels on its own. {r, l}+C (other than /x/) had a more limited breaking effect, /l/-clusters were the most limited in this ability. As for the /x/+C, /r/+C, and /l/+C clusters, they influenced the preceding vowel in this order: /x/+C affecting practically all, /r/+C most, and /l/+C affecting least of the vowels. – It has to be added that the patterns in (4.11) show considerable variation among OE dialects, and even the spreading of the phenomenon can be traced through time, which partly explains the gaps in (4.11).

4.3.2 *The phonetic description of breaking and its modelling*

The actual vowel changes are widely assumed to be the following:

(4.12)		phonetically	orthographically (West-Saxon)	
	æ	>	æa	<ea>
	æ:	>	æ:a	<ea>
	e	>	eo	<eo>
	i	>	(io) > eo	<eo>
	i:	>	(i:o) > e:o	<eo>

The “textbook” assumption about the actual phonetic value of these diphthongs is that they were phonetically composed of front–back sequences of the same height, the front member preceding the back (broken) half, as in [æa eo] (see Mitchell and

Robinson 2001, for instance). According to Quirk and Wrenn (1957:145), however, breaking is “the addition of a vowel glide to the front vowel through the influence of certain velar qualities in following consonants”. They provide the following derivation for *feoh* ‘life’ and *heard* ‘hard’:

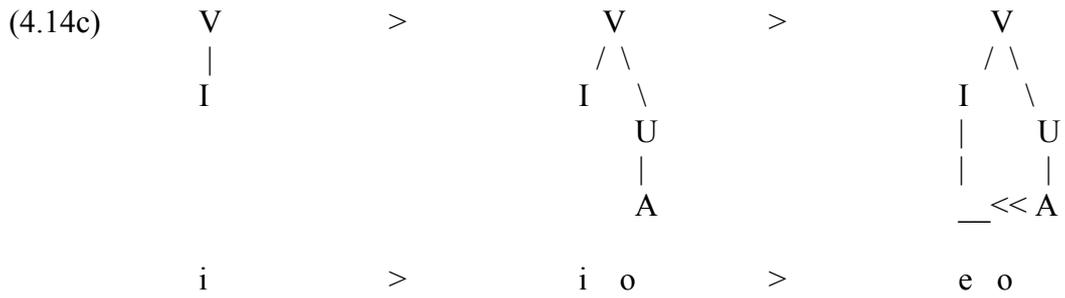
$$(4.13) \begin{array}{l} *fex > *feux > *feox > [feəh] = \langle feoh \rangle \text{ ‘life’} \\ *hærd > *hæurd > > [hæərd] = \langle heard \rangle \text{ ‘hard’} \end{array}$$

Accordingly, it will be put forward here that the phonetic realization that is usually associated with the orthographic symbols *a*, *o* in the broken vowels is [ə], instead of a truly back vowel [a o u]. Note that Bright’s Old English Grammar and Reader (Cassidy and Ringler 1971/74:31) also transcribes broken vowels (“in broad phonetic terms”) with [ə]. The phonetic vowels were then [æə eə], short or long.

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 spreading of the non-palatal element. The representations for contour structures below illustrate the elemental make-up of the short diphthongs [æa], [eo] and [io]:

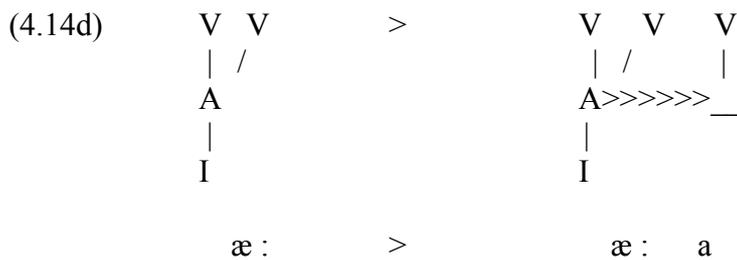
$$(4.14a) \begin{array}{l} V > V \\ | & / \ \backslash \\ A & A >> _ \\ | & | \\ I & I \\ \text{æ} & \text{æ} \ a \end{array}$$

$$(4.14b) \begin{array}{l} V > V \\ | & / \ \backslash \\ I & I \ \backslash \\ | & | \ U \\ | & | \\ A & A >> _ \\ e & e \ o \end{array}$$



While the representation of /æa/, (4.14a), is not very difficult even assuming the traditional phonetic value of the broken vowel, 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 assuming the [æa], [eo] and [io] values for these broken diphthongs.

The representation of a long diphthong could be the following:



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 timing slot out of nothing (there is no ternary opposition in vowel length in OE), and there should be some reason why the broken half attaches to the right-most /æ/.

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 /x l r/ shared this element and spread it into the preceding vocalic slot. This assumes an active spreading of a given element, that of A. 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] to be the approximate pronunciation of <io>, which could be associated 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. 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. Consider the following representations then:

$$\begin{array}{lcl}
 (4.14a') & \begin{array}{c} \text{V} \\ | \\ \text{A} \\ | \\ \text{I} \\ \text{æ} \end{array} & > & \begin{array}{c} \text{V} \\ / \quad \backslash \\ \text{A} \quad _ \\ | \\ \text{I} \\ \text{æ} \quad \text{ə} \end{array}
 \end{array}$$

$$\begin{array}{lcl}
 (4.14b') & \begin{array}{c} \text{V} \\ | \\ \text{I} \\ | \\ | \\ \text{A} \\ \text{e} \end{array} & > & \begin{array}{c} \text{V} \\ / \quad \backslash \\ \text{I} \quad _ \\ | \\ \text{A} \\ \text{e} \quad \text{ə} \end{array}
 \end{array}$$

$$\begin{array}{lcl}
 (4.14c') & \begin{array}{c} \text{V} \\ | \\ \text{I} \end{array} & > & \begin{array}{c} \text{V} \\ / \quad \backslash \\ \text{I} \quad _ \end{array} & > & \begin{array}{c} \text{V} \\ / \quad \backslash \\ \text{I} \quad _ \\ | \\ \text{A} \end{array}
 \end{array}$$

i > i ə > e ə

There are a number of tough problems that have remained unresolved, though. It remains to be answered why only front vowels were affected, not the 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/ (/x/ is lost). Both front and back vowels are broken before /r/: [iE UE eE (OE) aIE aUE OIE], but breaking only occurs after front glides: [i;E eIE aIE OIE] before /l/. Furthermore, there is no phonological motivation for the OE iə > eə change, it seems to be an unconditioned lowering. Also, it remains to be worked out how the unlauded counterpart of the above vowels, <iē>, is to be represented (Campbell 1959:§201 mentions wide variation even in the spelling of this unlauded vowel).

Another problem is why only /x/ triggered breaking among the velars? Why did /k/ not cause breaking? And why did the liquids, when followed by another consonant? In fact, a certain allophonic alternation in Spanish might be relevant to cite at this point. Sobieski and Várady (1992:27-31) in their phonetic description of Spanish vowels point out that all vowels are open (possibly lax would be a better term in the case of high vowels) in closed syllables and before /r/ and /x/ as in [ˈpɔro] ‘dog’, [ˈlɔxos] ‘far away’, [oˈrɔxA] ‘ear’, [ˈOxA] ‘leaf’ and [kOˈrɔr] ‘to run’. It is notable that this is practically the only vowel allophony which is triggered by a neighbouring segment rather than by the number of segments following. While this particular change is not a case of breaking, of course, and it affects all vowels, not just the front ones, there are important similarities. In particular, /k/ does not trigger the allophony. Also, both OE breaking and this vowel allophony in Spanish seem to be the result of laxing.

Returning to the OE phenomenon, in featural terms, it could be claimed that breaking is actually the approximation of the vowel to the following consonant, in particular to the [+back] feature specification of /x/, and since no

assimilation is needed in [back] for back vowels, it follows that they do not undergo breaking. As for /l/ in a coda position (before another consonant), it can be proposed that it was phonetically dark [ɫ], just like in present-day English. As for /r/, it can be similarly proposed that in coda position it is a velar rhotic, like in modern German or French, where [ʀ] can be cited for comparison. Incidentally, German [ʀ] does have similar effects on preceding vowels to what OE /r/ had. Nevertheless, it is still problematic why [k] does not cause breaking – unless breaking is somehow dependent on, besides place, the lack of occlusion. This remains to be seen.

4.3.3 *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 (4.8-10) 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 strong verbs of Old English. Mitchell and Robinson (2001:37) give a summary of the stressed vowels in each principal part of each type of strong verbs (with 3sg present indicative vowels added from their Appendix One 2001:152-158, and Class VII supplied from Campbell):

(4.15) part.		infin.	3sg pres	preterite		past	
				singular	plural		
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

The table shows that strong verbs may contain all the vowels that are subject to breaking. It is rewarding to compare the vowels above and the distribution of broken vowels in (4.11). It has already been noted that short /i/ does not undergo breaking before single /x/, and /æ:/ does not break before /x/+C. Indeed neither /i/ nor /æ:/ stand in relevant positions in strong verbs. It will be examined first whether or not this reluctance is due to a constraint. For instance, in Class I verbs, all relevant examples show /F/ instead of /x/, due to Verner's law, and this precludes breaking of /i/. In classes IV and V, where /i/ figures in 3sg present forms, there are no examples. Notice, however, that this is not so surprising since in these classes a single consonant follows the stem vowel. Now, /l r/ do not trigger breaking on their own, so it is actually due to the lack of /ix/ sequences that there is no breaking here. This absence of /ix/ in class IV is quite normal, since the single consonant should be a liquid in this class, /x/ is not even expected! We are then left with the lack of /ix/ in class V. This seems to be a rather special morpho-phonological environment for this "gap" to be a real problem. Therefore, it seems to be due to chance that short /i/ does not suffer breaking before single /x/ rather than to a phonotactic constraint: simply, there do not seem to exist any words that could undergo it. As for the absence of breaking of /æ:/ before /x/+C, it can be seen that the vowel regularly does not appear in class III where it could potentially undergo breaking before two consonants. For these vowels it is then safe to assume that they could undergo breaking theoretically, but they accidentally happen not to.

Nevertheless, nearly all classes are affected by breaking in some way: classes I, II, III, V, VI and VII. Only class IV verbs cannot be affected since the single consonant had to be a sonorant, not an obstruent (and recall that the liquids, on their own, do not cause breaking). Class II verbs are only affected in the infinitive, which is blurred by the later loss of /x/ (see section 4.4 below). 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 following paragraphs look at each class one by one.

The infinitive forms of Class I verbs were affected by /i:/ > /e:o/ (or [e:E]) before a single /x/, and the 3sg present tense form was affected in addition by umlaut. With loss of /x/, the result was the emergence of contracted verbs (named after their infinitive form). /x/ had regularly become /F/ in the preterite plural and the past participle – due to Verner’s law –, and therefore they are not affected.

Such verbs are (<-g-> is the voiced fricative [-F-]):

(4.16a)infinitive	3sg present	past sg	past plur	past participle
lēon ‘lend’	līehþ	lāh	ligon	ligen
tēon ‘accuse’	tīehþ	tāh	tigon	tigen
þēon ‘prosper’	þīehþ	þāh	þigon	þigen
wrēon ‘cover’	wrīehþ	wrāh	wrigon	wrigen

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

(4.16b)infinitive	3sg present	past sg	past plur	past participle
blīcan ‘shine’	blīcþ	blāc	blicon	blicen
swīcan ‘fail’	swīcþ	swāc	swicon	swicen
stīgan ‘ascend’	stīgþ, stīhþ	stāg, stāh	stigon	stigen
hnīgan ‘bow to’	hnīgþ, hnīhþ	hnāg	hnigon	hnigen

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:ə/ and /e:ə/ anyway:

(4.17) infinitive	3sg present	past sg	past plur	past participle
flēon 'flee'	flīehþ	flēah	flugon	flogen
tēon 'draw'	tīehþ	tēah	tugon	togen

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, so that breaking could apply in its fullest force, with all clusters exerting their breaking influence. Some examples with a velar consonant are:

(4.18a) infinitive	3sg present	past sg	past plur	past participle
feohtan 'fight'	fieht	feaht	fuhton	fohten
beorgan 'protect, bury'	bierhþ	bearg	burgon	borgen
belgan 'be angry'	bilhþ	bealg	bulgon	bolgen
sweorcan 'grow dark'	swiercþ	swearc	swurcon	sworcen

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

One verb, *fēolan* 'to press on', is a contracted verb (Bright's Grammar, Cassidy and Ringler 1971/74:68). The long vowel of this verb is subject to the compensatory lengthening – on why this assumed lengthening is not warranted in this case will be discussed in the next section. Its forms are:

(4.18b) infinitive	3sg present	past sg	past plur	past participle
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fēolan <unattested> fealh fulgon folgen
 ‘press on, follow’

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

(4.18c) infinitive	3sg present	past sg	past plur	past participle
ceorfan ‘cut, carve’	cierfþ	cearf	curfon	corfen
hweorfan ‘go’	hwierfþ	hwearf	hwurfon	hworfen
weorpan ‘throw, warp’	wierfþ	wearp	wurpon	worpen
weorþan ‘become’	wierþ	wearþ	wurdon	worden

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

(4.19) infinitive	3sg present	past sg	past plur	past participle
<i>brecan</i>	bricþ	bræc	br2ácon	brocen

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’:

(4.20) infinitive	3sg present	past sg	past plur	past participle
sēon ‘see’	siehþ	seah	sāwon	sewen
þicgan [-dZ:-] ‘partake’	þigeþ [-j-]	þeah	þ2ágon	[-F-] þegen

Class VI verbs that are affected by breaking are all contracted verbs and

show effects of umlaut in their 3sg present tense forms:

(4.21) infinitive	3sg present	past sg	past plur	past participle
lēan 'blame'	liehþ	lōh, lōg	lōgon	lagen
slēan 'strike'	slihþ	slōh, slōg	slōgon	slagen / slægen

Class VII includes the most phonologically complex forms:

(4.22a) infinitive	3sg present	past sg	past plur	past participle
fōn 'seize'	fēhþ	fēng	fēngon	fangen
hōn 'hang'	hēhþ	hēng	hēngon	hangen

Notice that the infinitives also lost the nasal before the original */x/ in **fan̄xan*, and the stem vowel became /o:/ from original /a/ through contraction, *fo:xan > *fo:an > fōn. No breaking took place in these verbs because there was no front vowel in the infinitives. Another verb of this class is *weaxan* 'to grow', which does have breaking:

(4.22b) infinitive	3sg present	past sg	past plur	past participle
weaxan [xs] 'grow'	wiext	wēox	wēoxon	weaxen

This example shows that breaking must have taken place before the /xs/ clusters became /ks/ since /k/ could not cause breaking (see *brecan* above).

4.4 The loss of /x/ between sonorants

The OE voiceless velar fricative /x/ was lost in the following environments: (1) between two vowels, (2) between a vowel and a voiced consonant (mainly a sonorant), and (3) between a consonant (generally a sonorant) and a vowel, according to Campbell (1959:104). As he correctly points out, this change must

have taken place after breaking since often the only trace of an original /x/ in a given form is the presence of a broken vowel. This justifies the ordering of this loss after breaking, in this discussion. Breaking is most obvious in infinitives of contracted verbs. In fact, it is the loss of /x/ that created the contracted verbs. Consider the following examples for loss of /x/ (based on Mitchell and Robinson 2001:41 with class III added):

(4.23) Changes to 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 glossaries that still show the presence of /x/ between sonorants. This indicates that the loss took place during the written history of OE. His examples include items from the Corpus Glossary and from the Épinal Glossary:

(4.24) Intersonorant /x/ in the early glossaries

Corpus Glossary			
<i>bituihn</i>	<i>betwēonan</i>	‘between’	
<i>raha</i>	<i>rā</i>	‘roe’	Gmn <i>Reh</i>
<i>tahae</i>	<i>tā</i>	‘toe’	Gmn <i>Zehe</i>
Épinal Glossary			
<i>furhum</i>	<i>fūrum</i> dat.pl.	‘furrow’	Du <i>voer(e)</i>
<i>ryhae</i>	<i>rēo</i>	‘blanket’	
<i>thohae</i>	<i>þō</i>	‘clay’	Gmn <i>Ton</i>
<i>uulohum</i>	<i>*wlōm</i> dat.pl.	‘fringe’	

From other sources, the name *uelhisci* of Charter 4 can be added (Kentish, original from AD 679 in Hoad 1988:200; Campbell (*ibid.*)). Wright–Wright

(1914/1945:256, 261) add Gothic *leihwan* and *saihwan* as cognates of OE *lēon* and *sēon*, respectively.

In connection with the loss of /x/ before a voiced consonant, Campbell (1959:104) states: “Loss of χ took place between vowel and voiced consonant with lengthening of the vowel.” He provides few examples, about some of which he himself has doubts. Etymology proves the existence of /x/ in *þwēal* ‘washing’: in Gothic a form *þwahl* can be compared, if they are really from *þweaxl, not from *þweaxol, where /x/ is intervocalic. Similarly, OE *ymest* ‘upmost’ can be compared to Gothic *auhumists*, again intervocalically. All in all, evidence is scanty for the pre-sonorant environment, and it cannot be determined with certainty whether all these examples involve an intervocalic /x/ or not. This would be an ideal position for typical compensatory lengthening to take place, by the way.

It is widely held that the loss of the voiceless velar fricative resulted uniformly in compensatory lengthening. It will be shown in 4.4.1 that this is warranted only intervocalically (although even this is more properly called vowel contraction), but definitely not when /x/ followed a liquid. In 4.4.2 Verner’s law will be discussed. It will be realized in passing that some of the words cited in this section have been cited above since they also show breaking.

4.4.1 *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 particular, it will be pointed out that stems fall into two well-defined groups according to their phonological environment. Moreover, they do not behave identically, contrary to their traditional treatment. Furthermore, it will be disputed whether compensatory lengthening in one of these groups could take place at all.

4.4.1.1 The traditional paradigms and some problems with them

Consider the following nouns *scōh* (masc) ‘shoe’, *eoH* (masc) ‘horse’, *meaRH* (masc) ‘horse, steed’, *wealh* (masc) ‘foreigner’ (paradigms based on Campbell

1959):

(4.25a)			(25b)	(25c)	(25d)	
	Sg	N	scōh	eoh	mearh	wealh
		A	scōh	eoh	mearh	wealh
		G	scōs	ēos	mēares	wēales
		D	scō	ēo	mēare	wēale
	Pl	N	scōs	ēos	mēaras	wēalas
		A	scōs	ēos	mēaras	wēalas
		G	scōna !	ēona !	mēara	wēala
		D	scōm	ēom	mēarum	wēalum

Further examples include: like (25a) are *flēah* ‘flea’, *hōh* ‘heel’, *lēah* ‘open country’, *slōh* ‘mire’, *flēah* ‘albugo’ and *dēoh* ‘thigh’; like (25b) are *feoh* ‘money’ and *pleoh* ‘danger’; like (25c) are *feorh* ‘pig’, *horh* ‘rheum’ and *feorh* ‘life, person’; like (25d) are *ealh* ‘temple’, *eolh* ‘elk’, *healh* ‘corner’, *sealh* ‘willow’, *seolh* ‘seal’, and *holh* ‘hollow’ (Campbell 1959:225-6).

Most Old English grammars treat all these words as behaving identically as for compensatory lengthening, namely that the loss of /x/ before vowel-initial endings (in fact all inflections for these stems) results in uniform compensatory lengthening. Davies (1980:7) writes: “Between vowels, and between *l*, *r* and a vowel, *h* is lost. The vowels which thus fall together contract into a long diphthong; and the vowel preceding the *l* or *r*, if short, is lengthened: *feoh* ‘money’, gen. sing. *fēos*; *Wealh* ‘Welshman’, nom. acc. pl. *Wēalas*; *feorh* ‘life’, gen. sing. *fēores*.” Similarly, 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. The words in (4.25), however, are quite dissimilar, and form two quite disparate groups with respect to their morphophonological properties: those like *scoh* and *eoh* (4.25a-b) as opposed to those like *mearh* and *wealh* (4.25c-d). The basis for their differentiation is their different phonotactic patterns.

As for the first type, (4.25a-b), it is characterized by vowel coalescence and, in consequence, pervasive lengthening of the stressed stem vowel (when it was short). The loss of the intervocalic /x/ resulted in forms such as **sco:es*, **sco:e*, **sco:um* for (4.25a) and **eoēs*, **eoē*, **eoum* for (4.25b), 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). Notice that lengthening was vacuous in long-vowelled stems like *scōh*. This is a perfectly regular phonological change: vowel fusion resulting in long vowels. (This means, of course, that there is no compensatory lengthening as such in these cases.) This group of words is further characterized by a historically inappropriate morpheme in the genitive plural. The *-na* ending is taken from the weak declension for phonological reasons: the genitive plural form would have coincided with the dative singular, and, to avoid this for some reason, the weak ending *-na* was used instead, according to Campbell (1959:225, N1). (See Mitchell and Robinson 2001:24, too; although it is not quite clear why the formal coincidence of exactly these two forms was functionally undesirable, given the heavy coalescence all through the paradigm). In this group, then, vowel lengthening is phonologically reasonable, and the special behaviour of these words is also shown by the irregular genitive plural ending. But, crucially, there is no lengthening that could be called compensatory in any trivial sense.

The other group, (4.25c-d), is quite different. The important observation in connection with such items as *meārĥ*, *weālĥ* is that the /x/ follows a liquid, /l/ or /r/. It is fair to say that practically all historical analyses (as well as modern critical text editions) show an alternation in the length of the vowel in the stem of these words: Campbell (1959), Mitchell and Robinson (2001), Wright and Wright (1914²:166 / 1945), Bright's (1891) *Old English Grammar and Reader* (Cassidy–Ringler 1971³:43,46-47,56-57) and Sweet's *Anglo-Saxon Primer* (Davis 1980) are such examples, with the notable exception of Quirk and Wrenn (1957) who indeed point out this problem. In traditional treatments, the loss of final /x/ resulted in the compensatory lengthening of the stressed vowel in the preceding syllable. There is thus an assumed alternation of short /ea/ in *meārĥ* (nom/acc

sing.) but 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 *eah* type referred to above.

Not only do the two groups have different phonological environments, they also do not behave identically. There is no reason to assume compensatory lengthening in the *meah* 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) cites forms with appropriate length marks for *meah*. Campbell 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]”. Moreover, 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*.”

Quirk and Wrenn (1957:137) make a distinction between the two phonological environments: “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* that there was the same compensatory lengthening [in the two phonological environments; emphasis mine].” They claim that the “only evidence usually cited for this is drawn from OE metre, but this is inconclusive”. This translates simply into claiming that there is no positive evidence that compensatory lengthening had ever taken place in words of the *-{l,r}h* type. Therefore, there is little, if any, positive evidence that compensatory lengthening took place since neither placename evidence, nor metrical evidence, nor spelling

provide conclusive proof.

4.4.1.2 There can be no compensatory lengthening

Besides the lack of positive evidence in favour of the compensatory lengthening view, there is another difficulty with the assumed compensatory lengthening approach. It would require substantial evidence to show that such lengthening can ever take place in this context: it hardly ever happens that the loss of sound after a consonant results in the lengthening of the vowel *preceding* that same consonant. While lengthenings such as *nihht* > *ni:t* are expected and are frequently attested cross-linguistically, lengthening of a hypothetical *melh* > *me:l* type are suspect at the very least.

- (4.26) (a) nixt > ni:t
 (b) melxa > *me:la

(4.26a) is a typical case of compensatory lengthening, such as in the case of nasal loss before fricatives, treated in section 4.2 above. (4.26b), on the other hand, cannot trigger such lengthenings, most importantly because the two segments are not adjacent (see Huber 2007?).

While it is true that some processes like (4.26b) are indeed recorded in the literature, these are substantially different from the OE case, and they cannot be equated. Moreover, those are equally not cases of compensatory lengthening (see Huber 2007?). Beekes (1995:68), for example, cites a case for “compensatory lengthening” of exactly this type from Ionic Greek where there is lengthening before -Rw- (R= any resonant):

- (4.27a) **kalwos* > *kālós* (but Attic *kalós*) ‘beautiful’

The direct attribution of the long vowel /a:/ to the loss of /w/ would require further justification in my opinion. (A solution in terms of metathesis will be instantly proposed: *kalw-* > *kawl-*.) He cites (*ibid.*) other such lengthenings from Ancient Greek, where /e i u/ lengthens before -tj-, -nj-:

(.27b) *phtherioo > phtheiro (where <ei>= /e:/)

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 -/d.w/- syllable contact of *odwos could form, at least theoretically and cross-linguistically, a perfect onset cluster /.dw/-. In English #dw- can be initial: *dwarf*, *dwale*, *dwelling*, *dwindle* or *Dwight* (although Wells (2000) syllabifies intervocalic -/dw/- as *Ed.win*, *Ed.ward*). But the OE -l.h- cluster cannot be but a coda-onset cluster because of sonority considerations. In fact, it is remarkable that this possibility is not even raised in the discussion of the Greek data. Similarly, the -l.w- of *kalwos could well be a coda-onset cluster. 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 a glide cluster cannot be excluded. Exactly such developments are shown by Latin *sapiam* ‘so that I know’ > Gallego *saiba*, Spanish *saipa > *sepa*. Here, the -Cj-clusters simply underwent metathesis, either resulting in diphthongs or some other vocalic fusions. It is all too premature to exclude this possibility for Ancient Greek. However, no such analysis is readily available for the OE -l.h-, -r.h- sequences because even a -.hr- or -.hl- cluster could only be an onset cluster. Notice that the sonority relations between the contact consonants in Ionic Greek and OE are not the same: in Greek the glide forms a perfect coda for the following onset, while /h/ is not a legitimate coda before a more sonorous liquid. 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 since there is no positive evidence that it did and the process is theoretically suspect. Notice too that no generalization is lost by accepting this view.

4.4.1.3 OE adjectives with loss of /h/

Among adjectives, *heah* ‘high’ and *þweorh* ‘crooked’ present similar distributions:

(4.28a)		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
(4.28b)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

The same observations hold as for nouns above: there are two types, and they do not behave alike. Rather they behave like the corresponding noun groups. It can be observed that the paradigms above do not show a long vowel in forms where there is a consonant-initial inflectional suffix: before the genitive plural *-ra*, the feminine singular genitive–dative *-re* and the singular masculine accusative *-ne*. The *heah* type actually shows no lengthening since they happen to have a lexically long vowel (see (4.25a), too). Further 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 /-F-/: *rūwes*, *rūge*.)

The *þweorh* type, on the other hand, does not show such wide-spread lengthening for reasons just discussed for noun stems. Other examples are *gefearh* (nom.sing.fem, only form recorded) ‘pregnant (of the sow)’, *sceolh* (only weak inflections occur) ‘oblique’.

It will be recalled that there is one example for verbs where the process seems to have applied: *fēolan* (see section 4.3 above).

4.4.2 *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 (section 4.3). Here, another property of such 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–ð (> d), s–z (> r), x–F (or zero). Here are examples to illustrate *þ–ð* and *s–r* alternations in verbal paradigms:

(4.29) infinitive	3sg present	past sg	past plur	past participle
snīþan ‘to cut’	snīþþ	snāþ	snidon	sniden
lēasan ‘to lose’	lēast	lēas	luron	loren

Verner’s law affected, of course, the velars in the plural past and past participle forms of such verbs. Such verbs appear in class I, II, III, V, VI, VII of strong verbs; class IV could not show this phenomenon.

(4.30a) infinitive	3sg present	past sg	past plur	past participle
leon (I) ‘lend’	liehþ	lah	ligon	ligen
teon (I)	tiehþ	tah	tigon	tigen

‘accuse’ þeon (I)	þie h þ	þa h	þigon	þigen
‘prosper’ wreon (I)	wrie h þ	wra h	wrigon	wrigen
‘cover’ fleon (II)	flie h þ	flea h	flugon	flogen
‘flee’ teon (II)	tie h þ	tea h	tugon	togen
‘draw’ feolan (III)	-	fea h	fulgon	folgen
‘press on’ seon (V)	sie h þ	sea h	sawon	sewen
‘see’ lean (VI)	lie h þ	loh, log	logon	lagen
‘blame’ slean (VI)	slie h þ	sloh, slog	slogon	slagen, slægen
‘strike’ fon (VII)	feh þ	feng	fengon	fangen
‘seize’ hon (VII)	he h þ	heng	hengon	hangen
‘hang’				

The phonological history of these forms gives a proper summary of all the processes that have been discussed so far in this chapter: nasal loss, breaking and /x/ deletion. Consider the following examples:

(4.30b)OE infinitive form	OE past participle form	
*þiŋxan > þēon	*-ŋF > geþungen /-ŋg-/	‘to thrive’
*faŋxan > fōn	*-ŋF > gefangen /-ŋg-/	‘to take’

The history of their infinitives is the following. Loss of the nasal before */x/ resulted in compensatory lengthening: *-iŋx > *-ī:x > *-i:x, and *-aŋx > *-ā:x > *-ō:x > -o:x (note that *-uŋx, for irrelevant reasons, could not appear in this form of verbs). This nasal loss was followed by breaking in the case of the front vowel: *-i:x became -e:Ex (back vowels were not broken). In the infinitives, the /-e:Exan/ and /-o:xan/ sequences lost their intervocalic /x/ with concomitant vowel lengthening, properly called vowel contraction (/ -e:En/ and /-o:n/ had long

vowels before */x/ anyway).

