

PHONETICS AND PHONOLOGY IN GALLO-ROMANCE PALATALISATION

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ABSTRACT

Palatalisation of the velars /k, g/ in Gallo-Romance applied not just before the usual front vowels /i, e, ε/ but also, famously, before the low vowel /a/. Various scenarios have been proposed regarding the phonetic realisation of /a/ and its relation to palatalisation. I argue that /a/ was allophonically fronted to [æ] in stressed open syllables, where the vowel eventually merged with /ε, e/. Here the palatalisation was phonetically motivated. But due to the relationship of fronted [æ] to the phonemic category /a/, the triggering environment was extended to other tokens of /a/, including non-fronted instances in closed syllables. Here the motivation was the abstract phonological connection between the different surface realisations of /a/.

In this paper I discuss the relationship between two sound changes in Gallo-Romance: the fronting of /a/ in stressed open syllables, and the palatalisation of /k, g/ before /a/ in addition to /i, e, ε/. I argue that allophonic fronting created the original phonetic conditions for palatalisation, but that the phonological structure of the language led to extension of palatalisation to non-fronted tokens of /a/, despite the lack of phonetic motivation in that context. The explanation for the change is therefore partly phonetic and partly phonological.

Section 1 provides basic background on the relevant sound changes in Romance and French. Section 2 focuses on the reflexes of Latin /a/, in particular the contexts in which it eventually led to front mid /ε, e/. Section 3 discusses the palatalisation of velars before this vowel, and theories about the relationship (if any) to the

change in vowel articulation. In section 4 I argue for fronting as the essential cause of palatalisation, with spread to all tokens of the category /a/. Section 5 includes discussion of other sound changes in which generalisation of an allophone occurs. Section 6 places the Old French palatalisation in dialectal context, and section 7 addresses a somewhat similar process in Modern French. Section 8 is a conclusion.¹

1. BACKGROUND

The early history of French can be divided into several periods (Einhorn 1974: 1). It is the Gallo-Romance period that is the primary focus of this paper.

- | | | |
|-----|------------------|---|
| (1) | Proto-Romance | up to the late fifth century |
| | Gallo-Romance | late fifth to mid ninth century |
| | Early Old French | mid ninth to late eleventh century |
| | Later Old French | late eleventh to early fourteenth century |

The sound changes under discussion here precede the clearer written data of the Old French period, so that many of the details are known only indirectly. Significant attestation of the language begins in the Early Old French period, and there is a large corpus available for Later Old French; but there is virtually no direct written record of Gallo-Romance. As discussed in section 6, palatalisation is characteristic of northern but not southern Gallo-Romance (respectively giving rise to ‘French’ and ‘Occitan’); however, since the literature generally refers to palatalisation before the reflexes of Latin /a/ as occurring in Gallo-Romance (French *gallo-roman*), I use the same term here.

In the change from Classical Latin to the Romance languages, the previous quantitative distinction was reinterpreted as vowel quality, with various mergers. The following chart shows the contrasts in stressed syllables in Proto-Gallo-Romance, the

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ancestor of Old French and the locus of the palatalisation discussed in this paper.²

(2) Classical Latin

ī	ĩ	ē	oe	ĕ	ae	ā	ǎ	ō	ō	ũ	ū
Proto-Gallo-Romance		i		e		ε		a		ɔ	
		e		ε		a		ɔ		o	
		i		e		ε		a		ɔ	

Vowel quantity came to play a predictable role in Proto-Romance, as vowels were lengthened in stressed open syllables and shortened in unstressed syllables. I follow other authors in using the notation *A* to refer to the merged reflexes of Latin short and long /ā, ā/, and the abbreviation *Á* for any such reflex in a stressed open syllable (where it is lengthened). Similarly, *KA* stands for /k/ or /g/ followed by *A*.

There were two changes in Gallo-Romance whose interaction is at issue here. First, /a/ in a stressed open syllable – that is, *Á* in Proto-North-French – was fronted and raised eventually to /e/ or /ɛ/ in Modern French, as in *MARE* > *mer* ‘sea’ and *PRATU* > *pré* ‘meadow’. Second, /k, g/ before inherited /a/ were palatalised and affricated to /tʃ, dʒ/ by the time of Old French, with the modern fricative reflexes /ʃ, ʒ/, as in *CARU* > *cher* ‘dear’, *CARRU* > *char* ‘cart’ and *GAMBA* > *jambe* ‘leg’. This palatalisation, a signal feature of French, occurred whether or not the /a/ was in a fronting environment, so that the modern forms in many cases preserve the vowel as /a/. The main questions to be addressed here are: What is the relationship between these changes? What are the implications for the interaction of phonetic motivation and phonological patterning?