The past plural and past participle forms illustrate the effect of Verner's law. The *x was voiced to /F/ because stress did not fall on the preceding syllable in these forms. Since it was voiced, it did not cause nasal deletion, nor breaking, and this led to the alternation in the paradigm. The past singular, as well as the third person singular present form, shows breaking of front vowels. Note the special changes in 'see': *seon* is from **sexan* < **sex^wan* where Verner's law produced -Fw- in the preterite plural and past participle forms, which became, regularly, -w- in OE, hence past forms *sawon*, *sewen*.)

4.5 The interaction of velar palatalization and umlaut (i-mutation)

There are two phonological processes that came to interact in OE: the palatalization of velars in the environment of front vowels, and umlaut (or *i*-mutation). Campbell writes (1959:173) about the first: "It was an outstanding feature of Prim. OE and Prim. OFrisian that the velar consonants *Z* and *k* developed sensitivity to the nature of vowels preceding and following them. This sensitivity began in the continental period of OE, but continued well after the conquest of England." This process is relevant for the present discussion because it illustrates well a crucial property of velars: their inclination for palatalization. Umlaut is important because it affected velars, uniquely among consonants, when they stood within the range of operation of the rule. This is a prime case where velars absorb the influence of neighbouring segments.

4.5.1 Velar palatalization

The velars became palatals before OE front vowels. The phonetic identity of such

palatals is debated. Campbell (1959:175) assumes a later OE assibilation which produced modern [tʃ], [dʒ], although [f] must have given [j] directly since even the earliest texts show identical spellings, with <Z>, for both *F and *j. Lass explains (1994:53) the impact palatalization had on the overall shape of English: “There was nothing at all (phonemically) in the palato-alveolar or palatal area except the approximant */j/ (...). In the transition to Old English a new series was created, occupying this previously empty region (...): the affricates /tʃ, dʒ/ and the fricative /ʃ/.” Examples for such initial palatalizations include: *cirice* ‘church’, *cidan* ‘to chide’, *ceorl* ‘churl’, *ceace* ‘cheek’, and *geard* ‘yard’ (Campbell 1959:173-174). In final and medial positions, Campbell (1959:174) writes, velars “were palatalized after OE front vowels, including those due to *i*-umlaut”. However, he does not support in detail why any of those front vowels that were not due to *i*-mutation could palatalize velars that followed. It is not frequent that palatalization spreads rightward (although: Latin *lacte-* > OSp *lejte* > Spanish *le/tʃe* ‘milk’; see Chapter 5). Not much hinges on this issue, fortunately: the point is that (at least) after front vowels which were indeed due to umlaut, velars were palatalized.

4.5.1.1 The palatalization of [k]

Since there are important differences between the actual outcomes of the palatalization of [k] and [g], it seems practical to demonstrate the process on the simpler case of [k], returning to [g] in the next section. As was illustrated above on a few examples, [k] palatalized in word-initial position under the influence of a following front vowel. Consider then the following cognates, where orthographic <ch> denotes /tʃ/ in English, and the velar fricatives /x, C/ in Modern High German (the fricative /C/ is taken to be velar because phonologically it seems to behave like a velar rather than a palatal):

(4.31) Modern English	Dutch	Modern High German
batch (from ‘to bake’)	gebak ‘cake’	(Gebäck ‘cake’)
ditch (<OE <i>dic</i>)	dijk	Deich, Teich ‘pond’
(be)see ch (see <i>seek</i>)	zoeken ‘search’	suchen ‘search’
reach	rijken	reichen
teach	tekenen ‘to draw’	zeichnen ‘to draw’
lych/lich (in <i>lychhouse</i>)	lijk ‘dead body’	Leiche ‘dead body’
-wich (as in <i>Norwich</i>)	wijk ‘district’	Weiche ‘side track’

The **-ian* ending of the verb or an ending **-e/i* of a noun both palatalized the velar and fronted the vowel of the stem – just as expected.

Obviously, subsequent history of the language altered this nice picture and there were a number of minor peculiarities and local differences as documents reveal (see, for instance, Campbell 1959:173-179 on variations). The case of the word *chalk* might demonstrate a possible variation on the theme. Taking the modern English pronunciation of the word, /tSO:k/ does not even suggest a velar origin for the initial consonant. Looking at words, however, of the *all*, *call*, *tall* type shows that the vowel had changed – from a front /æE/ type vowel – hence earlier /tSæEIk/. This vowel had been front already before i-mutation began to operate. The last velar in the string was not affected because it never stood before a front vowel of any kind. This “derivation” is supported in fact by cognates in other languages. In German there is *Kalk* ‘lime (for whitening)’, with the velar untouched; and the same stem hides behind Latin(ate) *calcium* which shows both an original velar word-initially and a palatalization of the Romance type for the second “velar” in the word. The German equivalent seems to be the most conservative in this respect preserving both velars. (Possibly a relatively late borrowing, it fails to show effects of the High German Consonant Shift which would have turned the final velar into /ç/.) The key to the *chalk*-story then is that there was indeed historically a palatal vowel following the initial velar which regularly palatalized it.

4.5.1.2 The palatalization of the stop allophone, [g]:

Let us now turn to the development of the other velar of Old English, /g/. To better understand the later developments of this phoneme a closer look has to be taken at its status within the phonological system of Old English. Cser (1996) argues that this phoneme had a stop realization only when geminate, [gg], and after a (homorganic) nasal, [ŋg]. Elsewhere, including word-initial positions and following a liquid, it was realized as the fricative [F]. Since this distribution is essential for the later divergent developments of this phoneme, another process, West Germanic Geminatio, which is more or less *contemporary* to i-mutation, has to be studied first. This important development of West Germanic languages doubled all consonants except /t/ when single and caught between a short vowel and yod. This accounts for forms like OE *settan* ‘to set’ (see Go *satjan*) where the stressed vowel /e/ is short and the stop was followed by a non-syllabic yod, which palatalized the back vowel still present in Gothic. When a consonant was part of a consonant cluster as in OE *wendan* ‘turn’ (Go *wendjan*) or preceded by a long vowel as in OE *sēčan* ‘seek’ (Go *sōkjan*), no gemination is observed and yod is also lost after it has palatalized the vowel wherever it could. Not only did this development have an impact on morphological paradigms (see the Go and OE paradigms for ‘hide’ in (4.37) below with geminate /l/ in OE, but not in Go), but it naturally included velar /k/ and /g/ (and /x/, too). If reflexes of two Old English words are considered, the influence of this gemination on the fate of these consonants is easy to see: *bitch* from OE *bicce* and *bridge* from OE *brycg* with long affricates. However, *tick* (the insect) from OE *ticca* (see MoHG *Zecke*) does not show palatalization since the geminate velar is followed by back /a/. All in all, gemination created input to the affrication of geminate velars.

4.5.1.3 The gliding of OE [F]

The fricative [F] behaved differently – not in the least in parallel with the stops. It is here to be added that Campbell also notes (1959:178) that the palatalization of /x/, long and short alike, is assumed to be parallel to the single [F]. Consider the following cognates where the first group is there for comparison (Dutch <g> and <ch> both stand for the voiceless velar fricative /x/):

(4.32)	English	Dutch	German
<i>geminate:</i>	bridge edge midge ridge	brug eg, egge mug rug	Brücke Ecke Mücke Rücken
<i>[+front] __:</i>	day eye hail nail play rain sail say way	dag oog hagel nagel plegen ‘care for’ regen zegel zeggen weg	Tag Auge Hagel Nagel pflegen ‘ <i>ident.</i> ’ Regen Segel sagen Weg
	fight light might ‘power’ sight	vechten licht macht ‘power’ zicht	fechten licht Macht ‘ <i>ident.</i> ’ Sicht
<i>[-front] __:</i>	bow ‘arch’ draw follow furrow maw (of a bird) (to)morrow	boog dragen volgen vurg (<i>dial</i>) magen ‘stomack’ morgen	Bogen tragen folgen Furche Mag ‘ <i>ident.</i> ’ morgen

	saw (of ‘to see’)	zag	(sah)
	sorrow	zorg	Sorge
	sow ‘female pig’	zeug	(Sau)
	swallow (verb)	zwelgen	schwelgen ‘to wallow in’
	willow	wilg	Wilge
#__:	plough	ploeg	Pflug
	yawn	geeuwen	gähnen
	yearn	gaarn(e)	gern
	yellow	geel	gelb
	yester(day)	gisteren	gestern
	yield	gelden ‘to be valid’	gelten ‘ident.’

Developments to a glide, [j w], are observed in the case of English, which glides became part of a diphthong. Word-initially and following a front vowel as well as a liquid /l r/ (note that the vowel of Modern English *say* /sei/ is front), it became a palatal glide /j/, while after a back vowel it became eventually a labial (labio-velar) glide /w/, both of which came to form part of a diphthong in Middle English (see section 4.8 on ME changes).

This process of palatalization had important morphological effects on Old English. On the one hand, it is quite manifest in the paradigms of nouns, adjectives and verbs where velars happened to be in just the right position to become palatals. Take the noun *dæg* (modern E *day*) as an example (<g> after [æ] was pronounced /j/!):

(4.33)	Sg	Pl
Nom	dæg	dagas
Acc	dæg	dagas
Gen	dæges	daga
Dat	dæge	dagum

There are palatals all through the singular paradigm, whereas velars come in the plural. The palatalization is exceptionally overt in the paradigm of the verb *secgan* ‘say’ (similarly in *licgan* ‘lie’, *lecgan* ‘lay’ and *hycgan* ‘think’), showing palatalization both to the glide and to the (long) affricate, and no velar forms are preserved in the whole paradigm (from Cser 1996:5):

(4.34) Present tense paradigm of *secgan*

1	secge		
Sg 2	sægst	Pl	secgað
3	sægð		

Note that the modern forms obviously do not come from the form with the affricate, but from the third person singular stem.

Further, palatalization resulted in alternations between a palatal affricate and a velar fricative /x/ in the past tense and past participle forms of some verbs (Mitchell and Robinson 1992:49, where OE <h> represents /x/):

(4.35) Old English

Modern English

sēcan	sōhte	sōht	seek	sought	sought
þencan	þohte	þoht	think	thought	thought
bycgan	bohte	boht	buy	bought	bought
wyrcan	worhte	worht	work	(regular paradigm, but see earlier <i>wrought</i>)	
brengan	brohte	broht	bring	brought	brought

On the other hand, it resulted in a number of cognate words that differ in meaning and this difference is carried by the difference in the velar–palatal opposition:

(4.36) **drink – drench**
stink – stench
milk – milch

bake – batch
make – match
stick – stich

A few interesting cases of morphological impacts are yet to be mentioned. One of the most important consequences of this change was the palatalization and later disappearance of the West Germanic perfective prefix *ge-*, still preserved in Dutch and German. The vowel of the prefix turned the voiced velar glide into a palatal glide. Being unstressed, the */je-/ string simplified through an *i/j* variant to an unaccented schwa which was ultimately lost altogether. Middle English forms like *y-clad* ‘dressed, clothed’ bear witness to this change. Traces of it might be seen in words like *enough*, which regularly corresponds to D *genoeg* and MoHG *genug*. Similarly, the modern English adjectival ending *-y* as in *sun–sunny*, *wind–*

windy is also the same, historically speaking, as *-ig* in Dutch and German: D *zon–zonnig*, *wind–windig* (with /x/) and MoHG *Sonne–sonnig*, *Wind–windig* (with /ç/). The English development of what has become modern *-ly* is “irregular”, just like the first person singular pronoun *I*, since they should have come down as */-litS/ and */itS/. They correspond to D *-lijk* and MoHG *-lich* and D *ik*, MoHG *ich*, which do suggest a voiceless velar stop origin. Since these two endings, *-y* and *-ly*, are sometimes hard to tell apart in the modern language, their counterparts in Dutch and German might help reveal ambiguities. For instance, is the word *fully* to be analyzed as *full + ly* or *full + y*? Both the pronunciation /fUli/ with a single /l/ and its cognates D *vollig*/**vollijk* and MoHG *völlig*/**völlich* favour the second analysis: *full + -y* rather than *full + -ly*.

4.5.2 Umlaut (*i-mutation*): the process

The other process, *i-mutation*, is common to all the Germanic languages (except Gothic) even if there are major differences as regards its spread across the lexicon and its morphological repercussions in the paradigms of the individual languages. I-mutation can be simply described as the fronting of a back vowel when there is /i/, or its non-syllabic counterpart, /j/, in the following syllable. It is a kind of vowel harmony where the unstressed vowel /i/, or its non-syllabic counterpart /j/, affects a vowel earlier in the string. The mechanism is well illustrated historically in Germanic by taking the Gothic and the Old English paradigms of the same verb ‘hide’ (customized from Lass 1994:34) in the present tense form (with /j/ still present in Gothic as a stem forming suffix before the vowel of the infinitive ending) and the preterite tense form (with /i/ in Gothic):

(4.37) Gothic (no i-mutation)

Old English (i-mutation)

	<i>huljan</i>		<i>hyllan</i>	
	present	preterite	present	preterite
1	hul-ja	hul-i-da	hyll-e	hyl-e-de
SG 2	hul-ji-s	hul-i-dest	hyl-(e)-st	hyl-e-dest
3	hul-jid	hul-i-da	hyl-(e)-đ	hyl-e-de

PL hul-j-and hul-i-dedun hyll-ađ hyl-e-don

This process of i-mutation is responsible for some of the irregular plurals of present-day English as in *mouse–mice*, *goose–geese*, where the plural form shows the mutated vowel (later developments could blur this picture, typically by levelling the alternation).

4.5.3 *The impact of i-mutation on intervening velars*

I-mutation had a peculiar effect in Old English (and Old Frisian), where it palatalized velar /k/ and /F/ which fell within the range of the rule. What is noteworthy about it in the present dissertation is that the other consonants were not affected. Although Campbell (1959:176) cites *gefecan* ‘to fetch’ < **fetjan*, and the compounds *orceard*, *ordceard* ‘orchard’ for *ord-giard*, and *micgern* ‘fat’ < **mid-gern*, as instances of sporadic influence on other consonants, these are obviously in minority, and do not constitute evidence that dentals were regularly affected.

This process is then peculiar because /i j/ palatalized velars to the exclusion of coronals (or dentals) such as /t/, /d/ or /s/. This situation is interesting because dentals are claimed to be more prone to such palatalization in a number of languages, and they did palatalize even in the later history of English itself: *na/tS/ure*, *gra/dZ/ual*, *mi/S/ion* (more on these in Chapter 8). The interaction of velar palatalization and umlaut introduced considerable allomorphy in paradigms. Consider strong nouns that are affected by regular i-mutation:

(4.38) Paradigm for *bōc* / *bēc* ‘book sg/pl’:

	Sg	Pl
Nom	bōc [k]	bēc [tS]
Acc	bōc [k]	bēc [tS]
Gen	bēc [tS], bōce [k]	bōca [k]
Dat	bēc [tS]	bōcum [k]

The word-final environment in the data above is not the only possibility where a (voiceless) velar stop might “strengthen” into a palatal affricate. A word of caution here, though: The examples above involve forms where the sounds concerned are word-final in OE, but they were in fact word-medial in Primitive Old English, followed by an **-i* in the dative singular ending, for instance.

Word-initially the picture is seemingly more diverse. Here the domain of the harmony comes to play a crucial role. Lass (1994:55) illustrates this situation with the following examples (orthographic <c> stands both for the OE palatal and the velar sound, but modern spellings and pronunciation help tell them apart):

(4.39) <i>palatalization:</i>	cinn ‘ chin ’	see MoHG Kinn
	cild ‘ child ’	see Go kilðei ‘womb’
	ceosan ‘ choose ’	see D kiesen
<i>no palatalization:</i>	Cent ‘ Kent ’	<Latin Cantia
	cene ‘ keen ’	see OHG kuoni
	cylen ‘ kiln ’	<Latin culina
	cyssan ‘ kiss ’	see OS kussian and MoHG küssen

The problem here is that in certain cases there is a palatal consonant before a palatal vowel, which is what is expected; in the other set of data, however, there is no palatalization of the consonant although it stands before a palatal vowel. The key to this discrepancy is straightforward when the origin of the vowels is examined. An originally palatal vowel triggered the palatalization of the velar even if it had no actual target *vowel* before the word-initial velar to front. The vowel of *chin* had long been palatal, and it palatalized a preceding segment. This is velar palatalization. In this example, it was only the velar consonant that such a vowel could palatalize, there being no other vowel before it in the stem. This also implies that when the originally palatal vowel came after a single non-velar consonant word-initially, it could not palatalize anything. In the other set of lexical items, the velar stood before an originally back vowel. It is crucial that when this vowel was palatalized, it could not palatalize the velar preceding it. No

palatalized vowel had the potential to further palatalize a velar before it, which simply means that there were velars left that kept on standing before a front vowel without any interference whatsoever between them. It has to be noted at the same time that all this reorganization did not affect the distribution of the velar stop since there still remained words that were not affected by i-mutation anyway and were thus left unchanged, for instance *wicu* ‘week’ with a velar all through its history (Du *week* and MoHG *Woche*) or *cu* ‘cow’ (Du *koe* and MoHG *Kuh*).

The change can be described by a rule:

$$(4.40a) \quad \begin{array}{ccc} \text{V} & \text{k} & \text{i} \\ [-\text{palat}] & [+ \text{palat}] & \end{array} > \begin{array}{ccc} \text{V} & \text{k}'/\text{tS} & (\text{i}/\text{j}) \\ [+ \text{palat}] & & \end{array}$$

In government phonology, the following can be a representation of the interaction of the two processes:

$$(4.40b) \quad /k/ \quad /i/ > /k'/ \quad > \quad /tS/ \quad (\text{i}/\text{j})$$

$$\begin{array}{ccc} | << \text{I} & & \text{I} & & \underline{\text{I}} \\ | & & & & \\ ? & & ? & & ? \\ | & & | & & \\ \text{h} & & \text{h} & & \text{h} \end{array}$$

4.6 The development of [sx]-, -[sx], [sk]- and -[sk] clusters

4.6.1 Changes to [xs] clusters

Germanic /xs/ clusters show a split in their behaviour in Old English (and Old Frisian): /xs/ > [ks] and /xs/ > [s], depending on the environment. When a vowel, a syllabic consonant (*l* and *n* typically) or word-boundary followed the cluster, the velar fricative became stop /k/, [xs] > [ks], as their modern reflexes show. Recall

that the strengthening to [k] must have taken place relatively late, definitely after the original [x] had broken the preceding front vowels as Campbell (1959:170) points out. Examples for the strengthening are, with traces of earlier breaking of [x] in *weaxan* and *Seaxe*:

(4.41) Development of [xs] > [ks] (represented by <x>)

<i>word-finally:</i>	feax	‘hair’
	fox	‘fox’
	meox	‘manure’
	siex	‘six’
<i>before a vowel:</i>	līxan	‘to shine’
	oxa	‘ox’
	Seaxe	‘the Saxons’
	weaxan	‘to wax, to grow’
<i>before a syllabic C:</i>	ōxn	‘armpit’
	gewrixl > wrixlan	‘to change’ (see MoHG <i>wechseln</i> and D <i>wisselen</i>)

It must have been operative in lexicalized compound nouns, as *weocsteall* ‘altar-piece’ from **weoh-steall* suggests.

However, when the cluster was followed by a non-syllabic consonant, such as /t/, the velar fricative is lost, [xs] > [s]. Examples for the loss of /x/ include:

(4.42) Development of [xs]+C > [s]+C

wæstm	‘fruit’ (see MoHG <i>Wachstum</i> ‘growth’)
-wæsma	‘growth’
(both related to <i>weaxan</i> ‘to grow’)	

This could occasionally introduce variation, which goes back to an earlier allomorphy. This is illustrated by *ðixl* ‘axle’, where *ðixl–ðisl* goes back to a paradigmatic alternation: *ðixl–ðisle*.

It is worth pointing out that in the other West Germanic languages the /xs/ cluster developed in a uniform manner both before vowels and before sonorants, either the velar fricative was lost as in Old Saxon (modern Dutch forms can be

compared), or they remained unaltered for a longer time, and only later did they turn into [ks] as in Modern High German, where spelling still suggests a long-lasting original fricative cluster /xs/. To summarize and better highlight these processes, compare the cognate items below (meanings remained basically the same, so that no glosses are given, although modern equivalents for English have been supplied for clarity's sake):

(4.43) Old English	gloss	Dutch	Modern High German
ax	'axle, axis'	as	Achse
fox	'fox'	vos	Fuchs
oxa	'ox'	os	Ochse
siex	'six'	zes	sechs
weaxan	'to wax, to grow'	wassen	wachsen
wrixlan	'to change'	wisselen	wechseln

Campbell (1959:171) states that [fs] clusters also show strengthening to [ps], as evidenced by Épinal and Corpus *waef̥s* > later *wæps* 'wasp'. This strengthening is exactly parallel to the [xs] > [ks] change. In this respect, both groups behave the same. However, there is no evidence that [fs] clusters can be simplified similarly to the [xs] > [s] change above. This further shows that the velar cluster is more prone to reduction.

4.6.2 #sk- and -sk# clusters

The palatalization of /sk/ clusters in Old English merits attention especially when compared to the treatment of this cluster in the other West Germanic languages. According to Campbell (1959:177): "Initially it was probably palatalized before front vowels only, but at least before 900 it was palatalized before back vowels and their umlauts also." This was clearly analogical. Later, a palatal /S/ appears before /r/ as well: *scread* 'shred', *scrifan* 'decree' (see D *schrijven*, MoHG *schreiben* 'write'). Word-medially as well as word-finally palatalization occurred,

which is then a far broader environment than in the case of the palatalization of /k/ and /g/. In all likelihood, the first step was the reduction of the velar through a fricative /x/ towards the palatal glide /j/, which in its turn palatalized the sibilant fricative to /S/, and the glide itself is never preserved. Bright's reader (Cassidy and Ringler 1974:20, N12) has exactly this likely sequence:

(4.44) [sk > skj > sxj > sj > S]

A comparison with the other West Germanic dialects reveals the same development in German but a divergent development in Dutch. On the one hand, there is a merger in Dutch with the reflexes of /xs/ treated in (7.43) above, while on the other hand, the retention of "intermediate" /sx/ clusters (orthographic <sch>) is also observed word-initially:

(4.45) English	German	Dutch
/S/	/S/	/s/
ash	Asche	as
fish	Fisch	vis
wash	waschen	wassen
wish (<OE <i>wyscan</i>)	wünschen	wensen
?	(aus) wischen 'to wipe out'	(uit) wissen
/S/	/S/	/sx/
ship	Schiff	schip
† shrive	schreiben 'write'	schrijven
shine	scheinen	schijnen
shoe	Schuh	schoen
show	schauen 'to look, stare'	schouwburg 'theatre'

The merger is rather overt in the case of *as* and *wassen* in Dutch, items which are systematically kept apart both in English and German by /sk/ as opposed to /S/.

4.7 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, specifically in initial positions, and Hogg (1992:94) treats [hn-, hl-, hr-, hw-] as containing the [h] allophone of /xn-, xl-, xr-, xw-/.

Clusters were formed with any of the obstruents, just like in modern English: *fram* ‘from’, *fleax* ‘flax’, *dropa* ‘drop’, *smæc* ‘smack, taste’, *smiþ* ‘smith’, as well as a few more exotic ones like /fn/ in *fnora* ‘sneezing’, *fnæs* ‘fringe’, *fnæd* ‘border, hem, fringe’. The clusters with a velar obstruent were a combination of /k g x/ followed by one of the liquids /l r/, the glide /w/, or the nasal /n/. What is noteworthy is that the velar clusters were systematically eliminated in the course of time. The following table gives the clusters as well as their later developments.

(4.46) 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
/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 with the plain sonorants, and spellings without <h> are found already by the Middle English period. Notice, however, that <hw> has been retained as <wh> in modern English (and

even in the pronunciation in certain varieties). It is interesting that the stops, /k/ and /g/, are retained in /kl-, gl-, kr-, gr-, kw-/ clusters, and modern spelling has preserved the trace even of OE <cn-> and <gn-> as in *knee* or *gnat*. Middle English spellings with *kn-* and *gn-* show that they were still pronounced at that time, while OE <hn hl hr> did not survive as shown by the fact that in ME they are spelt with <n l r>. The retention of /gC-/ in parallel to /kC-/ indicates, of course, that the voiced velar fricative /ʒ/ had already become a stop [g] in this environment as early as OE. Other initial clusters, such as #pl-, #bl-, #fl-, #pr-, #sl-, #sm-, #sn-, etc, have been retained until the present day. While the velar 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 /x/ was the same as in OE, and they also disappeared even from the spelling, but the stops /k g/ are still pronounced even in /kn- gn-/ clusters.

The development of the initial OE /xw/ cluster is interesting because of a small regularity. OE 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, modern forms like *how* [hau] and *who* [hu:] preserve the etymological velar as a glottal [h]. These forms are not quite as exceptional or accidental phonologically as they seem, 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 had been a change **hwo* > *hu*: by the first written records in OE, with loss of the labial secondary articulation of the original **xw-* (< IE **k^{w-}*) 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-*. This is shown

in OE by variants like *cwudu* – *cudu* ‘cud’ (Campbell 1959:188). This development is all the more likely since OE *tū* ‘two’ had the same change: **tuo* > OE *tū* > [tu:] *two* (Campbell 1959: 47).

Now it seems 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, which is not quite regular because it should have become an open vowel, [O:]: its raising was probably due to the preceding /w/. At this stage, **hwo:* could change to *ho:*, with loss of the secondary articulation. Then this form, /ho:/, regularly became the modern form [hu:] by the Great Vowel Shift. Alternatively, the /w/ was lost only after the GVS had produced /u:/: *hwo:* > *hwu:* then > *hu:*. An additional example for the loss of secondary labial articulation may be seen in a poetic form, OE *hwōpan* ‘to threaten’, which may be the ancestor of modern *whoop* ‘to give a loud cry of joy or excitement’. This would certainly explain why it has two modern pronunciations: /wu:p/ and /hu:p/. Possibly the alternative forms /}h5;tlberi/ and /}w5;tlberi/, spelt *hurtleberry* and *whortleberry*, also find explanation in this process.

4.8 An outlook on Middle English

Wardale (1937) is a useful summary of the relevant processes in Middle English. The single most important change concerning the velar fricatives was their vocalization. Wardale points at the beginnings of this process in Old English: spellings like *weig* ‘way’ or *daig* ‘day’ appear in Ælfric, and *peignes* ‘thanes’ in the Charters (1937:53). Middle English has wide-spread diphthongization of OE [ɣ] (see Brunner 1965:18-23 for more examples):

(4.47)	OE	læg	>	ME	lai	lay
		sægde	>		saide	said
		legde	>		leide	laid
		wegan	>		weien	move, weigh anchor

The change, as shown by the earliest OE data, started after front vowels, to be followed by back vowels in Middle English (1937:54):

(4.48)	OE	dagas	>	ME	dawes	days
		boga	>		bowe	bow
		fugol	>		fowel, foul	fowl

All this resulted in the eventual loss of [F] altogether.

It was, however, in Middle English that vowels came to change before /h/ as well, again with a glide <i, u> appearing in the spellings. This is illustrated by ME forms such as (1937:54):

(4.49)	OE	eahta	>	ME	eihte	eight
		seah	>		sauh	saw
		bohte	>		bouhte	bought
		læhte	>		lauhte	seized

and vacuously also in

(4.50)	OE	miht	>	ME	mīht	might, power
		ḍūhte	>		thouhte	thought

The loss of OE initial <hl, hn, hr> clusters was already pointed out. Wardale mentions the varied development of the OE internal and final *-h, -ht*. In the south they were weakened (eventually vocalized) as indicated by spellings such as <g>, <gh> and <gt>, <-ght>. In the north they were preserved and spelt <ch> (like in German today), while “in other parts of the country” they became /f/ (1937:59). Unfortunately, he does not expand on what parts of the country are involved, but it is an apparently dialectal situation then. Brunner (1965:43) only mentions that isolated 15th century forms attest the change.

As for the morphological alternations in the verbal paradigms, the OE palatal forms seem to have been generalized to all forms. For instance OE *gielðan* [j-], *geald* [j-], *guldon* [g-], *golden* [g-] gave *y*-spellings both for *yēlden* and *yōlden*, similarly in OE *cēosan* [tS-], *cēas* [tS-], *curon* [k-], *coren* [k-] gave past participle *chosen* (1937:108-9). Also, an analogical infinitive *fangen* for OE *fōn*

appears, with the consonant of the preterite and past participle, as in (4.30b).

4.9 Conclusions and the chronology of the changes

This chapter reviewed all major 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 the 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 is rather a simple [ə]. It was also proposed that breaking must have happened before this gemination, otherwise it is difficult to explain why *sellan* and *tellan*, from *-lj-, do not show breaking. As for the loss of /x/ between sonorants, it was argued that, for a certain well-defined class of words, the traditional analysis assuming compensatory lengthening is unwarranted because there is no positive evidence that compensatory lengthening took place in words of the *-{l,r}h* type. As far as OE /hw/ clusters are concerned, a possible explanation was offered for why there is a difference in the later development of *what*, *when*, *wheel* as opposed to *who*. The role of the following labial vowel was pointed out.

The chronology of the processes treated in this chapter is the following. The loss of nasals was a very early change, loss before /x/ is common to all Germanic languages. Breaking is already attested in the earliest documents in OE. Loss of /x/ must have taken place after breaking since often the only trace of an

original /x/ in a given form is the presence of a broken vowel. I-mutation must be the latest, crucially after breaking, since it produces mutated broken vowels.

Chapter 5

Velar changes in Romance languages

5.1 Introduction: some general Western Romance changes

Romance languages are conveniently divided into three groups: Western Romance, Eastern Romance and Sardinian (and Old Corsican) (see for instance Tamás 1978:25). With respect to velar processes, Sardinian and Eastern Romance are theoretically interesting for preserving rather than changing Latin velars. However, the changes to velars in Western Romance are more important for the present discussion exactly because they show changes often different from those affecting dentals. In particular, it will be established that velars are more prone to vocalizations, strengthenings and palatalizations than dentals. The history of Western Romance languages on the Iberian Peninsula and in Gallo-Romance (French in particular) shows remarkably complex but well-documented

consonantal developments. Some of these changes are shared by most Western Romance varieties. Two of them are discussed by way of introduction, before moving on to a more detailed description of Iberian Romance (especially Spanish and Galician) and French, respectively.

The focus in this chapter, nevertheless, will be on changes in which velars played a crucial role, either as triggers or as the results of the respective changes. The lenitions observed help illustrate on the one hand how velar stops decompose into glides (/j/ or /w/), and on the other how the last step on the lenition trajectory of palatal /S/ is the velar fricative /x/. In section 5.2, we take a closer look at these two phenomena in particular, which are otherwise well documented in the literature on Romance languages (see Menéndez-Pidal 1989, Lapesa 1981, Alvar-Pottier 1983 and Penny 1993, Tamás 1978, Herman 2003).

There is one particular change which is not treated here, because in Chapter 8 more space will be devoted to its presentation: the palatalization of velar stops. Also, it will be borne in mind that all the languages discussed here show re-borrowings or analogical reorganizations to varying degree, mainly through the influence of the written form of Latin, which contributed significantly to the revival of original clusters.

5.1.1 *Western Romance lenition*

The first change is the chain development that affected Latin (voiceless) geminate, single voiceless and single voiced obstruents (only stops are presented; a minus sign below indicates the change to zero):

(5.1)	Latin	*WR	Spanish	French				
(a)	degemination							
	pp	cuppa	‘cup’	*p	p	copa	p	coupe
	tt	gutta	‘drop’	*t	t	gota	t	goutte
	kk	vacca	‘cow’	*k	k	vaca	k > S	vache
	kk ^w	eccu	(h)ic ‘here’	*k ^w	kw	aquí	k > s	(ici)

(b) intervocalic voicing

p	ripa, riparia ‘bank’	*b	B	ri[B]era	v	rive
t	rota ‘wheel’	*d	D	rue[D]a		-
	roue					
k	spica ‘ear or corn’	*g	F	espi[F]a	-	épi
k ^w	aqua ‘water’	*g ^w	F	a[F]ua	-	eau

(c) intervocalic spirantization

b	caballu ‘horse’	*B	B	ca[B]allo	v	cheval
d	nuda ‘naked’	*D	D	nu[D]a		-
	nue			Ga nua		
g	sagitta ‘arrowhead’	*F	-	saeta	-	?
				Ga seta		

Geminate consonants, (5.1a), not so surprisingly, did not occur initially in Latin, not even in a “radoppiamento sintattico”-style sandhi phenomenon. These degeminated in all WR. Initial single voiceless stops remained /p t k/ in both Iberian Romance and French, but they became voiced medially, (5.1b). The voiced initial stops were retained as /b d g/ in WR, but they spirantized medially, (5.1c). Later, the individual WR varieties tended to merge especially the WR *[b d g g^w] and *[B D F] sets. The patterns of these mergers are interesting for a discussion on velars.

In Spanish, WR *[b d g] and *[B D F] came to stand in sandhi allophony between [b d g] and [B D F] in initial positions: fricative allophones appear intervocalically, stop allophones elsewhere. However, they merged in medial position invariably to [B D F]. Notice at the same time that in Castilian, WR medial *[F] is vocalized and it disappeared, and it seems WR *[D] is only retained before back vowels: L *nuda* > nu[D]a ‘naked; fem.’, but L *pedem* > *pie*

‘foot’. In Galician, WR *[D F] both disappeared medially before any vowel, hence L *nuda* > *nua* ‘naked; fem.’. Both the Castilian and Galician vocalizations must have occurred before the merger of WR *[B D F] and *[b d g] medially, since modern [F] in these varieties can only come from WR *[g] < Latin /k/. Merger happens really only between WR *[B D] and *[b d] in Spanish, and only between WR *[B] and *[b] in Galician. In French the WR reflexes of all medial non-geminates disappeared, only /v/, either from medial Latin /p/ or from /b/, is retained. From the point of view of this dissertation, it is crucial that, across WR, it is the voiced velar fricative [F] which is *uniformly deleted*. The fricative [D] is also deleted in most varieties, but this may depend on the following vowel, as in Castilian. Reflexes of *[B] are the most stable. This underlines an important point in the dissertation: the velar fricative is the least stable, the first to be deleted (followed closely by the dental, to be fair). Another point to be noted here about the change at the WR stage is that all places of articulation were affected alike in the beginning. Namely, it was a change in manner of articulation and voicing – further details are not relevant here.

5.1.2 *The velar fortition of [w]*

The second change general in WR is related to the borrowing of a large number of Germanic words beginning with /w/, after 409 Common Era on the Iberian Peninsula (Lapesa 1981:111). Such words from Spanish had already been cited in chapter 3 (3.17-21). To illustrate the currency of these items, Lapesa notes (1981:115) that in the Spanish of the 12th and 13th centuries *guisa* ‘way’ (see English –*wise*) was productively used to form compound adverbs like *fiera guisa* (for modern Spanish *fieramente*) ‘fiercely’. The tendency to avoid initial /w/

+vowel sequences must have been a very stable phonotactic constraint since even diphthongs of the /we/-type which were created much later also have /gw/ as in Leonese and Aragonese *güeyo*, *güello* ‘eye’, for Castilian *ojo* without a diphthong (Lapesa 1981:127). (And recall that it is still operative at least for /wa/ even in contemporary Spanish.) In Galician territory Germanic names in [w] appear in forms like *Guimara* (< *Vimara*) from 941 and 977, when *Guistrarici* or *Guistrarit* (< *Vistrarius*) are attested in documents in the monastery of Xubia (Mariño Paz 1999:88). French examples include names like *Guillaume–William*, *Gaultier–Walter*, and probably *Guido*, *Gilles* as well as the following words (where generally modern Germanic cognates are given rather than reconstructed Gmc forms for comparison):

(5.2)	<i>guêpe</i>	E wasp
	<i>querre</i>	E war
	<i>gant</i>	Du want
	<i>galloper</i>	< *wali lopen ‘well walk/leap’
	<i>garantie</i>	warrant
	<i>garde</i>	E ward
	<i>guise</i>	E -wise

The velar fortition of /w/ was probably motivated by phonotactic restrictions since by this time Western Romance had turned Latin [w] to [B] (Herman 2003:38 dates “the loss of the velar component” by the end of the Republic Era). French is interesting, though, since there are some [g] reflexes even of Latin [w], probably indicating that in this area [w] remained (much) longer to undergo the fortition to [gw]: *gué* ‘ford’ < *vadum* (Spanish *vado*), *guéret* ‘fallow land’ < *vervactum* (Sp *barbecho*), *Gascogne* < *Vasconiam*. But the majority of Latin words developed to WR *[B] in French as expected, and as in Iberian Romance. This [B] coincided with WR reflexes of medial Latin /b/ and /p/, whatever they became in the individual languages: Latin *vota* (originally the plural of *votum*) ‘vows, obligations’ > Sp [b]oda ‘marriage’ and *su* [B]oda ‘his marriage’, L *votum* > French [v]œu ‘vow, wish’. This left no [w]+vowel

sequences initially in Proto-Western Romance (but for the few French words noted above). It was against this background that Germanic words with initial [w] + V began to appear, where any of the Germanic vowels could theoretically appear.

The appearance of [g] can be explained as the fortition (“promotion”) of the velarity of the labiovelar glide [w]. In fact, it seems that the [w] > [g^w] change is a general option in initial position across Romance, and not only in Western Romance since it is also attested in Dalmatian (where there were no Germanic words to accommodate in the system): when Latin /o/ diphthongized, the realization is [gwa] in initial position, as in L *octo* ‘eight’ > Dalmatian *guapto*. In terms of this discussion, [w] to [g^w] can be seen as the minimal change necessary to make [w] more consonant-like, that is without adding any place specification to it: only an empty skeletal position is attached initially. Nevertheless, the reason why the new [w] from Germanic did not develop to [B] and then to [b/B] in Iberian Romance and [v] in French is hard to capture. To explain away the situation, it can be assumed that late Latin had [V] and Germanic had [w], so that they were not in fact identical phonetically, and this difference is responsible for the divergent development. This is clearly not a satisfactory explanation, especially since authors generally agree that Latin had [w], never a [V] (for instance, Herman 2003:38). Nonetheless, the reflexes of the two sounds did not merge in Iberian Romance and only a handful of words did in French. There is a further important feature of this strengthening and at least one proposal must be refuted: the resulting [gwV] sequence, contrary to first impressions, does not create a structure that is well-formed in Latin (not even in Vulgar Latin) since Latin had no [gwV] in initial position. It actually created a structure that had not been before. In other words, it cannot be argued that this fortition occurred in order to assimilate these new words into the existing system.

5.2 The adventures of Don Qui[x]ote – velar developments on the Iberian Peninsula

5.2.1 Palatalization of initial #pl-, #fl- and #kl- clusters

One of the most important changes in the history of Iberian Romance languages, excluding Catalan, was the early palatalization of initial #pl-, #fl- and #kl- clusters. That all major places were affected in a like manner is also true of another change: the changes to initial, and especially medial C+l clusters (for similar processes in Tai languages and a detailed analysis of the Romance patterns, see Huber 2006c). These clusters palatalized, but the relevant point is that some regularly gave velar /x/ in Castilian, this is why it is discussed here. These comprise all the clusters in the languages starting with a voiceless obstruent followed by /l/. (In Latin, /tl/ clusters were excluded from initial positions.) There are two reflexes in Iberian Romance: in Spanish they became palatal /ç/, in Galego-Portuguese /tʃ/ is found, which is still seen in Galician, although in Portuguese it turned later into /ʃ/. The reflexes are illustrated in the data below:

(5.3)	Latin	Catalan	Italian	Spanish	Galician
	plenu	ple	pieno	lleno	cheo ‘full’
	clave	clau	chiave	llave	chave ‘key’
	flamma	flama	fiamma	llama	chama ‘flame’

Note that while Catalan preserved all the clusters, in Italian the lateral /l/ was weakened (lenited) to a palatal glide /j/ (the Italian digraph <ch> represents /k/). On the Peninsula, however, neutralization of the contrast among the initial consonants is observed. Moreover, these clusters all neutralize in palatals which seems to be a case of these segments getting more complex, by absorbing palatality. Probably it is not far from an adequate account for the choice between /

ϕ / and /tS/ to stipulate that, phonologically speaking, they differ only in voicing. If so, then Spanish came up with a voiced reflex, possibly from the /l/ component of the cluster, while in Galician (and in Portuguese as well) a voiceless reflex is found, possibly from the voiceless stop. This step is, however, problematic because it suggests two disparate processes: in one the /l/ is simply palatalized and that's that, while in the other an Italian type process came to fruition through letting the glide palatalize the stop. Still, the unique output in all three cases is remarkable and there seems to be little explanation for the palatalization of /p/ and /f/ either to /tS/ or / ϕ /. The simple palatalization in Spanish is also supported by the early (roughly contemporary) parallel palatalization of Latin -ll- /l:/ to / ϕ /, where Galician–Portuguese has simplex /l/ (L *gallu* > Sp *gallo*, but Ga *galo*). In this way Spanish neutralization in / ϕ / was rather pervasive.

In the Iberian Romance palatalizations, the majority of items that have the palatal reflexes of Latin clusters go back to a labial cluster rather than velar clusters. In Huber (2006c), it was pointed out that although any vowel could follow Latin *pl*-, *cl*- and *fl*-clusters, front and back, high and low, yet, the relative underrepresentation of palatal vowels in the reflexes is all too conspicuous: only Spanish and Galician pairs like *llegar* – *chegar* ‘arrive’ and *lleno* – *cheo* ‘full’ as well as exclusively Galician *chepa* ‘a species of fish’ and *cheda* are found before front vowels. Also, a brief and non-representative search for relevant clusters in Latin resulted in the following observation: back vowels do indeed dominate for all these clusters. Moreover, /a/ is the most frequent vowel following these clusters, it appears in (slightly more than) half of the roots. Latin initial C+l clusters had then a somewhat special phonotactic pattern: back vowels significantly predominated in these clusters (in 72.5%) and the most frequent (one third of) such cluster was /pl/. The Iberian Romance patterns, that /pl/ is most frequent and that back vowels follow in such words, do not seem to be accidental then. The major observation about these palatalizations is that it occurred before back vowels – which is strange for palatalization at first sight. This fact points at

some phonotactic restriction which triggered the lenition of /l/ to /j/ or to /ç/, which in its turn palatalized the preceding stop (further analysis can be found in Huber 2006c).

5.2.2 Changes to word-medial clusters

Word-medially the picture is somewhat more colourful. The prominent feature of these neutralizations is that they produce the same output in Spanish and Galician–Portuguese (again excluding Catalan). This time, however, the clusters underwent different neutralizations depending on the phonological context rather than dialect.

On the one hand, after a coda consonant (including geminates), they fell together in /tS/ (orthographical <ch>):

(5.4)	context	Latin	Sp/Ga/Po	Sp gloss
(a)	N+pl	amplu exemplare	ancho ensanchar	‘wide, broad’ ‘to extend’
(b)	p+pl	*cappula afflare ‘to blow’	cacha Sp hallar Sp fallar Ga achar	‘scabbard, case’ ‘to find, encounter’ ‘to judge’ ‘to judge; encounter’
(c)	s+pl	no data?		
(d)	N+cl	conchula	concha	‘shell’
		trunculu	troncho	‘trunk’
	N+gl	cingulu	cincho	‘waist/sword belt’
(e)	s+cl	(facula >) *fascula ‘small torch’ masculu	Sp hacha Ga facha macho	‘wax candle; torch’ ‘masculine; male of animals’
(f)	c+cl	*cacculu	cacho	‘sort of earthenware receptacle’

As can be observed, the coda consonant itself is lost if it was an obstruent (only /s/ and /f/ seem to have occurred in this position). If it was a nasal, however,

it was retained (although it is phonetically a palatalized [ʃ] under the influence of the following affricate). The history and relationship of Spanish *mancha* ‘spot’ and Galician *malla/mágoa* may have been the following: Latin *macula* seems to be the origin of both Galician forms (*mágoa* is a later borrowing), while the Spanish form seems to go back to a form **mancula* (like in (5.4d) above).

On the other hand, when intervocalic, these clusters neutralized in the palatal lateral /ç/ in all the varieties under consideration. In Galician this /ç/ is still retained. In Spanish, however, it became /Z/, then it devoiced, like all /Z/, at this time, to /S/, and eventually it gave the velar fricative /x/. This is illustrated by the following words, often involving the Latin *-iculum/-a* diminutive suffix > Spanish *-Vjo/-Vja* (orthographical Ga <ll> and Sp <j>, respectively):

(5.5a)	Latin	Spanish	Galician	
	<i>acucula</i>	<i>aguja</i>	<i>agulla</i>	‘needle’
	<i>auricula</i>	<i>oreja</i>	<i>orella</i>	‘ear’
	<i>articulus</i>	<i>artejo</i> (<i>artículo</i>)	<i>artello</i>	‘article (of limbs)’
	<i>f(o)enuculum</i>	<i>hinojo</i>	<i>fiollo</i> , <i>fiúncho</i>	‘sweet fennel’
	<i>macula</i>	-	<i>malla</i> dial. Ga	‘spot’
	<i>oculus</i>	<i>ojo</i>	<i>ollo</i>	‘eye’
	<i>vermiculu</i>	<i>bermejo</i>	<i>vermello</i>	‘blood or bright red’
	‘small worm’			
(5.5b)	<i>regula</i>	<i>reja</i>	<i>rella</i>	‘ploughshare’
	<i>tegula</i>	<i>teja</i>	<i>tella</i> (also <i>texa</i>)	‘roof’
	<i>coagululum</i>	<i>cuajo</i>	<i>callo</i>	‘congealment’

Lapesa (1981:49) adds *cuniculus* > Sp *conejo*, Ga *coello*, *coenllo* ‘rabbit’ as a specifically Iberian word, which was adopted into Latin from the Peninsula. The intervening unstressed /u/ had to be lost before the changes. It has to be also pointed out that the /x/ reflex in modern Spanish obviously does not directly come from anything in Latin, it is the reflex of /S/.

A point of clarification is in order now. Apart from sporadically attested

voicing developments into **-gul-* (from which Ga *mágoa* could develop), in most cases the unstressed vowel was lost, making the two consonants adjacent and thereby feeding the palatalization. This loss of /u/ seems to be most frequent in the *-kul-* sequences of the diminutive suffix, possibly due to its high lexical incidence, but it seems also to occur occasionally in *-pul-* (*-ful-*?) as well as some rare instances of *-tul-* and *-dul-* sequences. It is noteworthy that, in theory at least, all clusters were affected. Lapesa (1981:78) notes the loss of unstressed medial vowels is attested quite early in Latin (by Plautus, for instance), which produced *ochum* ‘eye’ < *oculum*, *triblum* ‘flail, thresh’ < *tribulum*, *auca* ‘goose’ < *avica*. The *-tl-* < *-tul-* sequences passed to *-cl-* “by analogy with the numerous *-clus*” from the ending *-uculus*, *-iculus*. Of course, another reason could be that intervocalic /t/ clusters are bad branching onsets. As Lapesa (1981:82) remarks, such diminutive suffixes were extremely widespread in Western Romance, see for instance French *oreille* ‘ear’, *soleil* ‘sun’ And they all behave in much the same way as *-kul-* sequences. Here are some examples: *vetulus* > *vet’lus* (Probi “non veclus”) > Sp *viejo*, Ga *vello* ‘old’; *manipulu* ? > Ga *mollo* ‘<a measure of volume>’; *mundulu* ? > Ga *moño* ‘topknot, chignon’. More examples for this:

(5.6)	Latin	Spanish	Galician	
	tribulum	trillo	trillo	‘flail, thresh’
	mutulus, -ónis	mojón	?	‘boundary stone’

Since not many examples with *-bul-* offer themselves, it is uncertain what the relevance of the unexpected development to /ç/ in Spanish *trillo* is due to. One might think of voicing as triggering a voiced reflex, but then *-gul-* sequences (see *tegula* > *teja* in (5.5b) above) should also behave like that. Dialectal borrowing could be defended theoretically, but it would not be a very strong argument. Spanish *doble* ‘double’ < L *duplex*, and *establo* ‘stable’ < L *stab(u)lu*, as given by Tamás (1978:67), seem to be learned borrowings rather than normal developments. This is, however, a minor point, not relevant for the present thesis.

The general assumption about the development of these medial clusters is

that they uniformly became the palatal lateral [ç], during the Germanic period and definitely by the early 8th century (Lapesa 1981:124-5). It has to be underlined that this palatalization was preceded by a change where the pre-/l/ consonants fell together in [k], which then weakened (vocalized) to [j]: *oc.lu* > *ojlu* > *oçlo* > *oZo* > *ojo* ‘eye’ (see Lapesa 1981:79, N14). Places of articulation were neutralized and they gave a placeless velar. Lapesa (1981:125, N15) cites a form *obegiam* for expected **obegliam* < *oviculam*, on plate XLVI from the Western part of Asturias. He rightly remarks that this form would pose serious problems for the supposed development because, he claims, it is not a scribal error, and it does not show the palatalization of /l/.

One might wonder what happened to two further, related sets of clusters in the transition from Latin to the Iberian Romance languages. The first is the voiced initial series *#bl* and *#gl* (**#vl* and **#dl* were non-existent in Latin). Word-initial *#bl-* clusters regularly turned into *#br-* clusters in Galician as well as in Portuguese, but remained unaltered in Spanish, as in Sp *blanco* ‘white’, *blando* ‘bland’ but Ga *branco*, *brando*. The other cluster, /gl/, either followed suit and turned into *#gr-*, or the velar was simply lost. This deletion can be taken to support the neutral, placeless status of voiced velar stops. Examples are:

(5.7) Latin	Spanish	Galician
g landinem	landre ‘tumour’	landra/ládoa ‘acorn’
g lis - g lirone	lirón	leirón ‘dormouse’
g lattice ‘to bark’	latir ‘to palpitate; to bark’	latexar ‘to palpitate’ (derived form)

The second group of relevant clusters is Latin *#Cr*-clusters: *#tr-*, *#dr-*, *#kr-*, *#gr-*, *#pr-*, *#br-* and *#fr-* (**#vr-*). They, however, survived the turmoil unharmed (well, obviously some of the relevant words got lost underway), unlike *#Cl*-clusters where all of them were affected one way or another. An account for this discrepancy is awaiting a genuine insight on someone else’s part. It can be proposed that it has to do with the lateral /l/ versus rhotic /r/ distinction. Recall

that in Italian Cl- went to Cj-, but Cr remains. All in all, it seems to be the case that the tendency was to eliminate complex clusters with /l/ and might in fact be concluded that it was /l/ which was responsible for all this.

5.2.3 Changes of /kt/ clusters

In Latin *-kt-* clusters the velar segment gradually turned into the glide /j/, occasionally into /w/ after /o/. Lapesa (1981:43) assigns this change to a Celtic substratum in Spanish since “[i]n nearly all the Romance countries where Celts settled down, the Latin /kt/ group evolved to /it/ or /tS/”. He also assigns the similar change of Latin /ks/ to “the probable influence of the Celtic substratum” (1981: 85). In addition, the “relaxation” of /k/, the first phase of the process, “appears on Gaulish inscriptions and is general in Irish”: *Rectugenus* (Rhetogenes) appears next to *Retugeno* (1981:43). Mariño Paz (1999:36) also attributes it to a Celtic substratum because, apart from Celtic language data like IE *nokt- ‘night’ > Welsh *noeth*, Cornish *neth*, “the aspiration phase of Latin stop /k/ is testified by coins and Gaulish inscriptions where lexical pairs like *Luxterios* and *Lufterios*, *Pixtolos* and *Pictolos* occur” (1999:37). But he admits that the substratum theory may not be so conclusive, for instance because this change appears in Romance where Celtic influence is hard to assume (and see section 5.2.6 below for a similar process in a Slavic languages), so that it might be better to treat this whole process as an “internal development”.

Whatever the role of language contact in this change, the fact is that spellings in earlier documents preserved traces of the process through the velar fricative /x/ (spelt <ch>) probably also dropping in on /F/ towards the glide /j/. The glide could induce some phonologically local changes. Specifically, it fronted a preceding Latin /a/ to /e/: /aj/ > /ej/; and it lowered a preceding /u/ to /o/. The other vowels were not affected. This is the point where the process stopped in Galician (and Portuguese). In Spanish, however, the resulting palatal glide turned the following coronal stop into /tS/, and disappeared. Thus the following pattern

emerged:

(5.8)	Latin	Spanish	Galician
	[kt]	[tS]	[(i)t]
	dicta	dicha	dita
	dictatum	dechado	?
	dictu	dicho	dito
	ficta <ppt of 'fix'>	(hito)	fita
	fictu <ppt of 'fix'>	hito	fito
		'border stone'	'fixed'
	strictus	estrecho	estreito
	ictu	(ictus)?	eito
			'strict; narrow'
			'a plot of land'
	*confectare	cohechar	confeitar
	lectus	lecho	leito
	pectus	pecho	peito
	profectus	provecho	proveito
	tectum	techo	teito
			'to blackmail'
			'bed'
			'chest'
			'profit, gain, benefit'
			'roof'
	facta <ppt of 'do'>	fecha	feita
	factu <ppt of 'do'>	hecho	feito
	fracta	-	freita
	iactare	echar	(a) xeitar
	iactu	-	xeito
	lacte	leche	leite
	lactuca	lechuga	leituga
	pactum, pl pacta	pecho	peita
	tractu	trecho	treito
	vervactum	barbecho	barbeito
			'date'
			'deed; event; fact'
			'landslide'
			'to cast; to lie'
			'manner, way'
			'milk'
			'lettuce'
			'tribute paid by vassal'
			'tract, distance done'
			'uncultivated land'
	bis coctus	bizcocho	biscoito
	coctura	cochura	?
	noctis	noche	noite
	octo	ocho	oito
			'biscuit'
			'cooking'
			'night'
			'eighth'
	ductu	ducho	-
	luctari	luchar	loitar
			'experienced'
			'to fight'

tructa trucha troita ‘trout’

(Note, however, *auctor* – *auctoricare* > *otorgar* ‘to license, authorize’, *auca* > *oca* ‘goose’. This is clearly a minor pattern for L /awC(C)/. Furthermore, no explanation can be offered for why L *strictus* developed as if it had stressed /e/.)

As can be seen from the examples above, all (short) Latin vowels /i e a o u/ could precede the /kt/-cluster. In general the /k/ vocalized to /j/ (and was regularly contracted with a preceding /i/ – see *dita*, *fita* in Galician), and in Spanish it palatalized the following /t/. There are some problematic cases, though. First, the Spanish word *afeitar* ‘to shave’ < L *affectare* is irregular: it seems as if it was a borrowing of the regular development of Galego-Portuguese. It gives some plausibility to this assumption that the word is indeed attested first in the 13th century, when Galego-Portuguese was spoken even at the Castilian court. Second, although the regular reflexes of Latin *-act-* give *-eit-* in the first step, in the Latin stem *act-* it gives the labial glide /w/ which later fuses with /a/ to give /o/. And finally, Latin *fructum*, or rather its plural *fructa*, regularly gives *froita* in Galician, but in Spanish *fruta* does not show the expected palatalization. (Besides these inherited words, both Spanish and Galician have, of course, quite some words that are cultural borrowings from Latin, consequently they have retained the Latin cluster as can be seen in *efecto* ‘effect’ and *edicto* ‘edict’, for instance.)

Such a palatalization process is, however, not unique to /kt/ clusters. The development of Latin *-ult-* sequences also resulted in the vocalization of /l/ into /j/ in Spanish and then in palatalization. The reflexes are identical to the development of /kt/ above:

(5.9a) Latin	Spanish	Galician	
multu	mucho	moito/muito	‘much’
pultarius	puchero	(pucheiro)	‘type of pot’
pultes	puches	?	‘porridge’
auscultare	escuchar	escoitar (Po <i>escutar</i>)	‘listen to’
vulturnus	bochorno	(bochorno)	‘dry summer heat’
(5.9b) vultur	buitre	voitre	‘vulture’

Examples such Latin *alter* > *otro* ‘other’, *altus* ‘high’ > (*oto*) > *otero*, *otear* (modern Spanish *alto* is a learned borrowing) and *balbus* > *bobo* ‘stupid’ show that the change above does not apply but to *-ult-* sequences. As for the developments of Latin *vultur* in (5.9b), it is in fact not exceptional. One can assume that the sequence *-tur-* became *-tre-* (like in *pater* ‘father’ > *padre*), and this could effectively prevent palatalization by the palatal glide, perhaps because it would have resulted in medial /tSr/, which was (and still is) an ill-formed cluster.

A word must be said about Latin /pt/ clusters (see Tamás 1978:67-68) both because it did not change in parallel to /kt/, and because it is indicative of the relative chronology of the two changes. It is remarkable that /pt/ generally simplified to /t/, most probably through a geminate stage /t:/, otherwise they also should have become voiced /d/ in intervocalic position. Regular examples include L *septem* ‘seven’ > Sp *siete*, Ga *sete*, and L *aptare* > Sp / Ga *atar* ‘to tie, fasten’ (Lapesa 1981:81). This state of affairs has, however, some important consequences for the chronology of the changes to /pt/ and /kt/, respectively, but this is not commented on. The “relaxation” of /kt/ must have preceded the gemination of /pt/ to /tt/ or else nothing, in theory, could prevent /kt/ from undergoing the same change. To put it differently, /kt/ was no longer a stop+stop cluster when gemination of /pt/ to /tt/ began. It is Italian which shows the uniform gemination of the clusters: both /kt/ and /pt/ became /tt/ as in *notte*, *sette*. These patterns indicate that gemination is a later change than the weakening of /k/ in /kt/ clusters in Western Romance.