2. OUTCOMES OF LATIN *A*

Several contexts must be distinguished for the outcomes of Proto-Romance *A* in Gallo-Romance (Fouché 1958: 125, Bourciez 1967a: 55ff.). The first is a stressed open syllable, where *Á* was lengthened

²The same mergers occurred more generally in Proto-Italo-Western-Romance; somewhat different mergers occurred in Sardinia, the Balkans, and parts of Corsica and southern Italy (Hall 1976: 185ff.). Proto-Romance /au/, not shown in (2), became /ɔ/ in North French, while remaining unchanged in Occitan (Bourciez 1967a: 97, Hall 1976: 92, Brun-Trigaud et al. 2005: 291), but this merger with existing /ɔ/ necessarily occurred after palatalisation, as illustrated in (23).

and fronted. As discussed in more detail below, I treat the fronted vowel as phonetically [æ] in both Gallo-Romance and Old French, with raising at a later time (see also section 7). Proto-Romance forms are shown in small caps, following a conventional notation based on Latin spelling. In many of the forms here, allophonic lengthening of vowels in stressed open syllables, although predictable, is added for clarity; periods denote syllable boundaries; and ϵ , \circ stand for the open vowels / ϵ , \circ /.

(3)	Proto-Romance	Old French	Modern spelling	
a.	PÁ.TRE	/pæðrə/	<i>père</i>	'father'
b.	MÁ.RE	/mæɾ/	<i>mer</i>	'sea'
c.	LÁ.BRA	/lævrə/	<i>lèvre</i>	'lip'
d.	CLÁ.VE	/klæf/	<i>clef, clé</i>	'key'
e.	PRÁ.TU	/præð/	<i>pré</i>	'meadow'
f.	PAS.SÁ.RE	/pasæɾ/	<i>passer</i>	'to pass'

The transcriptions of Old French included here, based on Hall (1976), represent the pronunciation of Early Old French; in particular, they include /ð/, a sound absent from the Later Old French pronunciations that are largely the basis for modern spellings.

In a closed syllable, the vowel remains /a/ through Modern French. This is true for closed syllables whether stressed (4) or unstressed (5). Note that the persistence of Latin gemination into the Gallo-Romance period is essential for determining syllable structure at this time, but this distinction is lost by the time of Old French.

(4) a.	PÁS.SU	/pas/	<i>pas</i>	'step'
b.	GRÁN.DE	/grant/	<i>grand</i>	'big'
c.	PÁR.TE	/part/	<i>part</i>	'part'
d.	FLÁM.MA	/flamə/	<i>flamme</i>	'flame'
e.	ÁR.BO.RE	/arbrə/	<i>arbre</i>	'tree'

(5) a.	BLAN.DÍ.RE	/blandir/	(<i>blandir</i>)	'to flatter'
b.	ES.CAP.PÁ.RE	/estʃapæɾ/	<i>échapper</i>	'to escape'

The fate of /a/ in an unstressed open syllable depends on its position in the word. In a word-initial syllable, the vowel remains

/a/, except in combination with palatalisation as discussed in section 3. (For the cross-linguistic strength of initial syllables, see Beckman 1998.)

- (6) a. MA.RĪ.TU /marið/ *mari* ‘husband’
 b. A.MĪ.CU /ami/ *ami* ‘friend’
 c. A.BĒ.RE /avejr/ *avoir* ‘to have’

Elsewhere in the word, i.e., in medial or final position, the A ends as /ə/ or is deleted; sometimes it is presumed to have passed through an intermediate step such as /ɛ/ (Matte 1982: 151ff.).

- (7) a. OR.NA.MĒN.TU /ɔrnəment/ *ornement* ‘ornament’
 b. AR.MA.TŪ.RA /arməðurə/³ *armure* ‘equipment’
 c. LA.VA.TŪ.RA /lavəðurə/ *lavure* ‘washing’
 d. PEC.CA.TŌ.RE /pɛfəðowr/ *pêcheur* ‘sinner’
 e. PŌR.TA /pɔrtə/ *porte* ‘door’

The crucial observation is that only some tokens of stressed /a/ underwent fronting, namely those in open syllables. The important remaining question is the status of the other tokens of /a/ at the time of the palatalisation, since all trigger the change in KA: were they somehow phonetically fronted, perhaps to a lesser degree, but still low? Or had they become mid vowels? For some evidence on this point, we must examine the reflexes of A in Old French.

2.1. Fronted A in Old French

Assonances in Old French poetry are an important source of evidence regarding the distinctness of various non-high front vowels in the post-Gallo-Romance period. Based on sets of words that are permitted in positions of assonance – which depends on the identity of the stressed vowel – it is clear that fronted Á[had not yet merged with /ɛ/ and /e/; despite the fact that all were spelled

³These transcriptions of Early Old French, from Hall (1976), do not show the effect of the sound change that fronted /u/ to /y/, which probably did occur by the time of the earliest literary attestations (Bourciez 1967a: 94f.); but certainly this fronting had not occurred at the time of the Second Palatalisation, as discussed in section 2.2.

with *e*, this letter actually labels three different assonance classes, which can be assigned to the following Old French phonemes (Nyrop 1935: 201, Fouché 1958: 261f., Herslund 1976: 11, Buridant 2000: 42).