5.2.4 Changes to /ks/ clusters

A further related process involves the sequence *-ks-*. The velar stop changed in much the same way as in /kt/, and became a palatal glide [j] which palatalized the fricative [s] both in Spanish and Galician–Portuguese to /S/. The Spanish reflex later turned into the velar fricative /x/ from this /S/ (just like those coming from Latin *-cul-* sequences above). Hill (1988:281), following the work of others,

assumes the [S] to [x] change to have started in Andalucía in the first decades of the 17th century and have finished by the 1660s at the latest. Lapesa (1981:378) cites the first attested traces in spelling from a letter from Lima in 1559, somewhat earlier: *mexior*, *dexiara*, *moxiere*, *vexiés*, *oxios* for modern Spanish *mejor* ‘better’, *dejara* ‘(he/she) had left’, *mujeres* ‘women, wives’, *vejez* ‘old age’, *ojos* ‘eyes’. These <xi> graphs must have indicated the first phase of the change: [S] to [ç]. He adds (1981:379): “By the first third of the 17th century the [x] was completely installed.” (Culturally it is interesting to note that spelling did not change immediately, leaving /x/ to be spelt <x> as it used to be when still pronounced /S/. Galician still spells /S/ with <x>, and such spellings are preserved in Spanish names like *Mexico* and *Texas*.) Compare the following examples from Spanish and Galician:

(5.10a)	Latin	Spanish	Galician	
	[ks]	[x]	[S]	
	axis	eje	eixe	‘axle; axis’
	buxis	buje	?	‘wheel hub’
	buxu	boj(e)	buxo	‘box-wood’
	coxa	-	coxa	‘thigh’
	coxus	cojo	coxo	‘lame, paralyzed’
	-	dijo	dixo	‘he said’
	exir - exitu >	ejido	eixido	‘surroundings, the field (around village)’
	‘to go out’			
	fraxinu	(fresno)	freixo	‘ash-tree’
	-	trajo	trouxo	‘he wore’
	laxare (!)	dejar	deixar	‘to leave’
	Gmc *þachsu			
	> taxo	tejón	?	‘badger’

Reflexes of Latin *exemplum* behave as if they were the regular development, Sp *ejemplo* and Ga *exemplo* ‘example’, but it is remodelled, as the retention of -mpl- reveals.

Notice that the development of -uls- sequences also result in the above

reflexes at least in the following probable etymology:

(5.10b)	Latin	Spanish	Galician	
	impulsare	empujar	empuxar	‘to push’

Also, Latin /s/ which came to be palatalized, shows the same reflexes:

(5.10c)	russeu ‘bright red’	rojo ‘red’	roxo ‘brownish yellow’
	phasulu, faseolu	fréjol, frijol	freixó ‘bean’

Latin /ps/ clusters behaved similarly to /pt/ clusters (Tamás 1978:67-68), that is, became geminate /ss/, and gave modern reflexes in /s/, as in *ipse/ipsu* > Sp, Ga *ese, eso* ‘this’. However, at least one word in this set behaves interestingly: L *capsa* > Sp *ca[x]a*, Ga *cai[S]a* ‘box, case’. The divergence is probably due to the occasional alternations between [s] and [S], as shown by other sporadic examples such as Sp *jabón*–Ga *xabón* ‘soap’ from *[s] in L *sapone*, Sp *jibia*–Ga *xiba* ‘squid’ from L *sepia*, or Sp *sordo* but Ga *xordo* ‘deaf, voiceless’ from L *surdus*. French shows the expected forms with /s/: *châsse* (also *caisse?*), *savon*, *seiche* and *sourd*, respectively. No immediate solution offers itself for these divergences, especially because often */s/ is not followed by a front vowel which could more easily trigger palatalization.

5.2.5 Another source for Spanish /x/

Recall (5.5) where the palatal /ç/ reflex of medial /kl/-clusters turned into /x/. The same process occurs in the reflexes of Latin /l/’s which were either preceded or followed by /j/:

(5.11)	Latin	Spanish	Galician	
	alliu	ajo	allo	‘garlic’
	cilia	ceja	cella	‘eyebrow’
	colligere	coger	coller	‘to take’
	consilium	consejo	consello	‘council’

filiu	hijo	fillo	‘son’
mulier	mujer	muller	‘woman’
folia	hoja	folla	‘leaf’
melior	mejor	mellor	‘better’
miliu	mijo	millor	‘millet’
molliare	mojar	mollar	‘to make humid’
palea > -[lja]	paja	palla	‘straw’
pulegiu, puleiu	(poleo)	poexo	‘penny-royal’
*tripaliare	trabajar	traballar	‘to work’

Lapesa (1981:49) adds *cusculium* > Sp *coscojo* ‘scarlet oak’, as a specifically Iberian lexical item for a specifically Iberian species.

The fricative /x/ comes from /S/ (earlier /Z/). Attention must be drawn to the observation that these palatalizations of /lj/ had to be distinct from the palatalization of Latin geminate /l:/, which regularly gave /ç/ in Castilian (and simple /l/ in Galego-Portuguese): as in *ga/ç/o* versus *ga[l]o* < L *gallu* ‘cock’. As for the chronology, Mariño Paz (1999:36) dates the degemination of Latin /l:/ well before the palatalization of /lj/ (and attributes the former to Celtic influence, although he carefully points out that it also occurred in dialects where there is no evidence of such a substratum). Lapesa, on the other hand, dates degemination much later, to the period between the 9th and 11th centuries (1981:166), and remarks (*ibid.*, N10) that in some Iberian varieties (Western Leonese, Navarro-Aragonian and Western Catalan) there is indeed merger of the clusters. The chronology thus is very intricate because the written material seems to indicate that there was a period where the two reflexes were minimally distinct but both of them were palatals. This is phonologically slightly unlikely, however. If one assumes that the degemination indeed occurred later than the palatalizations, that is, like Lapesa claims rather than how Mariño Paz supposes, then the phonologically more likely order is where degemination occurred only after the palatal [ç] had already shifted to affricate [dZ]. This means that the palatalizations occurred in two distinct points in time, in the following order:

(5.12)	Latin		
(1)	-llj-, -lj-	Castilian	/dZ/ > /Z/ > /S/ > /x/
		Galego-Portuguese	/ç/
(2)	-ll-	Castilian	/ç/
		Galego-Portuguese	/l/

Now since the reflex of the palatalization of *-llj-*, *-lj-* is identical to the development of Latin *-Cul-* sequences, it is natural to assume that the resulting medial C+/l/ clusters equally became [dZ] in Castilian and [ç] in Galego-Portuguese. Recall now the peculiar form Lapesa cited from a plate (see 5.2.2 above), *obegiam* for **obegliam* < *oviculam*, which is then indeed the representation of a palatal [dZ]. This voiced affricate was probably strictly intervocalic, since in (originally) post-consonantal positions the reflexes are voiceless across Iberian Romance: *amplu* > *ancho*, *conchula* > *concha*, *masculu* > *macho*, etc (see (5.4) above).

To sum up the velar developments on the Peninsula: all initial and medial *Cl-*clusters are eliminated through palatalizations – Spanish later turned the medial cluster into a velar fricative; /k/ in pre-consonantal position is prone to undergo lenition to /j/ which in turn palatalized the following /t/ and /s/ to [tS] and [S] in Spanish, and the latter, like [S] from other sources became velar fricative [x]. Below is a summary of the changes (but not their chronologies!) of the various Latin clusters:

(5.13)	Spanish	<	Latin	>	Galician
	-ç -		-ll-		-l-
	#ç		#C+l		#tS
	-x-		-Cl-		-ç -
	-x-		-lj-, -llj-		-ç -

-x-	-ks-	-S -
-tS -	-kt-	-(i)t-
-tS -	-ult-	-(i)t-
-tS -	-NC+l-	-tS -

The wide-spread change from [S] to [x] is interesting both phonetically and phonologically. In featural terms there does not seem to be a proper trigger for the change: there is no single feature which could be changed to directly give [x] from [S]. In feature geometry [S] has coronal specification, both because its major place is coronal and because palatal secondary articulation is also associated with coronal (Kenstowicz 1994:466), while [x] is invariably dorsal. It is not obvious how a “dorsal” feature can be acquired! In Government Phonology, the problem of representing fricatives, especially [s], is well-known. Cyran (1997:191) proposes the following representations for the fricatives (with representation for [ç] added), where *H* stands for friction and place elements are heads (underlined):

(5.14) [f]	[s]	[S]	[ç]	[x]
x	x	x	x	x
<u>U</u>	<u>A</u>	<u>I</u>	I	
H	H	H	H	H

The change from [S] to [ç], later to [x] is then a simple case of successive element suppression, whereby [S] loses its place specification (first losing the head status of the palatal element *I*) and becomes a placeless velar fricative.

5.2.6 *An excursus: on some Croatian palatalizations*

Starčević (2003) cites some peculiar palatalizations from Croatian, which pretty

much resemble those found in the Spanish developments in (5.8) above. Although both Spanish and Croatian are Indo-European, there seems hardly any connection between the respective processes – in this way, the Croatian data provide further support for the phenomenon of velars turning into a glide, and palatalizing a following /t/.

In Croatian the only irregular verb conjugations occur in verbs whose stem ends in a velar obstruent, /k/, /g/ or /x/. It is noteworthy that the irregularity is restricted to velars only. The irregularity consists in having no vowel between the stem and the infinitive marker *-ti* (*rad–raditi* ‘work’, *ven–venuti* ‘fade’, *per–prati* ‘wash’). Furthermore, palatalization occurs on the infinitive marker *-ti*:

(5.15) Infinitive	Stem	1SPres	Imp 2S	gloss
vući	vuk	vučem	vuci	‘drag’
peći	pek	pečem	peci	‘roast’
leći	leg	ležem	lezi	‘lie’
vrijeći	vrh	vršem	vrsi	‘thresh’

What is most remarkable about the palatalization of the infinitive marker is that the resulting palatal <ć> is different from the result of the other palatalizations occurring in the Croatian verbal paradigm in general and in these same verbs. Namely, in verbal paradigms, exclusively <ć> and <c> occur, never <č>. From the nominal palatalizations in Croatian it is known that <c> and <č> predictably come from a velar, as opposed to <ć> which can only come from /t/. This simply means that the palatalized <ć> in the infinitive of velar-final verb stems is not the result of the palatalization of the stem-final velar as in the 1SPres and Imp 2S forms, but rather that of the /t/ of the infinitive marker. Moreover, while in 1SPres and Imp2 there are alternation pairs: **k – č/c**, **g – ž/z**, and **h – š/s**, nothing of the sort is seen in the infinitive form: exclusively <ć> occurs. If this reasoning can be maintained, then clearly a trigger for palatalizing /t/ must be found. It cannot be the /i/ in the infinitive marker because elsewhere it does not trigger palatalization: *raditi*, **radići*. There is only one possible candidate left: the stem-final velar. In other words, it is proposed that before the infinitive marker the velar of the stem

becomes a palatal (glide) which is capable of palatalizing /t/.

The similarities between the Spanish and the Croatian data involve two observations. The first is that in both a velar becomes a palatal which in turn palatalizes a coronal stop. The second is the direction of the process: in both this is a case of progressive palatalization. Although the similarities are obvious, direct evidence (from, say, earlier written documents) for the validity of the analysis of the Croatian data (as opposed to Spanish) cannot be provided since as early as the earliest records the development seems to have already completed.

5.3 Velar changes in French

5.3.1 *The palatalization of velars before */a/*

Northern Gallo-Romance had a somewhat peculiar palatalization that occurred before Latin /a/, a back vowel. As mentioned at the beginning of this chapter, palatalization, as a general phenomenon, will be discussed separately, but this one stands out from expected changes so that it will be treated here. Quite conspicuously the palatalization of velars before */a/ is later than the general palatalization in Western Romance since while the latter resulted in [s] in French, as in Latin *centum* > Fr [s]ent ‘hundred’, while this peculiar fronting resulted in [tS] > [S], as in L *canis* > [S]ien ‘dog’, *caballum* > [S]eval ‘horse’ (Martinet 1975b:220). Martinet also notes that nobody doubts that the change was triggered

by a front [æ] realization of */a/, in other words, it is a simple case of velar palatalization before another front vowel. Thus, phonologically speaking there is nothing peculiar about the palatalization itself.

Why this process is still worth discussing here is because the possible cause that triggered the change gave way to much speculation. It is known that it is a typical internal development of Northern Gaul, for at least the following two reasons: (1) none of the neighbouring modern Germanic languages show palatalization; (2) in the Picardian and Normand varieties, where Franco-Romance bilingualism was most prominent, there is no trace of this palatalization. Anyway, it is the Franks, generally conceived of as a homogeneous Germanic people, who are credited with all the decisive changes that make French so French.

Martinet (1975b), however, offers a genuine insight into the problem, and links this change to the Anglo-Frisian palatalization of velars and the so-called Anglo-Frisian brightening, where Gmc */a/ became front /æ/, which in its turn palatalized a preceding velar. He correctly points out that there were indeed Germanic tribes in the North Sea region well before the arrival of the Franks from around the Weser, although not much is known with certainty about the ethnic situation there at this early period. He draws attention to the fact that the earliest Germanic loans into Romance have <a> for Common Germanic */ai/. From changes in other languages of the world, it is known that /ai/ does not normally change to /a/, but to /e/ or /ɜ/. This practically means that the original form of these loans must have been /a/, and not the Frankish /ai/. It is the Anglo-Frisian dialect area which shows /a:/ from Gmc */ai/ (obviously not by simple monophthongization). This lends support for his claims.

Martinet (1975b:223) assumes the following chain reaction in Anglo-Frisian:

(5.16) Gmc ai > AF a:
 Gmc a:, a > AF æ:, æ

In addition he remarks that exactly these are the dialects that are known to

have early palatalizations of velars. As for the later history of velar palatalization, when the Franks arrived, they assimilated all other earlier Germanic people in the region (including the Frisians, the Anglo-Saxons had already left the area), and since Frankish became the prestige variety and it had no palatalization, this process was eliminated: in the Franco-Romance bilingual area no trace of palatalization remains. More to the south, however, in the Ile-de-France region, this pre-Frankish palatalization came to be the prestige norm: this survives in modern standard French. Note that Martinet intends this description as finding a contact cause for the (new!) palatalization of velars. He is careful not to say that the L /a/ > [æ] change was due to this Germanic layer. A separate, Romance, /a/ > [æ] change favoured this palatalizing tendency.

Indeed, the fronting of Gmc */a/ to /æ/ and the */ai/ > /a:/ change had a different story in Frisian and Anglo-Saxon, as Campbell describes (1959). The fronting of */a/ to /æ/ is later than */a:/ > /æ/, and it “seems, in fact, to have taken place independently in OE and OFris”, Campbell (1959:52) writes. He assumes the following order for the changes for OE and Old Frisian, respectively:

(5.17a)	WGmc		OE
	(1) PGmc /æ:/ > /a:/	>	W-Saxon /æ:/, elsewhere /e:/
	(2) /ai/	>	/a:/
	(3) /a/	>	/æ/
	(4) /au/	>	/æu/, later spelt <ea>
(5.17b)	WGmc		OFrisian
	(1) PGmc /æ:/ > /a:/	>	/æ:/ = <e>
	(4) /au/	>	/a:/
	(3) /a/	>	/æ/
	(2) /ai/	>	/æ:/ = <e>

WGmc long /a:/ had become a front vowel before the short /a/ was fronted,

but the latter must have happened at different times in OE and OFris. The basic difference is that in OE /ai/ must have monophthongized before the short /a/ was fronted (else one would expect OE /æi/), while in Old Frisian it monophthongized later than /a/ fronted. What is crucial for the later reflexes in French is that the WGmc /ai/ > /a:/ change is typical of the varieties that came to be Anglo-Saxon, rather than Frisian, where WGmc /ai/ became /æ:/. In this respect, Martinet's (1975b:223) example is interesting: "One cites most often the word *hāte* which derives from **haifstis*, attested in Gothic in the form *haifsts*, and which has the form *hāst* in Old Frisian." The Gothic form means "violent", and it is cognate with OE *h2âst*, a rare poetical form, also meaning "violent, vehement". While the vowel of the OE cognate shows the expected development presented by Campbell, in (5.17a) above, the Old Frisian form does not immediately bear out Campbell's expectations. One could speculate, to deliberately arrive at Campbell's results, that /f/ influenced the preceding diphthong and that is why it has the OFris reflex of /au/. However the case may be in connection with this item and the fate of the diphthong in the Anglo-Frisian area, Martinet seems to be right in assuming this Germanic area and these Germanic varieties behind the palatalizations, a common trait of both OE and Old Frisian.

5.3.2 Velar changes in French

Apart from the general Western Romance changes already mentioned in section 5.1, and the palatalization just treated, French does not show further processes that affected velars in ways which are not already discussed in connection with Iberian Romance varieties. The Latin intervocalic medial *-C(u)l-* sequences turned to palatal lateral [ç] as still indicated by the spelling <-il, -ille>, and eventually gave modern [j]:

(5.18)	Latin	Galician	French
(a)	acucula	agulla	aiguille [egij] 'needle'

	articulu	artello	orteil [ORt3]	‘article (of limbs)’
	auricula	orella	oreille [OR3j]	‘ear’
	coagulare	callar	cailler [kaje]	‘to coagulate’
	f(o)enuculum	fiollo	fenouil [fEnuj]	‘sweet fennel’
	oculu	ollo	oeil [#j]	‘eye’
	tribulum	trillo	? trille [tRij]	‘trill (in music)’
		‘flail, thresh’		
	tegula	tella	? tuile [tɪ]	‘roofing tile’
	vermiculu	vermello	vermeille [v3Rm3j]	‘blood or bright red’
		‘small worm’		
	vetulus	vello	vieille, vieux [vj3j vj@]	‘old’
(b)	alliu	allo	ail [aj]	‘garlic’
	ilia	cella	cil [sil]	‘eyebrow’
			ciller [sije]	‘to blink’
	colligere	coller	cueillir [k#jiR]	‘to take’
	consilium	consello	conseil [kO~s3j]	‘council; advice’
	filia	filla	fille [fij]	‘daughter’
	folia	folla	feuille [f#j]	‘leaf’
	melior	mellor	meilleur [m3j#R]	‘better’
	milium	millo	mil, millet [mij mij3]	‘millet’
	molliare	mollar	mouiller [muje]	‘to make humid, moist’
	palea > -[lja]	palla	paille [pAj]	‘straw’
	? tripaliare	traballar	travailler [tRavaje]	‘to work’

Note that in French, just like in Iberian Romance, there is no merger between Latin geminate /l:/ and these palatalizations: *poule* ‘hen’ etc. Also, notice that these Western Romance developments are in sharp contrast with other Romance, such as Italian where the medial *[kl] clusters lenited the [l] rather than the velar, and have /kj/: *orecchio*, *occhio*, *finocchio*, *vecchio*; and where there is no merger like in (5.18a, b) above: *figlio*, *foglia*, *miglio*; and where, of course, Latin geminate /l:/ is retained as in *pollo* ‘hen’.

Similarly to the Galician reflexes, the velar in Latin [kt] and [ks] clusters vocalized in French, and eventually fused with the preceding vowel, without palatalizing the following [t] or [s]. Some examples are listed below:

(5.19a)	Latin	French	
	[kt]	<(i)t>	
	dictu	dit	<ppt of ‘say’>
	iacrare	jeter	‘to cast; to lie’
	strictus	étroit	‘strict; narrow’
	lectus	lit	‘bed’
	pectus	poit(rine)	‘chest’
	profectus	profit	‘profit, gain, benefit’
	tectum	toit	‘roof’
	facta	faite	<from ppt of ‘do’>
	factu	fait	‘fact’
	lacte	lait	‘milk’
	lactuca	laitue	‘lettuce’
	tractu	trait	‘tract, distance done’
	bis coctus	biscuit	‘biscuit’
	noctis	nuit	‘night’
	octo	huit	‘eighth’
	luctari	lutter	‘to fight’
	tracta	truite	‘trout’

(5.19a)	Latin	French	
	[ks]	<(i)s>	
	axis	essieu	‘axis between wheel, shaft’
	buxu	buis	‘box-wood’
	coxa	cuisse	‘thigh’
	fraxinu	frêne < fresne	‘ash-tree’
	laxare	laisser	‘to leave’

Finally it is worth noting the development of Latin [kwV] sequences in the various Romance dialects treated above. Original Latin sequences simplified to [kV] irrespectively of the quality of the following vowel in French. This development is shared by Galician, for instance. In Spanish, however, [kw] is preserved before [a], while it became [k] elsewhere.

(5.20) Changes to Latin [kwV] sequences in Western Romance

Latin	French	Galician	Spanish	gloss
[kwV-]	[kV-]	[kV-]	[kwa/ke/ki-]	
quando	quand [kA~]	cando	cuando [kwa-]	‘when’
quattuor	quatre [katR]	catro	cuatro [kwa-]	‘four’
quindecim	quinze [k3~z]	quince [ki-]	quince [ki-]	‘fifteen’
quid	que [k(E)]	que [ke]	que [ke]	‘that’
querella	querelle [kER3I]	querala [ke-]	querella [ke-]	‘quarrel’

5.4 Conclusions

Western Romance shows a number of phenomena that are relevant for a discussion on velars. Vocalization of velars is very prominent. First of all, across WR, it is the voiced velar fricative [F] (< Latin /g/) which is uniformly deleted. The fricative [D] is also deleted in most varieties, but this may depend on the following vowel. Reflexes of [B] are the most stable. This underlines the important point in the dissertation that the velar fricative is the least stable, the first to be deleted. Secondly, various Latin medial -C(u)l-clusters fell together in *[kl], which illustrates that /k/ is a weak consonant to which others can reduce. The velar in these clusters vocalized and palatalized the following [l], either to [dZ] or [ç], depending on the variety. Thirdly, the velar stop changed in Latin /kt/ and /ks/ clusters, and became a palatal glide [j] which palatalized the [t] in Spanish, and the fricative [s] both in Spanish and Galician–Portuguese to /S/ (neither is palatalized in French). And finally, Spanish reduced /S/ to /x/. This was analyzed as losing all place specifications.

Chapter 6

Velar phenomena in some non-Indo-European languages

6.1 Introduction

The purpose of this chapter is to illustrate on a number of non-Indo-European languages many of the processes already found and presented in the historical phonology of some IE languages in the preceding chapters. Thereby considerable support is given to the frequency and spread of the various phenomena related to velars, which have been used to provide evidence for the placelessness of velars. Also, the changes below may serve as a summary of the range of velar processes across languages. There are velar vocalizations, for instance, in Finno-Ugrian and Tai languages, palatalization of velars in Northern Tai and instances of velar–labial interactions in many Asian languages. A minor purpose of this chapter is also to show that non-IE languages are often important in order to offer a more balanced view of a set of phenomena: for example, while labial–velar changes are relatively rare and sporadic in Germanic and Romance languages, they are definitely common in Chinese varieties. In general, it may be rewarding to have a broader look at the world’s languages when discussing the markedness issues of coronals and velars, rather than concentrate on minor sets of, say English, data that tentatively show the unmarked status of dentals. On the other hand, it has to be admitted that some of the data below, especially from Asian languages, come from languages and sources which are not easily accessible. Nevertheless, it gives some credit to them that they were not specifically assembled for the purposes of a dissertation like this one, so there is no preconceived idea behind their publication: indeed, they may have contained

material which would be contradictory to the statements in this dissertation.

6.2 Velars in the history of Hungarian

6.2.1 *The major consonant shifts up to Old Hungarian*

The history of Hungarian is interesting for the very early *k > /x/ change in a specific environment, for the vocalization of *F > /j/ and the strengthening (affrication) of *j, ç > /dʒ/ which also affected loans from Latin. Otherwise, the velars in the history of Hungarian behaved pretty much like obstruents produced at other places of articulation.

For the data in this chapter the recent Hungarian historical grammar (Kiss and Pusztai 2003) was used. The historical phonological chapters were written by E. Abaffy for Primitive Hungarian, Old Hungarian and Middle Hungarian (2003:106-128, 301-351, 596-609, respectively; henceforth referenced as E. Abaffy). “Primitive Hungarian” refers to the period from around 1000 BC until 896 Common Era, which is the period from the separation of the other Ugric languages until arriving in the Carpathian Basin. Hungarian is attested in this time only in isolated word-forms in foreign language sources (and it can be reconstructed through comparison, of course). The Old Hungarian period lasted until 1526, to be followed by the Middle Hungarian period until 1772 (the rest of the periodization of the history of Hungarian is of no concern here; usual methodological precautions in establishing chronologies apply).

Primitive Hungarian can be reconstructed to have to the following consonants (based on E. Abaffy 2003:116, but with proper IPA symbols):

(6.1) The consonant phonemes of early Primitive Hungarian (ca. 1000 BC)

Labials:	p	-pp-	m		w
Coronals:				T	
	t	-tt-	n	s	l r
				S	tS

³ t□ j ϕ

Velars: k -kk- -N-

Only the coronal point of articulation had a voiceless fricative, /T/, but nasals could be produced at all places. It must be added that Ugrian *T regularly disappeared without a trace by the end of the Primitive Hungarian period (2003:120). E. Abaffy has the very misleading symbol /B/ for a bilabial “fricative”, but it must have been the labio-velar /w/ both because she identifies German <w> with this sound (which was never a /B/) and because it makes a better phoneme system (no voiced fricatives at all, and it does not change like fricatives proper).

Primitive Hungarian underwent a set of consonant shifts which resulted in the following series of reflexes by the end of the period (2003:117):

(6.2a) Changes until the end of the Primitive Hungarian period

Ugrian	Prim. Hung.		Old Hungarian	examples
-mp-	-mb-	>	-b-	hab ‘foam’
-nt-	-nd-	>	-d-	had ‘army’
-Nk-	-Ng-	>	-g-	dug ‘to thrust into’
(6.2b) -p- ‘cunning’	-b-	>	(-B -? >) -w-	-w-; -w, -□ ravasz
-t-	-d-	>	(-D-? >) -z- -z-	ház ‘house’
-k-	-g-	>	-F-	-F-; -w, -□ jó (as in names like Sajó) ‘river’
(6.2c) -pp-	-p-		-p-	epe ‘gall’
-tt-	-t-		-t-	hat ‘six’
-kk-	-k-		-k-	lök ‘push’

What is noteworthy in the changes above is that labial and velar single consonants

vocalized, and in final position their merger was well underway by Old Hungarian. (Also the patterns above are similar, apart from (6.1a), to the Western Romance changes.)

6.2.2 Spirantization of /k/ before back vowels

As early as Primitive Hungarian, the initial stops, /p t k/ developed divergently. The dental stop, */t/, remained unchanged (modern Hungarian *tud* ‘to know’, *tél* ‘winter’, *tál* ‘bowl’, *te* ‘thou’, *ti* ‘you’, *tő* ‘stem’, etc), while */p/- changed to /f/ before all vowels (*fog* ‘tooth’, *fül* ‘ear’, *fazék* ‘pot’, *fed* ‘to cover’, *fej* ‘head’, *füst* ‘smoke’, etc). But the velar stop, */k/, spirantized to /x/ only before back vowels, */a o u */, as in *ház* ‘house, cottage’, *had* ‘army’, *hal* ‘fish’, *hall* ‘to hear’, *hat* ‘six’, *három* ‘three’, *hó* ‘snow’, while it remained /k/ before front vowels as in *kéz* ‘hand’, *kő* ‘stone’, *kér* ‘to ask’, *köd* ‘fog’ (it is assumed, of course, that cognates in the other Ugrian languages and beyond confirm these sounds). The following distribution obtained *in native words*:

(6.3)	Prim.Hung	by Old Hung.
	*k	k / ____ [+front] x / ____ [-front]

Prim. Hungarian */k/ must have developed the allophone /x/ before back vowels by the 6th century (E. Abaffy 2003:118-119) as indicated by Turkic loanwords with */ka ko ku/ such as *kapu* ‘gate’, *korom* ‘soot’, *kút* ‘well, fountain’, where initial /k/ did not become /x/ any more. The fricative /x/ became a phoneme in its own right only after such Turkic loanwords were integrated, of course. The loans resulted in a full initial pre-vocalic range of /k/ (again!), while /x/ could appear only before back vowels (and only in Finno-Ugrian words). Later on, in Old Hungarian, sometime between the 11th and 13th centuries, /x/ became laryngeal /h/.

The reason for this divergence in the behaviour of initial stops is not clear, but – from the perspective of the present dissertation – it is not obvious at all

whether the changes had anything to do with the markedness of the places of articulation. Based on these patterns one could argue, with coronal unmarkedness in mind, that /t/ did not change because it is the unmarked (that is, placeless) stop – but then it is difficult to account both for why /k/ still changed in part, and why labiality in */p/ encouraged spirantization. The fact that coronals pattern differently cannot be automatically taken to mean that they are placeless (or unmarked).

As for the motivation for the spirantization of /k/ before back vowels, one might wonder why it happened before back rather than front vowels (and how it is related to the general $p > f$ change in the same period). First, one might argue that it was not the back vowels that triggered the change, rather it was the front vowels that prevented spirantization. This assumption can be topped with a further tentative observation: the dental /t/, which can on one reading be considered to have frontness, palatality (see chapter 2), does not change. But these remain mere speculations at this point and pure conjectures.

6.2.3 *Vocalizations and strengthenings*

The history of Hungarian presents a range of vocalizations of [F] and also a [Ft] > [Ct] > [jt] change. By late Primitive Hungarian, */F/ emerged from FU *k or *Nk and became /j/ when, due to vowel loss, it came to stand next to a preceding consonant. The imperative marker *F of late Primitive Hungarian also vocalized to /j/ in this way (E. Abaffy 2003:119). Furthermore, when /F/ became word-final towards the end of the Primitive Hungarian period, it started to vocalize during the already documented history of Old Hungarian, and came to form a range of new diphthongs in this period, between the 10th and 13th centuries (for similar vocalizations, see the OE developments in chapter 4). This process is well documented for Hungarian. In a Greek text by Constantine sporadic forms in -/F/ are found only: 'εζελεχ [3z3l3F] 'tasting', γεναχ [j3n3F] for modern *Jenő*

'<name of one of the tribes>'. In the Latin text of the Foundation Charter of the Tihany Abbey (1055), sporadic forms in final *-F/* and vocalized forms both appear: *meneh* [men³F] for modern *menő* [-@:] 'going', *azah* [asaF] for *aszó* [-o:] 'dry valley (in place names)', as well as *fer³eu* [fert³ɛ] for modern *fertő* [-@:] 'swamp, quagmire' and *gisnav* [dʃ³naw] for modern *disznó* [-o:] 'pig' (E. Abaffy 2003:302, transcriptions in IPA). Intervocally, */F/* disappeared eventually, and forms with and without */F/* are found in the document just cited: *fehe* and *fee* for modern H *feje* 'his/her/its head'. Additional examples include Turkic **ayaci* > modern H *ács* 'carpenter' and Turkic **bayatur* > 1138 *Bahatur* (a proper name) > 1230 *Baatur* (a proper name) giving modern H *bátor* 'brave', all with a long vowel today. It can be concluded that */F/* vocalized to */w/* or */ɛ/* depending on the preceding vowel, by the end of the Old Hungarian period.

[C], an allophone (of */F/*) restricted to the [Ct] cluster, also vocalized to */j/* in Old Hungarian: in the Königsberg Fragment (early 13th century/ca. 1350) there is *rohtonc* [roCtoNk] (Hung. *rajtunk* 'upon us'), but in the Jókai Codex (after 1372/ca. 1448) *rayta* (Hung. *rajta* 'upon it/him/her'). The same change happened to the precursor of the modern causative suffix *-ít*: **VFVtV* > *VFt* > [Ct] > 14-16th c. *Vjt* > modern [i:t] (E. Abaffy 2003:120, 304). (It has to be noted that, of course, this suffix *-ít* does not contain */t/* by virtue of coronals being unmarked, nor does this change take place before a coronal because coronals are unmarked.)

Sporadically, **j ç/* strengthened to a sound like */fj/*, */dɛ/* or */dZ/* in Primitive Hungarian, which became */f/* in the course of Old Hungarian (E. Abaffy 2003:119-120). This development can be compared to the regular strengthening of */ç/* in Castilian (in Chapter 5). Old Hungarian */dɛ/* or */dZ/* could come from various

sources such as Finno-Ugrian, Turkic loanwords with /dZ/ or across morpheme boundary in certain imperative forms such as /d/ + /j/ (E. Abaffy 2003:304). In addition, it seems that early Latin loans were also adopted with this value: Latin *gehenna* > *gyehenna* [f]- ‘Hell’ (although these are borrowed through Italian, and the palatal affricate can be the realization of /dZ/).

6.2.4 *On the change affecting uborka*

From the early 16th century two pieces of data show an already well-known phenomenon. In 1519 modern *uborka* [ubork^o] ‘cucumber’ is found spelt *wgorkaak* (in the plural form), and in 1529 as *wborka* (E. Abaffy 2003:312), with [b] for earlier [g]. The word is a Slavic loanword (see Czech *okurka*, Polish *ogórek*), but it is also found in High German as *Gurke* – all these forms testifying to the presence of two velars, /g/ and /k/, in the word. The received explanation for this isolated change in Hungarian is the (regressive) *dissimilation* of /g/ under the influence of /k/. It is surprising that the very prominent labial environment, /ugo-/, has not been called on to give a plausible reason for the change. (As a matter of fact, this environment is way too special for many items to show this change: *uborka* remains an isolated example.) It is proposed here that the change illustrates the spread of labiality over to the placeless [g], similarly to the Finnish change in (2.5).

There are two essential differences between the received explanation in terms of dissimilation and the present, purely local, one. First, in the received approach there is no explanation for why the dissimilation of /g/ is precisely to /b/, rather than, say, /d/ or /f/ (both were and still are existing voiced stops in Hungarian). Moreover, /d/ is often considered unspecified for place, it could emerge here – but it does not. The proposed explanation, on the other hand, establishes a link between the labial environment and the labial /b/: it is a simple case of local assimilation. Second, the present reasoning implies that the change

was not dependent on the following /k/ at all, but in fact it was totally insensitive to its presence (and perhaps it would have happened even if there was no /k/ later in the stem).

Although it might seem at first blush to be too far-fetched to spend this much space on analyzing an admittedly sporadic change in one single word, it should be recalled that the actual change, /g/ > /b/, is far from being isolated or sporadic cross-linguistically. Moreover, this new proposal crucially rests on the assumptions of this dissertation, namely that velars lack a place of articulation, which makes them ready for absorbing place specifications from the neighbouring segments. In fact, this sole example provides further support, this time from Hungarian, for the generality of these claims. It will be recalled that in SPE features, [labial] is not a feature of its own. As for in feature geometry, the effect of the environment is equally associated with labiality. However, it is not obvious why Dorsal is *replaced* by Labial. With no place assumed in velars, the change is explained in a straightforward fashion.

6.2.5 *An excursus on Balto-Finnish changes*

Balto-Finnish languages also show early vocalizations as well as glottalization of final */k/. Proto-Finnish *F vocalized and lengthened the preceding vowel. Examples include Proto-Finno-Ugrian *juFe ‘to drink’ > Finnish *juo-da*, Estonian *joo-ma*, PFU *wiFe ‘to carry’ > Fi *vie-dä*, Est *vii-a* (Bereczki 2000:18), where the stem has the lengthened vowel for the VFV sequence. While other stops are retained word-finally, /k/ disappeared completely in most Balto-Finnish varieties. However, certain Eastern Finnish varieties still have it (as in *lähek* ‘springhead’) while in other Finnish varieties it became a glottal stop (Bereczki 2000:41). Palatalization of /k/, in virtually all Uralian languages, is not a typical process (note that even Hungarian has palatalization only across morpheme boundaries, see Chapter 8). A rare case of palatalization occurs under the bilingual influence of neighbouring Russian in Votic (for details see Bereczki 2000:40-41).

6.3 Asian languages

The empirical data feature some simple cases of velar palatalizations; crucially, parallel palatalizations of coronals do not occur in the same languages. Velars, but not coronals, are attested to reduce to a glottal stop in certain cases and to zero in others (Li 1977). Labio-velars turn into plain labials: this process is found in a significantly large number of Asian languages including Tai languages, Mandarin and Cantonese varieties. They are exemplified by /x^w/ > /f/ and /k^w/ > /p/ changes, either as synchronic variation (Kunming Chinese; Gui 2001) or as historical developments (Tai based on Li 1977, Cantonese on Pulleyblank 1997). Again, it is necessary to point out that coronals do not show similar changes in these languages.

6.3.1 Palatalizations of velars in Tai languages

Tai languages, of which Siamese (Thai) and Lao are probably the best known representatives, can be grouped into three major dialect areas: Southern (or Southwestern) Tai, Central Tai and Northern Tai (Li 1977). Siamese and Lao belong to the group of Southern Tai languages, while most of Central and Northern Tai languages are spoken in Yunnan province of China. It is important to notice that the Tai varieties spoken in China typically show influence of (Mandarin) Chinese mainly in the vocabulary, but not generally in their phonology.

Some Northern Tai languages show palatalizations of Proto-Tai (PT) velars stops, but not of coronals (dentals). There are no palatal reflexes of PT *x, *F since they have gone to glottal /h-/ earlier in NT. In the data below Siamese has also been included for comparison (Li 1977:186-192, 193, 198-203):

(6.4a) Palatalizations of PT *k-, *kh-, *g- before front vowels in Northern Tai

tone	Siamese	Po-ai	T'ien-	Hsi-lin	Ling-yün	gloss
------	---------	-------	--------	---------	----------	-------

class		chow			
B1	k33	tSee	kee	tSee	tSee old, aged
C1	k33	tSee	kee	tSee	? to untie
C1	k33m	tSeem	keem	tSeem	tSeem cheek
D1S	kep	tSip	kip	tSip	tSip to pick up
A1	khem	tSim	kim	tSim	? needle
A1	kh33n	tSeen	keen	tSeen	? arm
A2	khem	tS33m?		?	? salty
A2	khiim	tSim	?	?	? tongs

Before PT non-front vowels there is, of course, no palatalization, as shown below. Notice that in the last item, Siamese came to have a front vowel, but Northern Tai attests to an earlier back vowel.

(6.4b) No palatalization before non-front vowels

tone class	Siamese	Po-ai	T'ien-chow	Hsi-lin	gloss
A1	kaŋ	kaŋ	?	kaŋ	gibbon
A1	kOO	koo	koo	?	clump of plants
A1	khaa	kaa	kaa	kaa	thigh, leg
A1	khau	kau	kau	kau	horn
A2	khaa	kaa	kaa	kaa	to get caught
B2	khuu	kuu	kuu	kuu	pair
A1	kin	k*n	?	k*n	to eat

The most important observation is that coronals are also not palatalized: Siamese *tii* ‘to beat’, *tiin* ‘foot, paw’, *thii* ‘close together; thick’, *thii* ‘place, spot’, *dii* ‘good’ and *diaw* ‘single, only’ correspond to Po-ai *tii*, *tin*, *tii*, *tii*, *nii*, *neeu*, respectively. Also, PT is reconstructed by Li (1977:164, 167, 168) to have palatal affricates */tS/, */tS^h/ and */dZ/. These NT palatalizations are later, and there is no merger with the reflexes of PT palatal affricates: in Po-ai, for example, all three reconstructed affricates became /S/, a reflex which is different from the

result of the palatalization, which is /tS/.

6.3.2 *Loss of velars in Tai languages*

Tai languages also illustrate a phenomenon which has not yet been cited in this dissertation, although it is fairly common crosslinguistically, namely that velars often reduce to a glottal stop. Li (1977:53) also confirms this for Tai: “In general, only the final velar stop is likely to be subject to loss. We must distinguish the real loss from the substitution of the velar by a glottal stop.” Although Li himself provides no examples for the glottal reflex, Gedney does (Hudak 1997). In Pa Kha, a Central Tai dialect the velar stop reduces to a glottal stop only after “original” long vowels (as shown by Siamese):

(6.5) Pa Kha	Siamese	gloss
du?	(kra-)duuk	bone (p.947)
no?	nOOk	outside (p.960)
thuu?	thuuk	correct; to be (p.970)
dek	dek	child (p.947)
nOk	nok	bird (p.960)
nak	nak	heavy (p.960)

6.3.3 *Velar deletion and vocalizations in Tai and Mandarin Chinese*

Velars often get deleted through vocalization, typically resulting in long monophthongs or diphthongs. Li (1977:54-55) provides data from Tai. In the Tushan dialect there is complete loss of /-k/, but the patterns of loss are sensitive to the environment: vocalization of /k/ to /*/ after short /a/, (6.6a); compensatory lengthening of short V with occasional modification of the vowel, (6.6b); and simply lost after VV or vocalic clusters, (6.6c).

(6.6) Tushan dialect

(a) Tushan	Po-ai	Siamese	gloss
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	pja*	pjak	phak	vegetable
	na*	nak	nak	heavy
	ta*	tak	th*k	male animal
	?a*	?ak	?ok	chest
(b)	rOO	lOk	hok	six
	rOO	lOk	nok	bird
	soo	Suk	suk	ripe
(c)	paa	paak	paak	mouth
	?OO	?ook	?OOk	to go out
	raa	laak	raak	root
	ruə	luuk	raak???	to vomit

Gui (2001:87) cites velar vocalization from Kunming Chinese, a Mandarin dialect.

(6.7a) friction rule: [ŋ] > F / ə ___ in Old Kunming Chinese:

əŋ1 > əF ‘blessing’

(6.7b) vocalization rule: əF > /əi/ in Contemporary KC:

təF1	təi1	‘lamp’
səF3	səi3	‘province’
kwəF4	kwəi4	‘stick’
ləF3	ləi3	‘cold’

6.3.4 *Velars interact with labials*

6.3.4.1 Processes across East and South East Asian languages

This feature, also found in Indo-European languages, is found to be particularly common in East and South East Asian languages. In Cantonese for instance it is

particularly common, as Pulleyblank (1997:189) claims: “L[ate] M[iddle] C[hinese] x , when labialized to x^w has merged with f in Cantonese. LMC xH and $?$, when labialized, give Cantonese w [H= ‘voiced aspiration’; *mine*].” Examples are legion:

(6.8)	Cantonese	Mandarin	gloss
	fo	huo	fire, flames
	fok	huo	very rapidly
	fui	hui	regret
	fu	hu	call, cry
	fa	hua	change, influence
	fai	hui	to wield

In Kunming Chinese, as Gui (2001:88) reports, there is an optional rule that $[\eta]$ is realized as $[m]$ after labial $[u]$:

(6.9)	$\eta > m / u$ ___		
	xuŋ2	xum2	‘red’
	thuŋ4	thum4	‘pain’

Simmons (1999:19) reports that among the Wu Chinese dialect group, Charnghsha (a Shiang dialect) $fa1$ ‘flower’ corresponds to $xo1$ in the closely related dialect of Shuangfeng (and to $/k^h x h/$ in other dialects; Beijing Mandarin has $hua1$). Since Charnghsha has $xa6$ ‘descend’ for $cia5$ elsewhere, the initial $/f/$ in $fa1$ can be taken to be the result of original labial in the rhyme: $xwV > fV$. Similarly, another Northern Wu dialect (1999:154), Chyanshiyau, has $fYi1$ ‘dust’ corresponding to Nantong $xue1$, Common Northern Wu $hué1$.

6.3.4.2 Excursus on a possible cognate pair in Tai

Finally, an interesting pair of words from Tai languages will be discussed. It will be proposed that the words meaning ‘body hair, feather’ in Southern and Central Tai are cognates of a word with the same meaning in Northern Tai, although Li (1977) does not recognize their relatedness. For Siamese (Southern Tai) and

Lung-chow (Central Tai), Li (1977:194) cites the following item:

(6.10a)	tone	Siamese	Lung-chow	gloss
	class			
	A1	khon	khun	body hair

He also enumerates the other cognates across ST and CT dialects (1977:197): “For the SW dialects, cf. Lao khon, Ahom khūn, Shan khon, Lü xun, White Tai xun. For the CT dialects, cf. Nung khôn, khôn, Tay khun, Tho khon, T’ien-pao khon.” And he remarks at the same time that: “The NT dialects use another word, cf. Po-ai pūn A1 (...).” The Northern Tai dialects use this word (1977:64):

(6.10b)	tone		Po-ai	gloss
	class			
	A1		p*n	hair, feather

His remark on this: “This is a typical NT word for ‘body hair, feather’, not usually found elsewhere, but Yungch’un (a CT dialect?) has *phun*, showing an aspirated initial.” Unfortunately, Li does not cite more reflexes for the NT form (Yungch’un is CT, and I think the word there could be a borrowing from a NT dialect). The CT Yungch’un word, *phun*, is important here (though possibly nothing decisive) because it is aspirated. Based on the un aspirated /p/ reflex in Po-ai, the PT could come from PT *p-, *ph- or *b-. The CT aspirated reflex, however, indicates a PT aspirated *ph- (Li indeed reconstructs the NT word with *ph-).

Although Li does not recognize these as cognates, they are. The tones (both A1), and the meaning match. Li does not give the meaning ‘feather’ for Siamese *khon*, nevertheless dictionaries do indicate this meaning so that the glosses are identical then. The NT form shows the developments of PT *ph-, while SW and CT forms go back to PT *kh-. Thus, both initials come from an aspirated voiceless stop in PT. Vocalism is also regular, although it is not the most wide-spread set of correspondences. Li (1977:272) mentions that Siamese /o/ sometimes corresponds to /*/ or /O/ in Po-ai. He speculates that it goes back in

such cases to a PT **w** diphthong, with glide *w* as the first element. (Later the glide is dropped, simultaneously causing the [***] to round in Siamese.) His examples include: A1 Siamese *fon* – Po-ai *h*n* ‘rain’, A1 Siamese *bon* – Po-ai *m*n* ‘above, sky’, and A2 Siamese *khon* – Po-ai *h*n* ‘person’. In all these cases CT Lungchow has **/*: *ph*n* ‘rain’, *k*n* ‘person’. What these items show, is that even the vowel indicates that the SW, CT and NT forms for ‘body hair, feather’ are cognates. The only difference is that SW and CT retain the original velar (with rounding **/* to */o/*), while NT developed a plain labial. These observations taken together lend support for the reconstruction of the initial of this item as PT **khw-*, and the whole form is probably from something like PT **khw*n*.

6.3.5 Various reductions, lenitions and palatalizations

Premssirat (1998:41) cites some much more peculiar changes from Khmu dialects. In the Ban Maj Chajdan dialect all dental + */r/* clusters become velar + */r/* clusters: initial */tr/*, */cr/*, */sr/* and */nth/* clusters reduce to */kr/* or */khr/*. Below are all the pairs Premssirat provides:

(6.11) other dialects	Ban Maj Chajdan	gloss
tra:k	kra:k	buffalo
trəh	khrəh ?aspiration	to pull out
cr*p	kr*p	to close the lid
chru?	khru?	deep
sre?	khre?	sand
sra?	khra?	<a kind of edible plant>
sro?	khro?	taro
sruət	khruət	morning
nthru:p	khru:p	to turn upside down
nthr*ŋ	kh*r*ŋ	horn
nthr*:	kh*r*:	to demolish, collapse

As to the aspiration or non-aspiration of the velar reflex, it seems that aspirated dentals and fricative /s/ went to /kh/, the others became unaspirated /k/, which is not particularly surprising (only the *trəh–khrəh* ‘to pull out’ pair does not meet this). But the most important point to note is, of course, that here dentals are seen to become – or in terms of this dissertation, “reduce” – to velars. Note as well that this reduction affects not only the place but also manner of articulation of the dentals in these clusters.

From Chamic Headley (1991:108) a similar case where dental clusters */dl/- and */tl/- become /kl/- (with the difference in register indicating original voicing distinction):

(6.12a) *tlaw ‘three’ > /klǎw/; *dleh ‘tired’ > /klĒh/

In addition, word-finally all obstruents reduce to a glottal stop historically (Headley 1991:108-10):

(6.12b)	*-p	>	/-?/		
				*gǎp ‘each other’	> /kǎu?/
				*ʔasǎp ‘smoke’	> /sǎu?/
				*chiǎp ‘wing’	> /ceau?/
				*lǎp ‘fold’	> /lǎu?/
				*hadip ‘alive’	> /tiu?/
				*ʔdiǎp ‘sticky rice’	> /diǎu?/
	*-t	>	/-?/		
				*haget ‘what’	> /kè?/
				*jhīt ‘sew’	> /chì?/
				*tuʔūt ‘knee’	> /taʔǔ?/
				*laŋīt ‘sky’	> /laŋì?/
	*-c	>	/-i?/ or /-?/ / [front vowels]____		
				*būc ‘pull up’	> /pùi?/
				*pruec ‘intestine’	> /proi?/

		*hūc ‘whistle’	> /hui?/
		*ʔamrec ‘pepper’	> /mrě?/
		*duac ‘run’	> /duai?/
		*sāc ‘shake out’	> /sai?/
		*huac ‘afraid’	> /huai?/
	*-k	>	/-?/
		*brũk ‘rotten’	> /prũ?/
		*bruã? ‘work’	> /prũ?/
		*katũk ‘flatus ventrus’	> /katu?/
		*pirāk ‘silver’	> /prea?/
		*mañak ‘oil’	> /mañ*ì?/
	*-ʔ	>	/-?/
		*pā? ‘four’	> /pa?/
		*hua? ‘eat rice’	> /hoa?/
		*pitu? ‘star’	> /patũ?/
		*ŋõ? ‘upgrade’	> /ŋOì?/
		*tasī? ‘sea’	> /tasi?/

Björverud reports (1998:47) an ongoing palatalization in Lolo (a Central Yipho language in the Burmese-Yipho branch of Tibeto-Burman): “There is an ongoing process in which velar stops in combination with the plain, high front vowel *i* are being shifted to palatal position, while becoming affricates. This process also seems to be pushing original palatal affricates into the lexically rare labial fricative position. This process has progressed differently in various sub-dialects.” She gives an example for the palatalization: *kj3* ‘star’ > *thjì* (aspiration is not accounted for), and another for the other change: *ájiqtjhipàq* ‘rooster’ > *ájiqfipàq* (note that <q> indicates a laryngealized tone, so it is not a segmental phoneme!).

6.3.6 A Cantonese phonotactic constraint

(6.14) *kaak* ‘neighbouring’, and *k^{hw}aak* ‘a loop’

The first word presents no problem: “velarity”, no matter how it is represented, doubly links, as in a range of other words including *kaŋ*, *ŋaak*, *ŋaan*. However, the other word, *k^{hw}aak* ‘a loop’, is problematic since only “velarity” is doubly linked, not the labial secondary articulation. It should be ill-formed just like **k^wam* is. In fact, such syllables are rather numerous in Cantonese: *k^waak*, *k^waŋ*, *k^wik*, *k^wiŋ*, *k^wook*, *k^wooŋ*, *k^{hw}aan*, *k^{hw}aŋ*, *k^{hw}ooŋ*, *k^{hw}ook* in a range of tones are all well-formed words. Moreover, it seems that in Cantonese there is also a constraint on consonants: within a syllable there can be at most two places. The only exceptions to this restriction are syllables having /kw khw/: *k^wat*, *k^waat*, *k^wan*, *k^waan*, *k^{hw}an*, *k^{hw}ut*. This is actually indicative of velars not having a *filled-in* place slot, rather they have an *empty* place slot.

Szigetvári (pc, 2207) raised the possibility that *k^waak* may be grammatical due to the fact that the two dorsal features are not adjacent, but separated by the labial feature of the secondary place. Accordingly, there are two instances of Dorsal:

(6.15a) C (VV) C
 | \ |
 Dor-Lab Dorsal
 *k^w (aa) k

Indeed, this configuration does not violate any of Yip’s constraints unless one interprets the phrase “two identical place nodes are disallowed (1997:261)” in a general sense: “two identical place nodes are disallowed within a syllable (or “phonological word”)", rather than in a restrictive sense: “two identical place nodes are disallowed next to each other”. Moreover, the configuration in (6.15a) would, incidentally, cater for the set *k^wat*, *k^waat*, *k^wan*, *k^waan*, *k^{hw}an*, *k^{hw}ut*:

(6.15b) C (VV) C
 | \ |

Dor-Lab Cor

* $k^w(aa) t$

The choice between the analysis that velars are placeless and that Dorsal can appear twice if separated by (only) Labiality hinges on how the double linking is interpreted. If all occurrences of a place feature within the syllable are to be doubly linked, then $k^w aak$ is problematic. If it is allowed that occurrences of a place feature need not be doubly linked when separated by another place feature, then it is remarkable that only Dorsal and Labial, and only in this order show this property.

6.4 Conclusions

This chapter analyzed a number of phenomena from non-IE languages to show the spread of these processes (and also for their own sake, of course). Hungarian and Tai languages were presented in more detail. The changes included vocalizations of velars, palatalizations in Northern Tai, labial–velar changes and velar glottalizations in many Asian languages. Also, a different, and possibly simpler, analysis was proposed for the change to Hungarian *uborka*, and evidence was presented for a cognate pair of words in Tai. Cantonese provides a phonotactic constraint that is compatible with the claim that velars are placeless: while place nodes cannot be double-linked within a word, the velar place can because there is no feature to double-link.

Chapter 7

On the interaction of velars and labials

7.1 Introduction

This chapter treats an important aspect of the thesis that all the observable phenomena related to plain velar consonants (notably /k g x ʁ ŋ/) can be accounted for if no phonologically relevant place of articulation is assumed in velars. The interaction of velars and labials provides a surprisingly rewarding area where the thesis can be affirmatively tested.

The data to be discussed below illustrate, on the one hand, that there is a pervasive direct interaction between labials and velars, crucially excluding coronals (or dentals) from these phenomena. Since the coronal (dental) space is excluded, these changes cannot be easily attributed to any place assimilation effects on the *production* side. Indeed, some authors such as Ferreiro (1999:116)

and Schmidt (1993:68) stress the *acoustic similarity* of velars and labials. They attribute a central role to perception – recall in this connection the feature [grave] of Jakobson and Halle in Chapter 2.2. On the other hand, the data also support the view that the drive behind these phenomena is simply both the presence of labiality in labials (expressed as some feature or element in phonological theories) and the lack of any place specifications in plain velars. The evidence presented here, and their theoretical account, clarifies what supports that velars can be said to lack a place of articulation.

There is in reality a two-way communication between labials and velars, conspicuously “skipping” coronals. Either a labial reduces to a velar, that is, loses its labial place specification, as observed in Dutch and Northern Russian reductions (sections 7.3.2.1 and 7.3.2.2), or a labio-velar “activates” or “strengthens” its labiality, as observed extensively in the world’s languages (section 7.3.1). These changes are rather straightforward cases phonologically. There is a more peculiar third case, however, when a plain velar becomes labial, as in Middle English and Rumanian (section 7.3.3). This is problematic since labiality is normally available either from a neighbouring segment, typically a labial vowel (/o u/ typically), or the labial secondary articulation of labiovelars. A solution, following King’s (1969) analysis, in terms of phonotactic restrictions excluding velars in certain positions is a promising line of investigation. It will be proposed that segments with no melodic content (no place of articulation) are not allowed in unlicensed positions. The empirical and theoretical problems related to these processes are discussed in this chapter.

The main empirical problem in describing these various phenomena is that they are far less obvious than, say, either a homorganic stop–fricative alternation or cases of palatalization, readily observed in quite a number of languages even in synchronic alternations. A velar and a labial are seldom found in an active *synchronic* (or even historic) alternation. Only one or two examples in Dutch reductions are of this rarer species, though even in Dutch the majority of examples are fossilized lexical items. Generally, such processes are really the realm of the history of the individual languages, but surprisingly enough, not a rare

phenomenon at that, dispersed across the lexicon.

The main theoretical problem, as already indicated, is that there is a two-way communication. Labials might lose their labiality and become a plain velar in a one-step change, with no interludes on the lenition trajectory and not splitting up into labio-velars either. This lenition is a typical lenition process. Also, there is a phonological motivation for it: such a labial tends to stand in a traditional coda position, $_C$ or $_\#$. But how does it work the other way round? Where does a velar get its labiality from, since this change is phonologically arbitrary? The answer to this question lies in the observation that it is historical $*k^w$, $*g^w$ clusters that may undergo the change, never the plain velars. In government phonological terms, this strengthening is a simple reconfiguration of the labiality element into a more prominent position (see section 2.5 on this approach):

(7.1) $k^w \implies p$

$$\begin{array}{cc} [] & [U] \\ \backslash & \\ & [U] \end{array}$$

The loss of labiality, on the other hand, simply consists in the loss of a place of articulation:

(7.2) $p \implies k$

$$\begin{array}{cc} [U] & [] \end{array}$$

Notice that a $p > k^w$ change is not attested. This would consist in splitting up /p/ to create a contour structure. The problem is that this should happen before another consonant or morpheme-finally, a position which favours reductions rather than fortitions (whatever these metaphors actually mean). The loss of place in $p > k$, on the other hand, *is* reduction. In other positions, such as before vowels, a $p > k^w$ change would not eventually be a fortition either because – even though its contour structure would make it strong and stable – its place specification, labiality, would not occupy the strongest position in the structure, it would only be

a secondary articulation. Indirectly, the fact that $p > k^w$ is unattested provides evidence that velars do not have a major place of articulation which could make the contour structure stable.

The chapter is structured as follows. In section 7.2, a preliminary typology of the relevant phenomena is presented (largely based on Huber 2002:31-35, 2004b:27-30). Section 7.3 presents an extensive range of labial–velar interactions attested mainly in the diachronic changes of quite a number languages. Section 7.4 is an attempt to analyze the data in the framework of Government Phonology.

7.2 About the typology of the interactions

There seem to be at least two ways to classify the various phenomena that show interactions between labials and velars: (1) whether they occur frequently in natural languages; and (2) whether there is phonological motivation behind the phenomena. The second approach is admittedly and conspicuously more phonological, while the frequency approach will turn out to be the result of mere lack of data and their unsatisfactory understanding. In Huber (2002, 2004b) no typology had been set up, although a mixture of the two approaches just mentioned is implicit. The combined approach seemed promising at that stage since the primary emphasis was on drawing attention to the facts themselves, seldom described systematically in the phonological literature, while at the same time trying to give a theoretical account for the phenomena and pointing out more problematic cases. Consequently, cases that could be handled more easily in the theory were termed “typical” phenomena while others were termed “atypical”. The typology based on this mixed set of assumptions is presented in (7.3) below.

(7.3) The typology (to be modified):

- 1) Typical phenomena (=frequently attested):
 - a) phonologically unconditioned phenomena
 - b) phonologically conditioned phenomena
- 2) Atypical phenomena (= less frequently attested)

Interestingly enough, the various interaction phenomena have turned out to show a biased combination of these two perspectives, frequency across languages and phonological motivation: Atypical phenomena tend to be phonologically conditioned while typical phenomena are either so conditioned or not. The most important conclusion here will be that all these phenomena are in fact phonologically conditioned and regular: certain changes systematically occur in prevocalic, others in preconsonantal and word-final contexts. In particular, labio-velar > labial changes occur in prevocalic positions, reductions of labials to velars in preconsonantal and word-final positions. This leads to a reconsideration of the initial typology, as shown in (7.4):

(7.4) The revised typology:

- (a) Phoneme inventory affected > changes in __V
 - 1 Changes from labio-velars to plain labials and labio-velars to velars
- (b) Phoneme inventory not affected > changes in __C/#
 - 2 Reductions of labials to velars is only prosodically conditioned
 - 3 Velars > labials only when there is labial vowel preceding

The most important point, however, in the subsequent argumentation is that all the observed phenomena can be directly explained by the presence or absence of a labiality element (the equivalent of [+labial] in featural terms), which is assumed in labials anyway (see Harris and Lindsey 1995:65-73, Cyran 1997:24, and others). Velars, it will be shown, do not need to be assumed to have place specifications at all.

7.3 The data and their analyses

7.3.1 Labiovelar changes to plain labial

7.3.1.1 The three series of velars in Indo-European

Indo-European is assumed to have had three velar series: a plain velar (*k *g *g^h), a palato-velar (*kⁱ *gⁱ *gⁱ^h) and labio-velar series (*k^w *g^w *g^w^h). Incidentally, this makes the velar place of obstruent articulation the most numerous in IE (although no velars appeared in inflectional endings, they only appeared in roots, and most notably in the verbal suffix *-sk-). The various IE languages generally merged some of these clusters, Tocharian merged all of them. The most important point of variation is that some IE varieties came up with sibilant reflexes of the palatal series, and they have plain reflexes of the plain and labio-velar series (these are called satem languages). On the other hand, other IE languages retained the labio-velars and merged the plain and palatal series into a plain velar series (these are the centum languages). These mergers left all modern IE languages with at most two velar series. The table below shows the developments in some selected IE languages, crucially excluding various allophones which emerged in the history of the individual languages. In other words, the table below is to be read Language *X* has at least on some occasions the reflex *y* of IE *K* (for a complete list of all the reflexes in these languages see Beekes 1995:110):

(7.5) IE	Latin	Greek	Germanic	Sanskrit
k ⁱ	k	k	x > h	Ṣ
g ⁱ	g	g	k	dṢ
g ⁱ ^h	g	k ^h	g	h
k	k	k	x > h	k
g	g	g	k	g
g ^h	g	k ^h	g	g ^h
k ^w	k ^w	k, p	x ^w > hw	k
g ^w	g ^w	g, b	k ^w	g

g^{wh} g^w k^h, p^h g^w g^h

In satem languages like Sanskrit the sibilant reflexes are the result of early fusion (strengthening) of the two components of the palatal velars. This was followed by the merger of the other velars, plain and labial. In centum languages like Latin, Greek and Germanic the palatal velars fell together early with the plain series, retaining the labio-velars.

Beekes (1995:109-113) argues that it is in fact quite possible that there had only been two series, a palatal(ized) velar and a labio-velar because the plain series can be established to occur in positions where the two series would be neutralized. In other words, the plain series emerged as allophonic variants of either series, and came to be phonemicized early, in fact still in IE times. It has to be noted at the same time that this phoneme inventory is fairly problematic since it assumes the existence of velars with secondary articulations, but no plain velars. Beekes does not seem to offer a good excuse for this pattern.

Beekes establishes a number of contexts where such neutralizations could occur. Some are quite complex, but in fact all of them are based on well-established IE alternations, so his reasoning appears to be well-founded. Without going into the details of each, two processes will suffice to illustrate the point. After IE *s- (either fixed or the so-called *s*-mobile) the palatal and labial series neutralized by losing the secondary place of articulation: IE *(s)k^hupt- > Skt *Súpti* ‘shoulder’, MLG *schuft* ‘withers’, where Sanskrit has the *s*-less form, Germanic has an initial */s/. Also, a stem that showed alternation of, say, *Cen* and *Cn*, may have depalatalized the palatal velar in the zero-grade form, that is, where it came to be preconsonantal. And this plain allophone could then be analogically generalized to all form of the given root in the individual languages. Such allophonic variations then resulted in the emergence of a new, plain (in fact neutralized) velar series as early as IE itself. The relevance of this argumentation in this discussion is that on the one hand, there are still two velar series, more than at other places of articulation, and on the other, both original series comprise a secondary articulation, with allophonically conditioned neutralization of this

secondary articulation. Only velar can do this in IE.

7.3.1.2 Celtic changes

Among the Indo-European (IE) languages, members of the Celtic branch have been cited most often to show the phenomenon where an IE labio-velar consonant (for instance /k^w/) turns either into a plain velar or labial. The change /k^w/ > /k/ is a simplification which is cross-linguistically wide-spread (for further examples, see section 7.3.1.4). Of particular interest here is, of course, the change to a plain labial, /k^w/ > /p/ and /g^w/ > /b/. Two paradigm examples for the change in Celtic are shown below with some other IE cognates for the sake of comparison:

(7.6) IE ***ek**^wo- ‘horse’

- (Beekes (1995:113) reconstructs ***ek**^juo-, giving Iranian ***aspa**, etc)
 > Ogam Irish **ech** /ex/ versus Welsh **ebol** ‘colt’ (Schmidt 1993:68)
 > Latin **equu**- /-kw-/, Old English **eo**h**** /-x/
 > Ancient Greek **hippo**- /-pp-/

IE ***-k**^we ‘and’

- > Lepontic Celtic **-pe** (Eská-Evans 1993:44)
 > Latin **-que** [kwe] > Spanish **que** [ke]
 > Gothic **-uh**

As can be seen, Indo-European *k^w turned into /p/ in the so-called P-Celtic languages such as Welsh and Lepontic, while it remained a labio-velar (and later simplified to a plain /k/) in Q-Celtic languages such as Ogam (Old) Irish. Based on this dialectal feature, Celtic languages fall into two types as charted below (Schmidt 1993:68):

- (7.7) *k^w > /k^w/ (> /kw/) in Celtiberian, Ogam Irish, Archaic Gaulish
 > /k/ in Goidelic: Modern Irish, Scottish Gaelic
 > /p/ in Brythonic: Welsh, Breton; Lepontic (Gaulish)

It is phonologically significant that these changes to /p/ are not conditioned by a triggering segment in the environment of the labio-velar consonant. In other words, the development to /p/ is not the result of any kind of place assimilation or other. At the same time, it is equally obvious that the labial glide /w/ in the labio-

velar is the only possible source of the labiality. It is a case of reconfiguration then within a complex segment. Discussing these sporadic but characteristic changes to IE $*k^w$, $*g^w$, Martinet (1975c:174) points out that in Celtic the change $k^w > p$ could be facilitated in Celtic since IE $*p$, especially when initial, was deleted. More importantly, the emergence of /b/ from $*g^w$ could not cause merger in IE in general because IE $*/b/$ is extremely rare, and virtually unattested initially. Martinet (1975c:174) mentions that in Brythonic the change was “perfectly established”, while in Goidelic, there was vacillation, and indeed for a time [k^w] and [p] seem to be treated as allophones, hence the attested erroneous treatment of Latin *pascua* as *casc*, and *Patricius* appears as *Cothrage*. Although there is no contextual triggering segment, there is phonology behind the curtains – but let us see some other examples first.

Since Schmidt mentions Gaulish (as developed from Archaic Gaulish) in the P-group, a path from *kw* rather than k^w is suggested by him. This account is problematic, however, because it seems to be more motivated for a single, if complex, segment to turn into a simplex segment than for a sequence to do so. Although there are no objective criteria to tell [kw] and [k^w] apart in a synchronic phonological system (in other words, they are not contrastive), diachronically the following difference is expected: [kw] changes like a sequence of sounds, while [k^w] changes like a cluster (or a contour structure). A case of variation in the actual realization of such a segment may easily be assumed, which later came to be decided in favour of the sequence *kw* rather than k^w . (Besides, alphabetic writing systems do not make such a distinction.) Schmidt notes (p. 82, Note 9) that there are parallels in other languages as well where the set of velars undergoing the “expansion” $k^w > kw$ can even involve voiced /g^w/ and voiced aspirated /g^{hw}/ (in Ancient Greek, for instance, these changes tend to depend on the dialect or the phonetic environment, see below). Unfortunately, he does not give examples. Lass (1994:20-21), however, supplies the relevant developments: IE $*/g^w/$ became /kw/ in Germanic (see Dutch *kwam* for *came*, also OE *cwom*), but it is /b/ in Greek (Gk *baíno* ‘come’ < **banio*) and /w/ in Latin (*venire* ‘come’).

7.3.1.3 Other IE examples

Some examples for the same kind of splits are also attested in other IE languages, which shows that the change is far from being exceptional or rare in any sense. Martinet (1975c:170) indeed claims that “the passage of [k^w g^w] to [p b], that is, the transfer of occlusion from the velum to the lips, is a well-attested and perfectly normal evolution”. For instance, Latin, as the data in (7.6) above show, had retained the labio-velars. From the Italic languages, however, Latin is the only such variety, since neighbouring Osco–Umbrian varieties came up with plain labial reflexes uniformly. This means that the Italic branch showed exactly the same kind of dichotomy as did the Celtic branch, with Latin retaining labio-velars while other Italic languages turned them into labials. The correspondences are regular between Latin /kw/ and Osco–Umbrian /p/ as far as the scarcity of Osco–Umbrian data allows us to see. The following is a brief illustration:

(7.8)	Latin	Oscan	Umbrian	
	quis /kw-/	pis /p-/	pisi /p-/	‘who?’ (Fodor 2000: 1494)
	a sentence in Oscan: <i>status /p/us set hurtin</i> (Fodor 2000:1122)			
		statues which are		in the garden

It is noteworthy that some Romance languages turned Latin labio-velars into plain labials. Rumanian and Sardinian have this feature, again without any contextual restrictions. The Rumanian data also reveal that both voiceless /k^w/ and voiced /g^w/ were affected. Here are some examples from Rumanian and Sardinian with the corresponding Latin items (data from Tamás 1978):

(7.9)	Latin	Rumanian	Sardinian	
	/kw/	/p b/	/p b/	
	aqua	apă	abba	‘water’
	equa	iapă		‘mare’
	lingua	limbă		‘language’
	adaquare	adăpă		‘to take to water’

quattro	patru	battoro	‘four’
qui	pe		‘that <conj.>’
cinque		kimbe	‘five’

As for other Indo-European languages, the Germanic branch, for instance, preserved the IE labio-velars, which show, of course, later effects of Grimm’s Law: IE *k^w > /x^w/: as in OE *hwa* ‘who’, OE *hwat* ‘what’, and IE *g^w > /k^w/: as in OE *cwicu* ‘alive’ (> E *quick*), Dutch *kwi(e)k* ‘quick, alive’, IE *g^wena > OE *cwena* ‘woman’ (> E *queen*), Southern Dutch (Flemish) *kween* ‘old woman’. Slavic languages merged labio-velars into plain velars, original palatal velars having become some sibilant (other satem languages had similar reflexes).

There are some sporadic alternations, nevertheless, whose theoretical importance seems to be little (data partly taken from Huber 2004b:29):

(7.10) Sporadic correspondences

/f, v/	/k, kw/
wolf	Old Slavic * <i>wilku</i> > Czech <i>vlk</i> ‘wolf’, Polish <i>wilk</i> ‘wolf’
four	L quattuor , quartus
five	L quinque

The word *wolf* seems to be an isolated example. Since the word-final /f/ comes regularly from /p/ as derived by Grimm’s Law, the change to /p/ must have preceded the Germanic Consonant Shift. It is interesting that Latin also has *lupus* ‘wolf’ with /p/, which is unexpected. The only explanation (if borrowing from, say, Osco-Umbrian or Sabellan can be excluded) is phonetic in nature. The /u/ of /ul/ may have had an influence on the etymological /kw/. Martinet (1975c:171) describes it as dissimilation rather: the “velar element” of initial /w/ of IE *wlk^wos dissimilated /k^w/ to /p/. He assumes then an earlier change, before the syllabic /l/ was dissolved to [ul] in Germanic. It is not quite obvious, though, why [w] is so much a velar that it could trigger dissimilation. A similarly peculiar case is E *liver* and L *iecur* < **lyk^wrt* (Martinet 1975c:171).

The Germanic word for *four* also goes back to an initial IE /k^w/: *k^wetwores. A standard explanation in this case is the analogical influence of *five*, which regularly goes back to an etymological IE /p/. For this latter word, ‘five’, Latin shows analogical influence since the initial kw- of the cluster in *quinque* is not etymological. It is either the influence of Latin *quattuor* ‘four’, or the assimilation of the second /kw/ of *quinque* < *penk^we. For a similar development, an interesting harmonic effect is detected in the Italic development of *p...k^w > k^w...k^w, for instance in *pek^wo ‘cook’ (see E ‘bake’) – L *coquo* / *popina* (<Osco-Umbrian; Welsh *pobi* ‘cook’). Martinet (1975c:174) adds L *quercus* < *perk^wus ‘oak’.

(7.11) Harmony in Latin: *p...k^w > k^w...k^w

*pek ^w o ‘cook’	> L (*quoquo? >) <i>coquo</i>
*perk ^w us ‘oak’	> L <i>quercus</i>
*penk ^w e ‘five’	> L <i>quinque</i>

This harmony seems to be locally (morpheme-internally) motivated, restricted to some lexical items rather pervading all the system, and in this respect it is slightly different from the rest of the phenomena discussed here. It is not a genuine case of p > kw (recall 7.1, (7.2)). Nevertheless, the examples in (7.10) are considered slightly deviant in form; they do not represent the regular state of affairs, which is that Latin and Germanic both preserved the IE labio-velars and Slavic (as well as other satem languages) came up with plain, but still velar, reflexes.

7.3.1.4 Ancient Greek changes

Ancient Greek is more revealing than it might seem at first sight, therefore it deserves attention. Ionic and Attic dialects of Ancient Greek show some remarkable changes of IE labio-velars *k^w, *g^w, *g^{wh}. On the one hand, there are regular plain labial reflexes of IE labio-velars: Lat *se*[kw]i- – Gr (h)e[p]e- ‘follow’, Gmc [k]u – Gr [b]ous ‘cow’, etc. However, the fate of these clusters seems in fact to have been determined by the following vowel: only when the vowel was one of the back vowels, /a o u/, did the change to a plain labial ensue. When the following vowel was front /e i/, developments to dentals are found

instead, which is truly remarkable. The data in (7.12) below show some examples for the changes to dentals:

(7.12)	*k ^w > t	*k ^w e	> te	‘and’
		*k ^w is	> tis	‘who?’
		*k ^w et ^w ores	> tettares or tessares	‘four’
		*penk ^w e	> pente	‘five’
		*k ^w ei/k ^w oi/k ^w i <root of ‘pay’>		
		*k ^w i-ti-> ti-sis		
		but:	*k ^w oi-neh ₂	> poiné
	*g ^w > d	*ŋ-g ^w en- > a-den-(os) ‘gland’		
		(see Lat. <i>in-gwen</i> ‘hips, waist’)		
		(before /i/, however, often: *g ^w iyos > bios ‘life’, *dios)		
	*g ^{wh} > t ^h	*g ^{wh} en-je/jo- <thematic impf. of ‘kill’>		
		*t ^h en-jó > 1sg. theinó		
		but:	*g ^{wh} on-o-s	> phonos ‘murder, killing’

There are then morphological alternations between /p b p^h/ and /t d t^h/ in Ancient Greek, but their actual morphophonological status is not investigated here. (It also has to be recalled that non-Attic varieties had more regular developments such as IE *penk^we ‘five’ > pen/k/e.) The general developments in the Ionic and Attic dialects can be summarized as follows:

(7.13)	IE *k ^w -	>	/t-/
	IE *g ^w -	>	/d-/ / _____ [+front]
	IE *g ^{wh} -	>	/t ^h -/

Elsewhere: /p b p^h/, respectively.

It is truly noteworthy that in this case reference must be made to a following vowel, and also that all three IE labio-velars are uniformly affected. This is going to gain importance in the following discussion. As for the actual motivation for this surprising change to dentals, the position was defended elsewhere (Huber 2006b) that some sort of palatalization is at work, but the details are not relevant in this discussion (see Rix 1976:87).

There is a further complication in Ancient Greek, however. As early as Pre-Mycenean Greek, a change of the form *k^w > /k/ before _u or u_ took place,

that is, *k^w became plain /k/ in the vicinity of /u/. In this variety, however, all other labio-velars remain intact. The word for ‘shepherd’ illustrates all the Ancient Greek changes particularly well. In Mycenaean Greek, there is /**gwoukolos**/ ‘shepherd’ rather than */**gwoukwolos**/: the only change here is the simplification of the middle complex labio-velar. If one compares this with the (much later) Attic Greek form /**boukolos**/, then both the rather early change *k^w > /k/ and the later Ionic-Attic developments of the initial /g^w/ to /b/ can be seen.

A parallel development to that just described in Pre-Mycenaean Greek, that is, delabialization under the influence of a neighbouring labial vowel, also occurred in Germanic languages where reflexes of IE *k^w have become simple /k/ before a labial vowel (and also at the end of words). Compare IE *g^wou- > Gmc *cu* > English *cow* /kau/, Gm *Kuh* /ku:/, D *koe* /ku:/ with simplification versus *cwicu* ‘alive’ with retained /kw/. Evidence for the original presence of /kw/ comes from Dutch, for instance, where the preterite form of the verb ‘come’ is still *kwam* (singular)–*kwamen* (plural) with /kw/ retained, while all other forms show the loss of the labial glide /w/: *komen* / **kwomen* ‘to come’ and *gekomen* / **gekwomen* ‘come <past participle>’. This preterite form is also attested in Old English: *cwom* ‘came’ as opposed to the simplified form in, say, *cuman* ‘to come’.

Returning to the discussion of Latin and Ancient Greek, one more important observation is in order here. In Ancient Greek simple /k/, which could occur either preconsonantly or prevocally, (7.14a), does not undergo any changes comparable to those above, (7.14b):

(7.14a)	Latin	Ancient Greek	
	se[ks]	he[ks]a	‘six’
	de[k]em	de[k]a	‘ten’
	[k]entu-	(he)[k]ato-	‘(one) hundred’
(7.14b)	se[kw]i-	(h)e[p]e-	‘follow’
	e[kw]u-	hi[pp]o-	‘horse’

This observation is important because it shows that only complex labio-velars underwent the change, simple velars did not.

7.3.1.5 /kw/ or /k^w/?

An important point, as already mentioned, is whether a sequence /kw/ or a single but complex phoneme /k^w/ should be assumed. The straightforward answer is that it does not matter since phonetically they cannot be told apart. In fact, there is by and large agreement (see any handbook on IE comparative linguistics) that IE had labio-velar phonemes such as /k^w/ rather than sequences of a velar followed by a labial glide as in /kw/, for example. Evidence comes from metrical facts in diction, syllabicity facts and, of course, later historical developments. Now it will suffice to point out that assuming a sequence, /kw/, runs into a problem difficult to evade. Namely, if /k^w/ is really /kw/, then it has to be explained why /tw/, for instance, did not behave like /kw/ and, in particular, why it did not change into a plain labial in the course of time. This means in practice that the changes from a labio-velar (and exclusively from these) to a plain labial could only happen at a time when the original sounds were (still) a single phoneme, /k^w/.

7.3.1.6 Labio-velars change outside IE as well

Turning away from Indo-European languages, the following swaps between Standard Chinese and Santai Chinese lend additional support for the view that only complex labio-velar segments, occupying one single timing unit, are capable of either splitting or switching. Duanmu cites (2002:85) the minimal pairs in (7.15a) for such regular swaps between the two Mandarin varieties, Standard Chinese (SC) and Santai Chinese. He also cites some words in (7.15b) for the lack of switches, to illustrate his point:

(7.15)	Standard Chinese	Santai Chinese	
(a)	[hwəi]	[fəi]	‘ashes’
	[fəi]	[hwəi]	‘to fly’
	[hwaŋ]	[faŋ]	‘yellow’
	[faŋ]	[hwaŋ]	‘house’
(b)	[hən]	[hən]	‘very’
	[hau]	[hau]	‘good’

What is a labio-velar in SC is labial in Santai and vica versa (7.15a), while plain velars do not show such swaps (7.15b). (Of course, such a situation can only occur when one of the alternating pairs came from some other segment.) In analysing the phoneme inventory of SC, Duanmu considers [h] to be one of the realizations of the velar fricative /x/ (2002:27), which means that the above data are rightly considered to be labial–velar interactions. From the data above it is apparent that only the labialized velar [h^w] switches to [f] and vica versa, while plain [h] never does. He argues convincingly at great length (2002:82-89) that a prenuclear glide (a /w/ in the case at hand) does indeed belong to the onset (it shares its timing slot). Consequently, the switches in (7.15a) are only possible if [h^w] is in fact a single segment rather than a sequence [hw].

In addition, Duanmu has also confirmed (pc, 2005) that there is a pair of words with initial [f] in both dialects: “The only clear case where both dialects (SC and Santai) use [f] is when the vowel is labial, in particular for the syllable [fu1] ‘husband’ or [fu4] ‘father’.” And he goes on to say: “Also, there are words where both dialects use [h] [although one would expect alternation – we may add]. This happens for the syllable ‘fire’, which is [hwo3] in SC and [ho] in Santai [not *fo]. I believe the reason is that Santai does not have the syllable [fo].” What becomes clear from this comment is that the presence, in both dialects, of word-initial /f/ and the lack of expected alternation is due to the presence of a following labial vowel. It would be good to know whether there are such swaps among other labials and velars as well, in particular with stops. Further investigation is needed here.

A somewhat similar process can also be cited from Thai (Smyth 2002:7). In working class Bangkok Thai word-initial [kw] is often realized as [f], although there is no mention of the reverse process. The peculiarity of this phenomenon lies in the fact that, unlike in SC, there hardly seems to be any evidence in Thai that an obstruent–glide cluster occupies a single slot. Moreover, in Thai, complex initial clusters such as kl-, kr-, pl-, pr- readily occur, unlike in SC. The solution to this apparent contradiction lies in the observation that in the variety associated with Bangkok Thai no complex clusters are allowed, which leaves open the possibility

of still analyzing [kw] as a single unit [k^w] in that particular variety.

What is generally overlooked in connection with this process is why [kw] (or rather [k^w]) turns into a labial fricative [f] rather than a labial stop [p]. The manners of articulations do not match. In a recent unpublished paper (Huber 2006d) I offered the solution that all the few lexical items that show this process go back to an earlier [xw]/[x^w], therefore, the change to [f] is actually rather archaic, historically speaking. Consider the following comparative data (collected by Gedney, edited by Hudak 1997:738-9, 787, 750, respectively):

(7.16)	Siamese	Chiang Mai	gloss
(a)	fai	fai	fire
	faa	faa	sky
	fɔn	fɔn	rain
(b)	khwaa	xwaa	right
	khwan	xwɔn	smoke
	khwaai	xwaaɪ	buffalo
(c)	kwaan̄	kwaan̄	wide

Only items in (7.16b) show [f] in working class Bangkok Thai. The above data provide support for the view that only single complex labio-velars can turn into a plain labial: eg k^w > p, h^w > f.

In connection with the claim that only labio-velars can turn into labials while plain labials cannot turn into labio-velars, it has to be shown why the well-known diachronic change /f/ > /x/ in Spanish is not a counter-example. It is known that Latin initial /f/ changed to /x/ in Spanish as well as in some other neighbouring Romance varieties such as Gasconian (where the change is much more consistent than in Castilian Spanish by the way). In this case, a plain labial /f/ turns into a plain velar /x/ (which was realized as [h] and later disappeared altogether) in exactly the same, prevocalic position as did all the other phenomena treated so far. What is peculiar is that /p/, for example, does not undergo similar changes. Lapesa (1981:38) attributes this change to a Basque substratum since

Basque “seems to lack original /f/; in Latinisms it tends to omit it (*filu* > *iru*; *ficu* > *iko*) or substitute it with /b/ or /p/ (*fagu* > *bago*; *festa* > *pesta*). Moreover, Basque – including Vizcayan throughout the Middle Ages – used to have an aspirated /h/ which could also substitute /f/, with which it alternates.” Lapesa (*ibid.*) writes that “the initial focus of the phenomenon is limited in the ninth to twelfth centuries to the north of Burgos, La Montaña and Rioja.” What all this means for the present discussion is that this particular change happens to be a case of sound substitution, originally in Basque, from which it spread to areas under Basque influence – such is not the case in any of the phenomena discussed so far. In addition, this change is far from being as regular as any of the cases presented above. Therefore, these Spanish examples do not pose a serious objection to the claim that only complex labio-velars can undergo a change to plain labials, not the other way round.

7.3.1.7 Conclusions

A number of important conclusions emerge from the preceding discussion. First of all, although there is no contextual phonological motivation for the various phenomena, all the above changes are phonologically conditioned since they occur pre-vocally and not pre-consonantly. This is true for all the phenomena discussed above: for the Celtic divisions into P-Celtic and Q-Celtic, Italic varieties (both Ancient and Romance), as well as the swaps between Standard and Santai Chinese. In this way then, all velar–labial interactions are phonologically conditioned. This is a major observation, which has tended to be overlooked (including Huber 2002 and Huber 2004b). Second, the above changes provide considerable support for the view that only complex labio-velars can turn into plain labials (or plain velars, of course). Plain velars and plain labials cannot undergo any comparable changes: e.g. $k^w > p$ and $h^w > f$ are possible changes, while neither $*k > p$, $*x > f$, nor $*p > k$, $*f > x$ are attested prevocally (recall that the Spanish change is irrelevant).

7.3.2 Labials reduce to velars

Those phenomena where labials reduce to velars, such as those in 7.3.1.1 above,

also lack a triggering environment. The phonotactic environment is readily seen, however: these changes occur before a consonant or both before a consonant and a word boundary. As for the changes themselves, here plain labials lose their labiality and become plain velars. These are typical lenition cases. (The Dutch and English changes have been treated at some length in both Huber 2002 and Huber 2004b, while Huber 2002 treated Rumanian in a preliminary way.)

7.3.2.1 Dutch: /f/ > /x/ before consonants

In Dutch, synchronically irregular past tense verbs show alternations of the type below:

(7.17)	zoeken	zocht	‘to search’
	brengen	bracht	‘to bring’
	denken	dacht	‘to think’
	? ziekte	– zucht	‘sickness, disease’

It is all normal to find [xt] clusters at the end of a word in Dutch. What is peculiar about Dutch, though, is that not only [k] is reduced to [x] in this position, but labials as well. Dutch shows reflexes of a diachronic change where a labial turned into a plain velar in preconsonantal positions. Here are some comparative data that show cognates of Dutch words in English and German (in Dutch <ch> represents /x/):

(7.18) the rule: Dutch: /f/ --> /x/ / __C

the cognates:

Dutch	English	German
kopen > kocht	cheap	kaufen ‘to buy’
‘to buy, bought 3Sg’		
berucht ‘notorious’		berufen ‘to be called’
related to <i>beroe[p]en</i> ‘to be called’		
gracht <type of channel>		
<D <i>gra[v]en</i> ‘to dig out’	grave	graben ‘to dig’
klucht <type of comedy; farce>		

	related to D <i>kloo</i> [f] ‘split’	cleave	<i>klaffen</i> ‘to gape’
achter ‘behind’		after	
kracht ‘power’		craft	Kraft ‘power’
lucht ‘air’		loft	Luft ‘air’
stichting ‘fund’			Stiftung
zacht ‘soft’		soft	sanft

The data above reveal that the change occurred irrespectively of the nature of the preceding vowel, both front and back vowels could appear there. What is also shown by the data is that the change was likely to occur only before a /t/. In fact, van der Wal (1992:30) gives the rule in the form: *ft* > *cht* (= [ft] > [xt]) in Old Dutch. The problem that immediately arises is why the change is restricted to this environment. (Recall what was said about the morphological dominance of dentals in many Germanic languages in Chapter 3.4.)

It can then be seen that Old Dutch, with the exception of the Old Hollands dialect where -ft# clusters were retained (see Old Hollands *after*, *gecoft*, *graft* for *achter*, *gekocht* and *gracht* in (7.18); van der Wal, 1992:121), regularly reduced all labial fricatives to [x], which means that the fricatives of Dutch in preconsonantal coda position came to be [x] and [s] only. Although contemporary Dutch does have words that contain [ft] clusters word-finally, a good number of these has been borrowed from English (*lift* and *soft drink*), Frisian (*bruiloft* ‘wedding party’) or from German (*schrift* ‘a piece of writing’, *lippenstift* ‘lipstick’), and those that were not borrowed did or sometimes even today do have [xt] counterparts dialectally (for instance *schrucht*). It must be added, though, that there is another way in which [ft] clusters emerge in Dutch, namely through morphological concatenation like in *drijven* ‘to drive’–*drijft* ‘he drives’, but there is obviously a morphological boundary in between: [[drijf] + [t]]. Moreover, the reduction *_ft#* > *_xt#* is a much earlier process which had come to an end by 1000 Common Era.

7.3.2.2 Northern Russian: [f] > [x] preconsonantly and word-finally

Incidentally, a strikingly similar phenomenon is also reported to occur in Northern Russian as well, where voiceless labial fricatives turn into [x] preconsonantly

and word-finally, that is in coda position. Cyran and Nilsson (1998:90), in analysing the motivation for the reflexes of Old Slavonic *w, cite some data to show that in Northern Russian there is alternation between [v] and [x] rather than [v] and [f]. Northern Russian, just like Standard Russian and Czech, but unlike Standard Ukrainian, turned the Old Slavonic glide [w] into a fricative [v]. In coda position, this fricative is devoiced either through word-final devoicing or assimilation to the following voiceless consonant. However, in Northern Russian, the voiceless reflex is [x] rather than [f].

This change is different from the Dutch cases above in an important respect: it is not restricted to preconsonantal environments, rather it applies at the end of words, too. (7.19) illustrates the reflexes of Old Slavonic *w in Standard Ukrainian, Standard Czech, Standard Russian and Northern Russian in word-initial, preconsonantal and word-final positions (data from Cyran and Nilsson (1998:90)):

(7.19) St Ukr	St Czech	St Russian	N Russian	gloss for St Russian
[v]Oda	[v]Oda	[v]^da	[v]^da	‘water’
ła[w]ka	la:[f]ka	ła[f]ka	ła[x]ka	‘fixed bench’
sli[w]	slO[f]	słO[f]	słO[x]	‘word’

As can be seen, reflexes of *w show a tendency to strengthen to fricatives in more and more environments. In strong positions (at the beginning of the word), all these dialects above have developed a voiced fricative reflex, /v/. In weak positions, however, various reflexes have developed. East Ukrainian, which is not represented above, is the most conservative: it retains /w/ in all original environments. Standard Ukrainian has fricative /v/ word-initially, but /w/ elsewhere. Standard Czech and Standard Russian pattern alike: they have /v/ word-initially and /f/ in the other two environments (they differ in more special environments not cited above). Northern Russian went furthest in that it has /v/ word-initially but turned /f/ to /x/ when word-final or before a consonant: the voiceless labial fricative reflex to a velar fricative by depriving it from its labiality

element U. The problem that arises if one compares Dutch and Northern Russian is why Dutch does not have that change word-finally as well? A discussion will follow later.

To conclude, all the typical phenomena are phonologically conditioned, more precisely, they are prosodically conditioned (there is no contextual reason at all) since they occur before a consonant or both before a consonant and a word boundary. That these labial–velar changes occur in prosodically defined environments is exactly what has been found to hold for all the cases in 7.3.1.7 as well.

7.3.3 *Velars prohibited by phonotactic constraints*

There are also cases where velars seem to be prohibited by phonotactic constraints. These are all cases where a plain velar becomes a labial, which is in stark contrast to an earlier conclusion (in 7.3.1.7 above) that only complex labio-velars can undergo splits to a plain labial. (Recall that a possible case of plain labials turning into plain velars, in Spanish, has been refuted above.) What is more, these atypical changes always occur in phonologically weak positions: in pre-consonantal and word-final positions (just like Northern Russian in 7.3.2.2). That these are called atypical is due to the initial difficulty in explaining them rather than their actual rarity in languages (see Huber 2004b). In fact, the changes to be discussed are phonologically absolutely regular, but this time the nature of the preceding vowel does have a role to play here: these changes took place after labial vowels (at least first), and only later could they spread further.

7.3.3.1 Middle English: /x/ > /f/

Old English /x/ turned occasionally into /f/ before a consonant or at the end of a word in Middle English times, but only after back vowels, never after front vowels (there the original velar fricative vocalized and came to form diphthongs). Normally, /x/ turned into a palatal glide /j/ and came to form a diphthong with the

preceding vowel just like in the developments of /F/ discussed in 4.8. Examples are: *high, sigh* (also D *hoog* and *zucht*). Word-initially, /x/ regularly gave /h-/ as in *house, home*, etc. Here are some examples for the change to labials:

(7.20) the rule: (Middle) English: /x/ --> /f/ / __C/#

examples with /-f/ (spelt <gh> today) and their Germanic cognates:

clough	Scots <i>cleuch</i> /klu:x/, D <i>kloof</i> as well <i>klucht</i>
cough	Du <i>kuchen</i>
enough	G <i>genug</i> ; Du <i>genoeg</i>
laugh	G/Du <i>lachen</i>
rough	Du <i>ruig</i> (see G <i>rauh</i>)
trough	G <i>Trog</i> ; Du <i>trog</i>

and some others:

chough, **slough** (of a snake), **tough**

also preconsonantly:

laughter, **draught** (see modern dra[g], draw < drawe < drage;
G *tragen*)

These words are interesting because here the velar fricative had no labiality linked to it, yet there had to be a source for it. Even the spelling suggests that the preceding vowel was a labial (or could have a labial variant as in *laugh*), a potential promoter of labial interests. It has to be noted, however, that the history of English shows signs of a rather colourful picture, since /f/ reflexes are also attested in documents in words like *daughter* and *slaughter*. It seems that the present day *-gh* words that are pronounced with an /f/ are pure historical accidents.

These Middle English developments are a mirror image of the Northern Russian pattern above in the sense that exactly the reverse change happens in exactly the same environment. The ME change, to repeat, occurs only after back vowels, more precisely after labial vowels. There is only a handful of examples with /a:/ and these can be analogical in fact.

7.3.3.2 Rumanian

In Rumanian /k g ŋ/ turned into /p b m/ before a consonant, but not at the end of words. Parallel developments are also attested in Dalmatian, an extinct language. That the change could originally be restricted to positions following a Latin back and labial vowel is indicated by the Dalmatian data: Latin *octu* gave Dalmatian *guapto* ‘eight’, *cognatu* gave *comnut* ‘male relative’. Also, in Albanian, traces of the same development are restricted to positions following a back (labial) vowel: Albanian *lu/f/të* < Latin *lu/k/ta* (Tamás 1978:67). Rumanian, however, seems to have extended the rule as the following data testify (from Tamás 1978):

(7.21a) the rule from Latin to Rumanian: /k g ŋ/ > /p b m/ / ___C

(7.21b) the data:

drea[pt]ă	‘right’	< Latin dire[kt]-
dre[pt]	‘straight, direct’	< Latin dire[kt]-
fa[pt]	‘fact’	< Latin fa[kt]-
la[pt]e	‘milk’	< Latin la[kt]-
lu[pt]ă	‘fight’	< Latin lu[kt]a-
noa[pt]e	‘night’	< Latin no[kt]-
o[pt]	‘eight’	< Latin o[kt]u-
coa[ps]ă	‘thigh’	< Latin co[ks]a
cu[mn]at	‘male relative’	< [ŋn] < Latin co[gn]atus
pu[mn]	‘fist’	< [ŋn] < Latin pu[gn]u-
se[mn]	‘sign’	< [ŋn] < Latin si[gn]u-

Notes: (1) the occasional diphthongs <ea, oa> are later regular Rumanian developments;
 (2) the [gn] > [ŋn] is regular too.

The Rumanian changes are a mirror image of Dutch (7.3.2.1 above) since word-finally no change occurs in either, but Rumanian has exactly the reverse change. It might be worth recalling that Rumanian also retained original preconsonantal /p/’s

(see *șapte* < Latin *septem* ‘seven’), which is unique among Romance languages, and that Rumanian regularly turned labio-velars to plain labials anyway (see (7.9) above). All in all, there is quite some labial dominance in Rumanian.

The intriguing problem in the English and Rumanian data is where these labials could possibly get their labiality from. Probably it is not irrelevant that the changes are either still restricted to positions after a back (possibly labial) vowel (in English) or at least they used to be so restricted (in Rumanian). A possible account for this phenomenon following King’s idea will be presented in the following section.

7.4 The analyses

As had already been indicated in 7.1, a major observation in connection with labial–velar interactions is that they cannot be easily attributed to assimilations on the production side. The acoustic similarity, that is, the perception side of the phonological component, however, has been noted by a number of authors. Probably Ferreiro (1999:116), writing about the history of Galician, had some similar observations in mind when he commented on this change to a labial as “being utterly natural”. Schmidt (1993:68) similarly notes that labials and velars are acoustically nearly equivalent. (It has to be noted here that labiovelars of the /kp gb/ type have been excluded altogether from the discussion. They will have to be treated elsewhere.)

In works of early Generative Phonology the feature [grave] had been introduced to subsume labials and velars as well (see Durand 1990 for an overview; see 2.2.2). However, [grave] cannot account exactly for labial–velar changes, since its specification crucially does not change. Therefore it is not entirely clear how to account for such changes in featural terms. It will be recalled

that velars were defined in SPE as [-labial] and [-coronal], that is, no independent feature was assumed which could define velars positively. This observation should not be neglected.

Government Phonology, to review its presentation in Chapter 1, sees the various phonological phenomena to be deducible from a strictly limited number of possible interactions between strictly adjacent segments. In fact, the only possible effects are termed *licensing* and *government*: licensing makes the realization of a segment possible while government exerts various effects that reduce the capacity of a segment to appear in a given position and thereby to deprive segments from their inherent properties (“consonants are mute, vowels are loud”; recall the Latin grammatical term *mutae* for stops; Szigetvári 2001:56). Both these forces apply from right to left (at least in the standard version of the theory, see Charette 1992, Harris 1997, Szigetvári 2001). In Government Phonology, the binary features of earlier frameworks are replaced by privative elements (Harris and Lindsey 1995). Labials, in particular, have a place element U which defines their lip-rounded pronunciation. Velars do not have an element of their own, which is the simple translation of the lack of labial and coronal properties expressed as [-labial, -coronal] in the earlier SPE theory. The lack of an independent element defining velars naturally follows from SPE features and it will be the basis for the following analyses.

As has been established in 7.3.1.7 above, the Celtic and other changes from labio-velars to plain labials, in (7.7–7.16) above, do not have contextual conditioning, rather they are prosodically conditioned by the prevocalic environment. They can be analyzed as a simple case of internal restructuring of a segment (the promotion of U labiality to head position or its elimination):

$$(7.22a) \quad \begin{array}{ccc} k^w & \implies & p \\ [] & & [U] \\ \backslash & & \\ [U] & & \end{array} \quad \text{versus} \quad (7.22b) \quad \begin{array}{ccc} k^w & \implies & k \\ [] & & [] \\ \backslash & & \\ [U] & & \end{array}$$

It is important to point out here that it is not absolutely theoretically necessary that a velar lacks a place specification. Consider the possibility that there is indeed an

element in the representation of velars. Either choice is possible for the representation in (7.22b). In (7.22b) all that happens is that the labiality of the secondary articulation disappears while nothing happens to the rest of the segment (and its representation). If an element were assumed in velars, it could still happily survive. In (7.22a), on the other hand, it does matter whether place specification is assumed in velars or not because in this case it has to be explained how the actual switch from velarity to labiality comes about since, as has been stated above, there is no phonological conditioning in the environment. In other words, there is no neighbouring trigger for the promotion of labiality. Worse, the supposed velarity element has to be delinked in the first step and the labiality element must be then promoted to the position it occupies in /p/. There is no theoretical motivation whatsoever for the delinking of the supposed velar element.

Notice at the same time that neither the promotion of the labiality to head position nor its deletion from the secondary position needs any special theoretical machinery: both phenomena are driven by the prosodic environment itself, namely the prevocalic position – a position which is phonologically strong. Here licensing makes segments stable, “licensed” (see Harris 1997, Szigetvári 2000). Also recall that in this position only complex labio-velars could be shown to change; the single case, in Spanish, of labials turning to velars in this position does not count as demonstrated above, and no data were found for a theoretically possible change of velars turning to labials before a vowel. To sum up then, there is no motivation for assuming an element in velars since it would not be used to account for any phonological phenomena (recall Occam’s Razor), while the fate of the labiality element – which has to be assumed in labials on independent grounds – in secondary position is readily accounted for by the prosodic environment: the prevocalic position.

The Northern Russian change in (7.19), which occurs preconsonantly and word-finally, is analyzed as a case of phonologically conditioned lenition. Here the effect of the lack of licensing in *_#* position is seen to make consonants more like vowels. The labial place element is lost (this is c-lenition) while all other elements like voicing and continuancy are unaffected:

$$(7.23) \quad \begin{array}{ccc} p & \implies & k \\ [U] & & [] \end{array} \quad \text{and} \quad \begin{array}{ccc} f & \implies & x \\ [U] & & [] \end{array}$$

Notice that in earlier featural terms, there was no problem on the formal side of the explanation since a labial segment became a non-labial one. However, an explanation should be found for why, on losing its labiality, the segment in this position gains a *velar* place of articulation exactly. (If, however, a feature positively defining velars were assumed, then there must be a reason for that to surface in this context.) Apparently, neither the velarity nor the cause for the [-labial] specification is encoded in the environment. In the government approach, on the other hand, the explanation is straightforward, and no appeal has to be made to the segmental environment: the labiality element U is simply deleted from the representation through not being licensed. In any case, the segmental environment has no role to play, which is empirically sound.

To conclude, so far the theoretically more straightforward cases have been accounted for. Two pervasive patterns have been identified. It has been found above that in prevocalic position the strengthening of a labio-velar either to a plain labial or a plain velar results in a more prominent, consonant-like consonant. This is the effect of licensing. In preconsonantal and word-final positions, the loss of the labial element resulted in lenitions of (plain) labials to plain velars. This then is the effect of the lack of licensing. What is important is that the two sets complement each other.

There remain more difficult cases, like the Dutch reduction of labials before /t/ on the one hand, and the Middle English and Rumanian changes on the other. In these latter cases, there is indeed a contextual reason for the acquisition of labiality, at least in the original setting. Later changes, however, could result in the extension of this initial pattern to more environments. The basic idea (taken from King 1969) for their treatment is that they can be analyzed in terms of well-formedness (phonotactic) constraints banning certain velars in certain environments, these constraints beginning to apply in consecutively more and

more environments.

In connection with the Rumanian change, King offers a plausible analysis (1969:115) in terms of rule addition. (It has to be noted that King aimed at an SPE-type analysis of historical changes.) He argues that the change from velar to labial, in (7.21b), is surprising only if one views this as a change *converting* a velar segment into a labial one. He proposes instead that the actual change is in the rule component: the addition of a restriction on well-formed structures. While earlier in the history of Rumanian there used to be no restriction on a sequence of a non-coronal (labial and velar) and coronal segments, now a rule was introduced of the following form:

(7.24) King's analysis (1969):

$$[-\text{continuant}] > [+ \text{anterior}] / \text{_____} \begin{matrix} [-\text{continuant}] \\ [+ \text{coronal}] \end{matrix}$$

This rule simply adds a restriction to the system to the effect that before a coronal non-continuant only a [+anterior] segment is allowed. This rule crucially does *not* say that a velar becomes something else, but that before a non-continuant coronal there can only appear a [+anterior] sound. Obviously, the rule applies vacuously to labials as well. It should be borne in mind that King also expresses the view that the labial in fact does not come from the velar. What is particularly attractive in King's analysis is that it can be extended to the (Middle) English and Dutch data as well: a rule can be added to exclude certain sequences. Although this solution is attractive, some questions remain. For instance, it is not immediately clear why the [+anterior] happens to be a labial, since an Italian-style solution with coronal gemination would also meet this restriction (see Italian *notte*, *fatto*, for instance). Of course, one could add a rule prohibiting geminate consonants in Rumanian, so this is not a serious problem. It is more problematic, though, that the reasoning is difficult to test since there is no other set of segments other than the velars that would show the effect of this rule addition. Notice that

this objection cannot be raised against the Dutch restriction since there even stop /k/ turns into /x/ regularly before another non-continuant: *zoek-* [-k] – *zocht-* [-xt] ‘look for; present–past’. This approach is important since King excludes the alternative route along some /k/ > /k^w/ > /p/ trajectory, which is totally unsupported by the data anyway and it is absolutely unnecessary once one accepts that it is not sounds but grammar that changes. As a final remark on this analysis, this change is a nice symmetrical twin of what was observed in Dutch: in Dutch a restriction was introduced to exclude labials, in English and Rumanian it is velars that are excluded by a structurally identical constraint.

King thus treats this particular change as a change in the rule component rather than an extension of a minor regularity to more and more environments. This latter possibility cannot be excluded, however, at least in a number of cases. Although it was mentioned in the preceding paragraph that this change is attested not only in words that have a neighbouring labial vowel, it can still be the case that indeed those were the first instances of the change, and later the rule extended its scope to all back vowels. In fact, the Dalmatian and Albanian data cited earlier do show such a scenario. (This is a possible chronology for the English *-gh* words, too.)

There is an apparent problem here. How to reformulate King’s analysis into a framework like Government Phonology, where there are no rules to add or delete because simply there are no rules, only elements, licensing and government. In a discussion remotely linked to issues of velars, a similar case has been seen: in Spanish only certain dentals are allowed in final position. There it was argued that these only are licensed. In a similar fashion, it can be proposed that in unlicensed positions languages may have restrictions what to allow. In Rumanian then it can be proposed that velars in preconsonantal coda positions are not allowed.

There is a final point to be considered. One important aspect of the various velar–labial interactions has been neglected so far: what impact all these changes have on the phoneme inventories of the respective languages. An important observation in connection with the Rumanian, Dutch and English changes is that

these phonotactic rule additions do not affect the phoneme inventory of the language, they only change some distributions in it. These rules do not delete a phoneme from the inventory or add a new phoneme to the system. In Rumanian, /k/ can and does appear word-initially, intervocalically and finally in words of Latin origin; similarly in English word-initial /x/ did not disappear but it gave /h/ as in *house*; also in Dutch, word-final /f/ is free to occur. Only, they are banned in some environments. However, in languages where labio-velars were affected before a vowel (Celtic and Greek), the (original) labio-velars did not survive, the inventory lost these phonemes altogether.

It is more than tempting to collapse this observation on phoneme inventories with the changes in the various prosodic environments. This gives a better and truly phonological typology of the velar–labial interactions across languages. In prevocalic position labio-velars undergo changes to plain labials (or velars) and this reduces the phoneme inventory. In preconsonantal and word-final positions, reductions of labials to velars is only prosodically conditioned, the quality of preceding vowels is absolutely immaterial for the changes. On the other hand, changes of velars to labials only happen if there is a preceding labial vowel as well. In this environment, thus, the unmarked process is from labial to velar, the reverse process needs the conditioning of preceding labial vowels. Any of the these changes in preconsonantal and word-final positions leaves the inventory intact.

These observations amount to saying that all labial–velar interactions are exclusively prosodically conditioned, the segmental environment only has a role in the marked process of velars turning to labials, and the preceding labial vocalic environment is a must in those cases. The revised typology looks like this then:

(7.25) The revised typology:

- | | | | |
|---|--|---|------------------|
| A | Phoneme inventory affected | > | changes in __V |
| 1 | Changes from labio-velars to plain labials and velars | | |
| B | Phoneme inventory not affected | > | changes in __C/# |
| 2 | Reductions of labials to velars is only prosodically conditioned | | |

- 3 Velars turn into labials only when there is labial vowel preceding

7.5 Conclusions

There are a number of important conclusions reached in the preceding discussion on the various interactions between labials and velars. Firstly, although there is no contextual phonological motivation for phenomena where a labio-velar turns into a plain labial (or velar), all such changes are phonologically conditioned since they occur prevocally. Plain labials show reductions to velars, and plain velars turn, under strict conditions, into labials in preconsonantal and word-final positions. In consequence, all velar–labial interactions are phonologically conditioned. Secondly, considerable support was found for the view that only complex labio-velars can turn into plain labials (or plain velars, of course). Plain velars and plain labials cannot become labio-velars. Thirdly, there is no motivation for assuming an element in velars since it would not be used to account for any of these phonological phenomena. Fourthly, changes of velars to labials can only occur if there is a preceding labial vowel. Later in the history of a particular language, this environment can extend to cover more and more contexts. This step can be best captured by phonotactic restrictions on what is licensed in a given position. And finally, while these latter phonotactic restrictions do not affect the phoneme inventory of the language, only some distributions in it, changes of labio-velars typically reduce the inventory (labio-velars are lost). These observations were united in the revised typology in (7.25).

Chapter 8

The interaction of velars and palatals

8.1 Introduction

The subject of this chapter is the interaction of velars and palatals. Better known palatalizations and lesser known other interactions will be discussed. It has to be mentioned in advance that the focus of the presentation to follow is not to argue for the exact phonetic details of palatalizations. In connection with palatalization the major point is that coronals and velars often behave differently, and these differences actually support the view that velars are in fact much more prone to palatalization than coronals. Moreover, another set of data from minor languages will be brought in to illustrate that velars are sometimes the result of the strengthening of palatal glide /j/: /j/ > /k/ in certain environments is attested, while

dentals do not result from such strengthenings.

8.2 Palatalization in Romance: a chronological consideration

Palatalization across Romance languages is a well-known phenomenon (see for instance Tamás 1978, Lapesa 1981, Menéndez-Pidal 1989, Herman 2003, etc). The focus of attention in this section and the next is how the results of the palatalization of Latin /t d/ differed from palatalizations of Latin /k g/, and what their relative chronology could be. Let us first have a look at the chronology here, and then at the divergent reflexes of dentals and velars in 8.3.

As is well-known, classical Latin /ke ki ge gi/ sequences were all pronounced with a velar stop. This is proven by loans into Albanian, Celtic, Basque and Old High German. Lapesa (1981:27) cites Basque *pake, bake* < Latin *pacem* ‘peace’. Old High German has *Kaiser* ‘cesar, emperor’ from the Latin name *Cesar*. This situation is only preserved in Sardinian and more archaic Corsican today. In all the other Romance languages palatalization began in the Imperial period, roughly along the following trajectory:

(8.1a) [k] > [kʲ] > [c] > [tS] / [ts]
 [g] > [gʲ] > [f] > [dZ] / [dz]

According to Lapesa (1981:80), the [tS] reflex was present in the Castilian of the Germanic period, as well as in Italian, Dalmatian and Rumanian. However, it turned later into /ts/ in Castilian (and Western Romance in general), a process widely referred to as assibilation. The received chronology is:

(8.1b) [k] > [tS] > [ts] (> [s T])
 [g] > [dZ] > [dz] (> [z])

There is nothing wrong with /k/ becoming either /ts/ or /tS/, Slavic attests to such patterns. Nevertheless, a change from /tS/ to /ts/ (depalatalization) seems

to be less likely phonologically than a change in the other direction, /ts/ > /tS/ (palatalization), because when /tS/ changes, it is usually a change in the manner of articulation, to fricative /S/, or deaffrication to /t/, but not depalatalization to /ts/. A genuine case of diachronic /tS/ > /ts/ remains to be seen. In addition, the modern Western Romance reflexes have non-palatal sibilant [s] or an interdental [T], which are likely to have come from [ts], of course. Therefore, it is not terminologically correct to talk about palatalization here since no true palatals emerged. But Herman (2003:41), quite interestingly, describes that [k] weakens (notice his expression!) before [j]+V to affricate [ts] (not [tS]!!), probably through [tʃ], moreover [t] behaves alike: *nacione* for *natione* in an inscription from Rome before the appearance of the first Christian inscriptions (before the second half of the 4th century). On the other hand, Menéndez-Pidal (1989:94) remarks that “[n]evertheless the sibilant from TY was different from that of CY, but still similar enough for continuous confusions in the 3rd and 4th centuries to occur.” In support of the chronology /ts/ > /tS/, it could be further argued that the difference between /ts/ and /tS/ was a function of the following environment as well as the original consonant, as Menéndez-Pidal notes: /k/ became /tS/ before /j/, and /t/ became /ts/. This is the case in Italian, for example, where /t d/ > /ts dz/, and /k g/ > /tS dZ/, but Spanish has uniform reflex, [T], for all:

(8.2)	Italian		Latin		Spanish or French, etc
	/ts/	<	/t/ +/j/	>	/T/ or /s/
	/tS/	<	/k/ +/j/	>	/T/ or /s/

8.3 Palatalization in Romance: a comparison of some patterns

8.3.1 *Introduction*

This section discusses some implicational properties of velar and coronal palatalizations across languages. The claims and observations below are deliberately sharp, and may be exaggerating in some cases, in order to arrive at a better understanding of the palatalizations of velars and dentals, and what they tell us about the representation of velars and coronals. The major observation is that velars undergo palatalization with far less restrictions than dentals. The discussion reveals important implications obtaining between the palatalization properties of the two groups of segments. These can be summarized briefly as follows:

- 8.3) a) when both velars and coronals palatalize in the history of a language, coronals will have a significantly limited environment to palatalize: velars have wider scope for palatalization;
- b) there are differences between the range of front vowels that trigger palatalization of velars and coronals: velars palatalize before more types of front vowel;
- c) when only coronals palatalize, it is often across a morpheme boundary, rarely within the morpheme: velars are not so restricted;
- d) velars tend to palatalize historically earlier than coronals in the same language;
- e) the palatalization of coronals may result in different segments than the palatalization of velars.

In addition to the observations listed above, it would be interesting to know more about the frequency of morpheme-internal palatalization across languages: is velar or coronal palatalization more frequent within morphemes? Probably there are more languages where only velars palatalize while coronals do not. At least, such languages do exist: in Tai languages, for instance, only velars underwent any palatalization historically. This will be left for future research.

Probably the most disputable proposal in (8.3) above is that the palatalization of coronals within the morpheme implies that velars have already turned into palatals, and that in general there is a morphological boundary involved in coronal palatalization (recall for instance that Latin /tjV/ crucially did *not* give palatals, but /ts/ at most). The palatalization of coronals, however, occurs often across morpheme boundaries only, and hence it is morphologically much more significant and salient. Probably it is not an exaggeration to suggest that the

morphological importance of coronal palatalizations led various phonological approaches to assign prime importance and a special status to coronals, citing their inclination to palatalization in support. A more balanced approach, however, would acknowledge the freer capability of velars to palatalize and the implicational relations mentioned above.

8.3.2 *Velars are practically unrestricted in their palatalization*

Even when both velars and coronals palatalize in a given language, coronals will have significantly limited environments to palatalize. For instance, although in Latin both velars and coronals became palatalized eventually, velars did so without restrictions: sequences like /ke- ki-/ were palatalized to /tSe- tSi-/ regardless of the phonological environment flanking the sequences: word-initially (8.4a-b), intervocalically (8.4c-d), and after sonorants (8.4e-f) as well as following obstruents (8.4g). Also, it happened morpheme-internally in the examples below, of course.

(8.4) Palatalizations of Latin /ke ki/ in various environments

	Latin /k/	>	Italian /tS/	Spanish /T/	gloss
(a)	/k/ircum	>	/tS/irco	/T/irco	‘circus’
(b)	/k/entum	>	/tS/ento	/T/iento	‘hundred’
(c)	pa/k/em	>	pa/tS/e	pa/T/	‘peace’
(d)	de/k/idere	>	de/tS/idere	de/T/idir	‘to decide’
(e)	vin/k/ere	>	vin/tS/ere	ven/T/er	‘to win’
(f)	fal/k/em	>	fal/tS/e	ho/T/	‘scythe’
(g)	s/k/ientia	>	/S/enza	/T/iencia	‘science’

Coronals, on the other hand, behave quite differently. To begin with, word-initial coronals were not normally palatalized in Western Romance when

they were followed by a vowel plus a consonant: Latin *terra* > Italian /t/erra, Spanish /t/ierra, etc ‘land’ as opposed to Latin *centu* > Italian /tS/ento, Spanish /T/iento, etc ‘hundred’ (see (8.4ab) above). Latin *terra* ‘land’ has remained with initial /t/ in practically all Romance varieties. Tamás cites Rumanian as the only Romance variety where word-initial Latin coronal obstruents, /t d s l/, did eventually change: Latin *terra* > Rumanian /ts/eară > /ts/ară ‘earth, land’, *dece* > [z]ece ‘ten’, *sic* > /S/i ‘and’ and *linu* > l’inu > in ‘wool’ (1978:60-61). Italian is noteworthy since in a handful of words, it has [ts]: Latin *thius* > Italian *zio*, but Spanish *tío* ‘uncle’, although both languages have [t] in reflexes of *tiara*. Brazilian Portuguese, (8.6) below, has palatalization before /i/, no matter whether another vowel follows, but importantly this happened after the language had already had palatals (see 8.3.5).

Furthermore, coronals palatalized (or assibilated rather!) word-medially only if the triggering vowel (or rather glide /j/) was followed by another vowel (8.5a, c). Finally, the actual developments, palatal or non-palatal affricate, also depended on whether there was a preceding consonant or not (see the contrast between 8.5c-d). In addition, an obstruent effectively blocked palatalization of coronals: *hostia* ‘host’ does not show palatalization, as opposed to (8.4g) above. These differences are illustrated below on data from Tamás (1978:69):

(8.5)	Latin	Italian	French	Spanish	gloss
(a)	tj + V	ts	ts, dz > s, z	ts, dz > T	
	<i>ratione</i>	-	<i>raison</i>	<i>razón</i>	‘reason’
	<i>platea</i> > *-tt-	<i>piazza</i> /ts:/	<i>place</i>	<i>plaza</i>	‘place’
(b)	C + tj + V	ts	ts, dz > s, z	ts, dz > T	
	<i>fortia</i>	<i>forza</i> /ts/	<i>force</i>	<i>fuera</i>	‘force’

(c)	dj + V	dZ	j	j	
	<i>hodie</i>	<i>oggi</i> /dZ/	<i>-hui</i>	<i>hoy</i>	‘today’
(d)	C + dj + V	dz	dz > Z	dz > T	
	<i>hordeu</i>	<i>orzo</i> /dz/	<i>orge</i>	<i>orzuelo</i>	‘barley’

In connection with developments of dj+V, (8.5c), it is totally reasonable to assume that it is *not* in fact a direct palatalization at all, but the fortition of a geminate (?) /j/, to which French and Spanish cognates point. This means in practice that *no palatal affricates ever* emerged from coronal /t d/ at this stage of Romance. This issue will be taken up again promptly.

To sum up what has been presented so far, the developments illustrated in (8.4-8.5) show that velars and coronals do not palatalize with equal freedom: coronals were severely restricted in their possibility to palatalize in Romance, while velars palatalized without further phonotactic restrictions.

Tamás (1978:61) provides the history of the voiced velars and coronals before palatals, which is interesting because these eventually merged completely in Romance. Latin /ge gi/ gave Italian, Catalan and Old French /dZ/, which became /Z/ in French in 13th century. Spanish is little more complex. There, Latin /ge gi/ gave /gʲe gʲi/, which changed into /j/ when before a stressed vowel (for instance, *gelu* > *hielo* /ʝjelo/ ‘ice’), but they disappeared before unstressed vowels: *germanu* > /er}mano/ (modern spelling has *hermano*). Across Romance, there is usually a merger with /j/ from original Latin /j/ as in *iam* > Spanish *ya* /ja/, French *ja* /Za/ ‘already’. In addition, in all Romance the route of development of /ge gi/ was often taken by /dj/+V, too. This is shown by *diurnu* > It *giorno*, Fr *jour* – this process is not attested all over Romance, though. As for Iberian Romance, Lapesa (1981:55) cites Asturian *xana* /Sana/ from *Diana* and toponyms in Asturias

include *Jomezana* related to the proper name *Diomedes* (1981:58). Herman (2003:41) cites the following spellings where the pronunciation must have been the same, a voiced prepalatal affricate, that is /dʒ/: *baptidiata* for *baptizata*, *Ionisus* for *Dionysus*, *Genuarias* for *Ianuarias* and *congiugi* for *coniugi*. Accordingly, Latin /d/ only gave palatal affricates in early Romance if it merged with Latin /j/, since only the latter became regularly palatal.

8.3.3 *The range of triggering vowels*

There are differences in the range of front vowels that trigger palatalization of velars and those that palatalize coronals. In Romance palatalizations, both of the front vowels, /e i/, affected the velars, but /t d/ were only palatalized before /j/, /teV- deV-/ were not (just like -tiC-, -diC- was neither). It will be recalled, though that in case *de+V* became *di+V*, which did happen through gliding, such clusters could also undergo palatalization as already illustrated above in (8.5c-d). (Moreover, since there are no other reasons for this raising of /e/ > /i/ > /j/ than the dentals themselves, this can be considered further evidence for dentals being palatal; see Chapter 2.6) Notice in passing that the Rumanian developments of Latin *terra* > Rumanian /ts/eară > /ts/ară ‘earth, land’, *dece* > *diece* > *zece* ‘ten’, *sic* > /S/i ‘and’ and *linu* > /l’inu > *in* ‘wool’ (Tamás 1978:60-61) only happened before /i/ and /je/. The difference from similar velar sequences is that after velars /eV/ did not become /iV/. In other languages, too, where coronals show palatalization, it is very often the case that they only palatalize before /i/ or /j/, not before other front vowels such as /e/:

(8.6) Brazilian Portuguese

initially

medially

<i>tia</i> [tʃiə] ‘aunt’	<i>genti</i> [ʒɛntʃi] ‘people’
<i>dia</i> [diə] ‘day’	<i>cidade</i> [sɪdɔdɔ] ‘city’

but [te], not *[tʃe], and [de], not *[dʒe]

This is the case in Hungarian, for example, where there is palatalization of /t/ only before /j/ – these processes will be discussed below.

Also, in RP British English where sequences like *na[tʃ]ure* show palatalization, it is always historical /t/ + /jV/ sequences that do so. It can be proposed, however, that these palatalizations are lexical cases. There are examples where the palatal form is stable and it is after a primary stressed syllable: *nature* [ˈneɪtʃə], *procedure* [prɪˈsiːdʒə], *future* [ˈfjuːtʃə], *erasure* [ɪˈreɪzə], but *mature*, with final stress shows alternation: [məˈtʃʊə] or [məˈtʃʊe]. In *sure* [ʃʊə] and *sugar* [ˈsuːgə] palatalization occurs under primary stress, and they are stable. Notice that initially there is no palatalization in RP British English: *tune* [tjuːn], *[tʃuːn], *dune* [djuːn], *[dʒuːn], even where /j/ is followed by a vowel. Furthermore, sometimes there are still alternations: *assume* can be [əˈsjuːm], [əˈsuːm] or [əˈʃuːm]. Note in particular that palatalization in English is active *only* across morphological boundaries: *miss you* [ˈmɪsju ˈmɪsju], *hit you* [ˈhɪtju ˈhɪtʃ(j)u], *got you =gotcha* [ˈgɒtʃə] etc. Such processes reveal that coronals can be affected by a narrower range of triggering vowels than velars.

8.3.4 Coronal palatalization tends to occur across morpheme boundaries

When only coronals palatalize in a given language, it is generally across a morpheme boundary, rarely within morphemes (recall the only active palatalization in English just mentioned). This is the case in Hungarian, Korean and Semitic languages. Hungarian and Semitic are discussed briefly below.

8.3.4.1 Palatalization in Hungarian verbs

In Hungarian there is palatalization only across a morpheme boundary. The rules are a little complicated phonologically, only the relevant aspects are analyzed here. For the sake of simplicity, the /t/ > [tS] or [S] change will be called true palatalization, while /t/ > [tj] (typically [c:] phonetically) is regarded as fake palatalization in Hungarian. [tS] or [S] are true palatals, while [tj] is merely a palatalized [t]. It is important to point out that in Hungarian only /t/ can undergo true palatalization (and only in verbs), other dentals (/d s/) cannot, these undergo fake palatalization: [d] goes to [dj] or [f] ([s] geminates in certain morphological environments). Underlying /t/ + /j/ obligatorily undergoes palatalization to /tS/, /t/ + /i/ combinations never give rise to [tS]. In underlying /t/ + /i/ combinations, /i/ undergoes gliding when before another vowel, giving rise to [tjV]. Here are the present tense paradigms for the indicative definite (a) and indefinite (b), the subjunctive definite (c) and indefinite (d) and the imperative (e), of the verbs *bont* ‘to sever, untie’ and *hint* ‘to spill’:

(8.7) Hungarian patterns of palatalizations for *bont* and *hint*

	a, def. indicative	b, indef.	c, def. subjunctive	d, indef.	e, imp. indef. (def)
	I sever the...	I sever a....	that I should sever the...	that I should sever a...	sever (the...)!
	bontom	bontok	bon[tS]am	bon[tS]ak	
	bontod	bontasz	bon[tS]ad	bon[tS]	bon[tS]
(d)	bon[tj]a	bont	bon[tS]a	bon[tS]on	
	bon[tj]uk	bontunk	bon[tS]uk	bon[tS]unk	
	bon[tj]átok	bontotok	bon[tS]átok	bon[tS]atok	

bon[tj]ák	bontanak	bon[tS]ák	bon[tS]anak
hintem	hintek	hin[tS]em	hin[tS]ek
hinted	hintesz	hin[tS]ed	hin[tS] hin[tS](d)
hin[ti]	hint	hin[tS]e	hin[tS]en
hin[tj]ük	hintünk	hin[tS]ük	hin[tS]ünk
hin[ti]tek	hintetek	hin[tS]étek	hin[tS]etek
hin[ti]k	hintenek	hin[tS]ék	hin[tS]enek

As can be seen, there are no palatalized forms in the indefinite indicative (column b) where 3sg forms appear without an ending. Furthermore, the subjunctive paradigms are fully regular in having true palatal [tS] in all forms. The underlying forms of these latter can be represented like this:

(8.8.) The underlying representation of subjunctive forms in Hungarian:

stem + **j** + pers-num suffix (with harmonizing vowel)

The present tense indicative definite forms (column a), however, show some allomorphy. In this group of verbs, an /i/ appears obligatorily after the stem in all forms except in 1,2sg (the motivations for this vowel are irrelevant for the present purposes), and this vowel is followed by an /a/ in verbs that have back vowels in the stem. The allomorphy in the indicative present involves the appearance of /a/ after stems containing a back vowel: *bon[tj]a* ‘sever; 3sg’ versus *hin[ti]* ‘spill; 3sg’. The person–number suffixes are added to this form. The underlying representation for these verbs is given below:

(8.9) allomorph ([back]): stem + **i** + a + pers-num suffix (excl 1,2sg)
allomorph ([front]): stem + **i** + pers-num suffix (excl 1,2sg)

In addition there is another rule which is needed independently for other processes anyway: a gliding rule of the form:

(8.10) gliding rule: i > j / __V

This rule ensures that the present definite allomorphs have [j] before a following vowel. In verbs that have /a/ after the stem-final consonant, the rule will apply in all forms (except 1,2sg of course), while in verbs of front vowel set, it will apply only to one form, the 1pl. The crucial opposition is, of course, that between *hin*[ti] ‘spill; 3sg pres. ind.’ and *hin*[tʃ] ‘spill; imper.’. – While this discussion did not consider important aspects of these paradigms, it could show the relevant point: in Hungarian only underlying /j/ can palatalize a dental (well, *only* /t/) and exclusively across a morpheme boundary. This is a fairly restricted environment for a dental to palatalize.

Indeed the history of Hungarian also supports the analysis presented above. The imperative suffix came to palatalize the preceding dentals probably by early Old Hungarian as attested by spellings like *oggun* [dʒ:] ‘that he should give’ and *tamag* [dʒ] ‘attack!’ for modern *adjon!* and *támadj!* [f:]. The personal endings of the indicative still did not palatalize: *tudyuk* for modern *tudjuk* ‘we know’ (E. Abaffy 2003:306).

8.3.4.2 Semitic palatalizations

Semitic languages are very interesting because palatalizations are expected to arise either from the interaction of root consonants when they happen to be adjacent in the template or because a coronal or velar is followed by a palatal vowel of the template. First, cases will be considered where a palatal vowel is part of the template, then cases where root consonants, the second of which is /j/, come next to each other.

Hudson (1995:785-787) analyzes some Ethiopian Semitic languages that often show palatalization in some stem forms of a particular type of verb, the so-called B-type verb. This type of verb is “characterized by gemination [although his data do not seem to have such] of the second consonant of the root in the perfect stem (...) and additionally by a front vowel after the first consonant of the root in the imperfect stem” (pp.785-6). The relevant property of such verbs for

this discussion is the front vowel following the first consonant. In Chaha, if the first consonant of the root is a coronal, it is palatalized to [tʃ] (represented by <č> in the data below) with the vowel centralizing to a [ə]. Of course, the front vowel surfaces as front when no coronal precedes it. In this language, the coronal is still preserved in the jussive, but it shows palatals in the imperfect and, by analogical extension, in the perfect as well (data from Hudson, 1995:786):

(8.11) Chaha palatalizations

perfect	imperfect	jussive	root	gloss
<u>met</u> 'ərə	y* <u>met</u> '*r	yə <u>met</u> '*r	mt'r	choose
<u>č'ənəm</u> ə	y* <u>č'ən</u> *m	yət' <u>ən</u> *m	t'nm	get dark

In Amharic, the process of palatalization also extended to the jussive stem so the root of verbs like 'get dark' are reanalyzed to have an underlying palatal all through. Compare the jussive forms of Chaha and Amharic below:

(8.12) Chaha and Amharic palatalizations

	perfect	imperfect	jussive	root	gloss
Chaha	<u>č'ənəm</u> ə	y* <u>č'ən</u> *m	yət' <u>ən</u> *m	t'nm	get dark
Amharic	<u>č'əlləm</u> ə	y* <u>č'əll</u> *m	y* <u>č'əll</u> *m	č'lm	get dark

Crucial in these changes is that only coronals are affected (and only in root-initial position). What is rarely pointed out, though, is the fact that this palatalization is clearly morphologically conditioned. Like in all Semitic languages, the radicals contain only consonants, and all vowels, including the triggering front vowel above, are supplied by a morphological operation, the template itself. Nevertheless, even if velars showed palatalizations, it would not be bad news since nothing excludes the possibility that velars also palatalize "across"

morpheme boundaries (see Slavic languages, too). The prediction is simply that in Semitic languages coronals will palatalize across morpheme boundaries.

Prunet (1996) analyzes South Ethiopic languages, Chaha and Inor, to provide evidence that non-concatenative morphologies can be just as opaque and complex as concatenative morphologies. The question now is what happens when a triradical root is of the form C_1yC_3 , where C_1 can be palatalized. Can such a palatalization be seen as morphologically conditioned or is it morpheme-internal? It is proposed here that cases of palatalizations where the palatal glide belonging to the root causes the preceding root C to become palatal is morphological. This is for the simple reason that a palatal glide can be adjacent to another consonant only through a morphological operation: template matching. Consider the Chaha verb ‘to cover’ and the Inor verbs ‘to be happy’, ‘to know’, and ‘to brew’ below (from Prunet 1996:233, 240, 245):

(8.13) perfective	imperfective	imperative	root	
ZEnEr	y*ZEn*r	zEr*r	zyr	‘to cover’
sar	y*S*r	sar	sAyr	‘to be happy’
SEkEr	y*SEk*r	sEk*r	sykr	‘to brew’
xar	y*x ^j *r	xar	xAyr	‘to know’

Whatever the details of the patterns and the actual templates are, it can be readily observed that the imperative forms uniformly do not have a palatal consonant. The C_1 of the imperative is the underlying root consonant, and only the templates of the perfective and imperfective make the palatal glide, C_2 , adjacent to C_1 . It is important to see that there is no “extra-templatic” or floating /j/ to trigger palatalization: the only source of palatality is in the root itself. Nevertheless, these palatalizations are also morphological since it is the template matching that makes root consonants adjacent on the surface. In Semitic palatalizations, which are morphological, seem to affect only coronals.

Before concluding this section, a further peculiar case has to be mentioned

where coronals are palatalized morpheme-internally and *progressively*. So far, practically all the cases involved a regressive palatalization: the triggering vowel or glide followed the consonant. It seems that in certain cases, a preceding palatal vowel or glide is equally capable of palatalization. Recall Latin *lacte* > *leite* > Spanish *le/tS/e* ‘milk’ or *factu* > *feito* > *heito* > Spanish *he/tS/o* ‘fact’ from Chapter 5. Similar developments were also attested in Croatian, recall the verbal stem *pek* ‘roast’ and its palatalized infinitive form *peći* from /pek/+/ti/.

8.3.5 Palatalization of velars tends to precede palatalization of coronals

It can be observed in the history of many languages that morpheme-internal velars palatalize earlier than coronals. Although in Latin dentals and velars began to palatalize probably at the same time (or perhaps dentals slightly preceding velars), dentals underwent palatalization only to some extent, and only velars ever become [tS]. (In many languages, however, this is not the case: recall English for instance, and Brazilian Portuguese where velars had long become palatals and only dentals show synchronic palatalization.) Slavic languages exhibit a series of palatalizations in their history, and only the second velar palatalization is followed in time by a palatalization of coronals. In addition, there is a very ancient palatalization of velars in some Indo-European languages, the one that led to the emergence of the so-called satem languages like Sanskrit and Indo-Iranian in general, as well as Slavic. In these languages only velars were affected and there is no trace of a similar palatalization affecting IE coronals at the same time. Also, in the history of palatalizations in English, velars were palatalized quite early (already in Old English), followed by an influx of Anglo-Norman words with palatals (/tS dZ/), while dentals were only palatalized much later. I am not aware of languages where coronals would have palatalized morpheme-internally simply under the influence of a following front vowel (but compare the Spanish progressive palatalization mentioned above). Brazilian Portuguese has such palatalization after it had developed palatals from velars. The major upshot of this

argumentation is that coronal palatalizations do not easily produce palatal fricatives and affricates in a language, it is velars that do.

The chronological order of palatalizations in Romance seems to have been the following. According to Tamás (1978:56), palatalization started in /ki + V/ sequences in 2nd or 3rd century Common Era, which led to occasional confusion with /ti + V/ as shown by inscriptions: he cites the form *Crescentsian(us)* from 140 CE (Herman (2003:41) *nacione* for *natione*). Then after around the 3rd century CE palatalization occurred in all (remaining) /ke ki/ sequences – in other words, no further vowel was needed after the glide to trigger palatalization: *centu* > *k'ientu* > *tsentu*. The assibilated pronunciation came to be the norm in the 5th century CE (Herman 2003:41), soon after the fall of the Empire, giving Italian /tʃe tʃi/ and Old French, Old Spanish /tʃe tʃi/. Rumanian is interesting in this respect as well: while the palatal reflexes of /ki + V/ and /ke ki/ are usually identical, either /tʃ/ or /ts/, in all Romance, Rumanian has both variants in a phonological distribution, /tʃ/ initially, /ts/ elsewhere: /tʃ/erb '(red) deer' and bra/ts/ 'forearm'.

8.3.6 Potentially different outcomes of palatalization of velars and coronals

As pointed out many times, the palatalization of coronals may result in different segments than the palatalization of velars in the same language. In Italian, it seems that Latin velars and coronals did not develop the same reflexes. Interestingly, in Romance languages like French or Spanish the palatal reflexes of velars and coronals merged. But crucially, no Romance variety has a /tʃ/ reflex for Latin /tj/ +V. These distributions are summarized below:

(8.14)	Latin		Italian		French
(a)	kj + V	>	tʃ		ts, dz > s, z
	tj + V	>	ts		ts, dz > s, z

(b)	g _j + V	>	dZ	dz
	d _j + V	>	dz	dz > Z or j

In Slavic, however, mergers happened. The results of the palatalization of coronals merged with the results of the first palatalization of velars (in /tS/), while the result of a subsequent palatalization of velars resulted in a different set in /ts/.

8.3.7 *A comparison of palatalization in OE and Romance palatalization*

It is now time to get things clear on the parallels and divergences between OE palatalization of velars and the similar process found in Romance languages. From the point of view of the actual *phonemes*, both OE and Romance palatalization result in an affricate realization of the velar. A major difference between the two processes is that the affricate realization of the voiced term, /dZ/, is by far not the only product in OE because a glide realization, /j w/, is predicted when it was single: *bridge*, *ridge* as opposed to *yell*, *yield*, *draw*, *follow* (see data in (4.32), in 4.5). Furthermore, while the OE process affected only the velars, the Romance process also had an impact on /ti-, di-/ sequences, although leaving /te-, de-/ strings untouched. It is also of considerable importance what impact the respective changes had on the *phoneme oppositions* in their systems. In Old English, the oppositions involving the velars did not change since a velar still could come before a front vowel if that vowel was itself the result of i-mutation; and of course, a velar was left to stay before a back vowel which was not palatalized. But most importantly, a new series of segments emerged that had not been around before, again a point of similarity with the Romance languages where affricates had not been heard of earlier either. There is an important difference, however, as regards the distribution of the new series and the velars in the Romance type. In Romance languages, but not in Old English, all plain velars were affected and none could stand before a palatal vowel, while labio-velar /k^w g^w/ were left untouched. Later in the history of practically all the modern Romance languages labio-velars lost their labiality (although spelling

conscientiously retains them as <qu> and <gu>), with the result that today plain velars (from Latin labio-velars) can come before a front vowel again. Old English /kw gw/ sequences (the latter extremely rare even today), just like any other cluster, survived unharmed: *craft* (<OE *cræft*), *queen* (<OE *cwen*), etc. Finally, these processes fundamentally differed in *the way they operated*. In Old English this was a side-effect of a more general rule of i-mutation (see Chapter 4 for details), while in late Latin it started as a process directly affecting velars, even though in both cases a palatal vowel forced its palatality on a preceding segment.

8.3.8 Conclusions

This section established that velars are much more prone to palatalization than dentals on a number of counts. It was shown that cross-linguistically velars are less restricted in their ability to palatalize. Velars undergo palatalization before any non-low front vowels (not only high front /i/). They are not sensitive to morpheme boundaries while dentals are often restricted to palatalization across morpheme boundaries but not within morphemes. In addition, the resulting palatals are not necessarily identical, palatal affricate /tʃ/ does not usually emerge from /t/. As for the relative chronology of palatalizations in a language, it can be proposed eventually that if a language develops palatal affricates internally (that is not through borrowing words containing this sound), it is generally from velars or from dentals strictly across a morpheme boundary. This observation has not been often pointed out. These results are important because they find a convenient explanation if velars are assumed to be phonologically unspecified for place of articulation: they more easily take on the place specification of neighbouring sounds.

8.4 Palatal glides may strengthen to velars

Beyond palatalizations, there is also a peculiar process which is relevant in a

discussion of velar–palatal interactions. In certain languages a palatal glide /j/ surfaces as a velar /k/. This is very important because it is manifest in morphological alternations.

The Bergüner dialect of Räto-Romansch exhibits such strengthening (this process was treated in Huber 2004b). The following data show some of these alternations:

(8.15) /krey + r/	> krekr	‘to believe’
/krey + a/	> kreya	‘he believes’
/rey + r/	> rekr	‘to laugh’
/rey + a/	> reya	‘he laughs’
/deyt/	> dekt (dialectal deyt)	‘finger’
/feyl/	> fekl	‘thread’
/veyr/	> vekr (dialectal veyr)	‘true’
/lay/	> lay/*lak	‘lake’
/dzey/	> dzey/*dzek	‘juice’

In this dialect the palatal glide is a member of a falling diphthong. Only when a consonant follows, does such a /j/ turn into a /k/. The strengthening of the yod to the velar provokes the syllabic realization of sonorants, but it surfaces as a velar even if the following consonant cannot turn into a syllabic segment. In all these words, the velar comes to form either an onset-cluster or a coda-onset cluster.

As the data brought up by Andersen (1988) suggest, this type of velar strengthening is not uncommon at all. He cites examples from various (and numerous) dialects of Räto-Romansch and High Provençal, Channel Island and Picardy French as well as certain German, Flemish and Danish dialects. In nearly all these cases, the velar stop uniformly surfaces in the place of either a /j/ or a /w/, voiceless or voiced depending on context. Apart from the sheer incidence and frequency of such forms in these mostly isolated dialects, there is one important trait, which merits to be mentioned here. Andersen says (1988:62-63): “An important fact about [these] dialects (...) is the restriction of parasitic consonants to the maximally explicit diction typical of citation forms, emphasis,

and words under sentence stress, the tendency for the parasitic consonants to be elided in connected speech”. Examples:

- (8.16) /ekr/ ‘to go’ /er a Sko:la/ ‘to go to school’
 /voks/ ‘you; pl.’ /vos pudʒgz ekr/ ‘you can go’

Another example is developments in certain High German varieties. In some language varieties there is a development in which historically stressed long high vowels develop a strengthened second portion – which surfaces as a velar (or occasionally as a labial after labials). Dialects around Waldeck, Hessisches Bergland (from Andersen 1988) provide examples for historical long *ii*, *uu*.

- (8.17) iks Eis ‘ice’
 driksiç dreißig ‘thirty’
 biksEn beißen ‘bite’
 opriksEn abreißen ‘tear off’
 rikfE Reif ‘rope’
 pikfE Pfeife ‘pipe’
 SlikfE schleifen ‘polish’
 tsikt Zeit ‘time’
 likp Leib ‘body’
- uks aus ‘out’
 fukst Faust ‘fist’
 druksEn draußen ‘out there’
 krukt Kraut ‘weed’
 rukpE Raupe ‘caterpillar’
- niNnE neun ‘nine’
 ruNmEn räumen ‘clear away’

A difference in the realization of the strengthened consonant can be observed in High Provençal: in Montana /p/ after /u/, while in Chalais a velar all through (from Andersen 1988)

(8.18)	Montana	Chalais
*nidu ‘nest’	nik	nik
*filu ‘thread’	fik	fik
*servire ‘serve’	servik	servik
*pippa ‘pipe’	pikpa	pikpa
*grifa ‘seize’	grikfa	grikfa
*nudu ‘naked’	nup	nuk
*vendutu ‘sold’	vendup	venduk
*pulsu ‘pulse’	pupsa	puksa
*dulce ‘sweet’	dups	duks
*libra ‘pound’	ligvra	ligvra
*vivo ‘living’	vigvo	vigvo
*vivere ‘live’	vigvr	vigvr

In Cologne German simple dentals became velars after Middle High German long high monophthongs /i: u: y:/ (Ségéral–Scheer (2001:314). When velarization happens, the MHG long vowel shortens. In addition, dental clusters /-nd -nt/ which follow a short high vowel /i y u/ also velarize. Note that there is word-final devoicing and g-deletion after [N] in Cologne German: MHG -nd- > CG -Ng- > -N-. The following data come from Ségéral–Scheer (2001:314) and some from Andersen 1988:

(8.19) Cologne German	New High German	gloss
bQuk (brugg)	Braut	‘bride’
QigE	reiten	‘ride’
StQigE	streiten	‘argue’
bygEl (büggel)	Beutel	‘bag’
lygE (lügge)	läuten	‘ring, sound’
hyk (hügg)	heute	‘today’
huk (hugg)	Haut	‘skin’

lyk (lügg) tsik (tsigg)	Leute Zeit	‘people’ ‘time’
SugiS	shauderlich	‘frightening’
SnigE	scheiden	‘cut’
ligE	leiden	‘suffer’
bQuN	braun	‘brown’
tsuN	Zaun	‘fence’
QiN	Rhein	‘Rhine’
liN	Leine	‘line’
nyN	neun	‘nine’
buNk	bunt	‘colorful’
piNk	Pinte	‘pint’
QyNE	runden	‘round’
biNE	binden	‘bind’
pyNEI	Bündel	‘bundle’

This velarization affects segments in coda position: either VVC or VCC . What is special is that it does not seem to be sensitive to whether it is a V or a C in that coda position.

Harris (1996) cites strengthening of /j/ to /k/ in Cypriot Greek for his point that in fact “segments” are not necessarily categorically and inherently vocalic or consonantal. Indeed whether a particular melody, say palatality, is realized as a vowel, glide or consonant is dependent on where it can associate. Harris argues that [consonantal] does not spread in these cases. When a consonant other than /l n/ precedes /j/, this glide is realized as [k], after /r/, and as [c], after obstruents (1996:310):

(8.20)	mantili-n	mantil/j/-u	‘handkerchief; nom. – gen.’
	tiani-n	tian/j/-u	‘frying pan; nom. – gen.’

teri ‘one of a pair’	/teri-azo/	> ter[k]azo ‘I match’
vari ‘heavy’	/vari-uma/	> var[k]uma ‘I am bored’
e-pia-s-en		> ef[c]asen ‘he took
poDi-on		> poT[c]on ‘feet’

Harris proves (1996:315) at length “that hardening in Cypriot Greek is syllabically conditioned and specifically targets a glide in the onset position of a coda-onset cluster”. – Maybe a similar analysis can account for the velar fortition of glides in Romance, 5.1.2.

8.5 Conclusions

In this chapter two main properties of velars was discussed. On the one hand, it can be established that velars are more prone to palatalization than coronals: velars palatalize in more environments (both initially and medially), before more types of vowel (/e i/), not only before /j/, and their palatalization tends to precede the occasional subsequent affrication of dentals. Moreover, dentals tend to palatalize across morpheme boundaries. On the other hand, it was shown on ample data that velars are sometimes the outcome of various strengthenings of (typically palatal) glides. All this is taken to mean that velars are placeless since either neighbouring palatality can spread into it (palatalizaions), or glides lose their place and the simplest consonant they become is a velar. In fact, this observation may warrant a more detailed ordering of places of articulations in sonority scales: (... >) non-velar > velar > glide > high (close) vowel > low (open) vowel.

Chapter 9

Conclusions

The dissertation discussed what representation velars should be assumed to have, and it was proposed and defended on the basis of a range of data that velars are placeless phonologically. The thesis has denied that there is a direct link between placelessness and markedness. Besides providing positive evidence for this, it was also pointed out that some of the phenomena that are often cited to show the placelessness/unmarked status of coronals do not actually show this.

The dissertation analyzed a range of velar processes. A number of small adjustments were proposed to describe and analyze these phenomena more adequately. To account for the different patterns of nasal loss before Primitive Germanic */x/ on the one hand, and /s f T/ on the other, it is 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). To put it differently, velar /x/ is the most unstable of all the nasal–fricative clusters of Prim. Germanic because the velar does not have a place specification to share with the preceding nasal. In connection with the phonetic interpretation of Old English breaking, it was assumed that the phonetic realization of the broken vowel is a simple [ə]. As for the loss of /x/ between sonorants in OE, it is argued that, for a certain well-defined class of words, the traditional analysis assuming compensatory lengthening is unwarranted because there is no positive evidence, either in the written sources or in phonological theory, that compensatory lengthening took place in words of the *-{l,r}h* type. As far as OE /hw/ clusters are concerned, a possible explanation will be offered for why there is a difference in the later development of *what*, *when*, *wheel* as opposed to *who*. The role of the following labial vowel was pointed out. Further, it was underlined that, across Western Romance, it is the voiced velar

fricative [F] which is *uniformly deleted*. This supports that the velar fricative is the least stable, the first to be deleted. In conention with the so-called velar fortition of [w] at least one proposal must be refuted: the resulting [gwV] sequence, contrary to first impressions, does not create a structure that is well-formed in Latin since Latin had no [gwV] in initial position. That is, this fortition did not occur in order to assimilate these new words into the existing system. As for labio-velar > labial changes, it will be shown that they occur in prevocalic positions, whereas reductions of labials to velars happen in preconsonantal and word-final positions.

A range of phenomena were reviewed from the history of Romance languages, Finno-Ugrian languages such as Hungarian, and also from East and South Asian languages. All these phenomena provide evidence that velars have an open place hosting site where neighbouring place elements can readily spread into.

Beyond providing considerable empirical support for viewing velars as placeless, the dissertation has some practical consequences. In at least two cases, the analyses provided here help to offer a better analysis. In Hungarian, the word *uborka* comes from *ugorka*. The received explanation involves dissimilation of g...k to b...k. Here it will be analyzed the spreading of labiality from the vowel to /g/, which is placeless. For similar considerations, it will be proposed that two Tai words can be related.

Further research is needed in a number of areas. Especially, the representation (and phonological behaviour) of contour structures (affricates, and labio-velars) will have to be addressed in terms of tier-activation. Aspects of the chronology (and historical phonology) of the developments of Latin /ll/ and their palatalization need to be analyzed further. Finally, the consequences of the hint at the end of Chapter 8 concerning the sonority ranking of the places of articulation appears to be a passable tract of future research.

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