- (8) /e/ *ele* < ILLA ‘she’
 met < MITTIT ‘put (3sg.)’
 ceste < (Ē)C-ISTA ‘this (f.)’
 dete < DEBITA ‘debt’
 /ɛ/ *bel* < BĒLLU ‘beautiful (m.)’
 bele < BĒLLA ‘beautiful (f.)’
 teste < TĒSTA ‘head’
 pert < PERDIT ‘lose (3sg.)’
 /æ/ *tel* < TALE ‘such (m.)’
 ele < ALA ‘wing’
 mer < MARE ‘sea’
 clere < CLARA ‘clear (f.)’

The result of open-syllable fronting is the third vowel, given here as /æ/. There is, however, controversy regarding the actual pronunciation of Á[in Old French.

One common view takes the third vowel to be long and mid, either /ɛ:/ or /e:/, in order to keep this vowel distinct from short /ɛ, e/ (Meyer-Lübke 1890: 212f., Schwan-Behrens 1914: 48, Pope 1934: 106, Fouché 1958: 261, Bourciez 1967a: 56, Einhorn 1974: 6, Zink 1986: 56). This position is problematic because contrastive length had otherwise been lost in Old French. In addition, such an analysis would require the long mid vowel even in a closed syllable, which is similarly inconsistent with the general pattern of Gallo-Romance. (The syllable was previously open, as in PARET > *pert*.) For example, the two words in (9) belong to different assonance classes (Herslund 1976: 12).

- (9) a. *pert* < PĒRDIT /pɛrt/ ‘loses’
 b. *pert* < PARET /pært/ or ?? /pe:rt/ ‘appears’

A second view, which I adopt here, treats the third vowel as low and front (Nyrop 1935: 201, Hall 1946: 579, 1976: 52, Price 1971: 66, Herslund 1976: 10ff., Walker 1981a, b, Buridant 2000: 42). In other words, at the time of Old French, fronted Á[was still a low vowel

/æ/ that underwent raising to merge with /ɛ, e/ after the twelfth century.

It is important to recognise that this \acute{A} also does not assonate with /a/, the closed-syllable reflex of A. Changes in syllable structure – in particular, vowel loss placing \acute{A} in new closed syllables – meant that /æ/ and /a/ now have to be treated as separate phonemes (cf. *pert* in (9)), although a morphophonemic rule relates them in verb paradigms (cf. Herslund 1976: 60, Walker 1981a: 26, Klausenburger 1982):

- (10) a. *lavons* /lavóns/ ‘we wash’
 b. *levant* /lévənt/ ‘they wash’

It should be pointed out that the back /ɑ/ still found in some modern varieties of French is a later development. It derives from long /a:/, which first arose by compensatory lengthening under deletion of coda /z/ and /s/, respectively by the eleventh century and around the twelfth century (Fouché 1961: 861f., Bourciez 1967a: 162f). The back vowel quality is attested as early as the thirteenth, and certainly by the sixteenth century (Fouché 1958: 243f.).

- (11) a. *bas* > *ba:* > *ba* *bas* ‘low’
 b. *pastə* > *pa:tə* > *patə* > *pat* *pâte* ‘paste, dough’

The relative chronology means that the backness of this /ɑ/ does not bear on the discussion of Gallo-Romance. However, as addressed in section 7, it may bear on palatalisation in Modern French.

2.2. *How fronting occurred*

In Classical Latin (Allen 1970: 50) and Proto-Romance (Hall 1976: 18), the low vowel /a/ appears to have been phonetically central. By what path did this A, lengthened as \acute{A} in a stressed open syllable, come to be /æ/ in Old French?

According to one analysis, the central fact is diphthongisation. Common proposals have some version of the following sequence of events, where the frontness emerges first as an offglide (Fouché 1958: 227f., Haudricourt & Juilland 1949: 44, 1970: 54, Bourciez 1967a: 56, Zink 1986: 56, Joly 1995: 55).

(12) á > áa > áε > έε (> έε)

This scenario suffers from the need to suppose a long front vowel in closed syllables in Old French (cf. (9)). The arguments in favor of the intermediate [æ] stage, made most explicitly by Fouché, are subject to other explanations. For example, the fact that Á[became the diphthong /aj/ before a nasal (FAME > *faim* ‘hunger’) does not mean that every token of Á[went through a diphthongal stage: that change might easily have applied only to nasalised vowels, which often follow different spectral paths to oral vowels (Hajek 1997; cf. Matte 1982: 191). Other arguments appeal to the fact that fronting occurred in open syllables only, but the common thread is vowel lengthening – an extremely common change in a stressed open syllable – and not necessarily diphthongisation.

Another approach involves simple fronting. Hall (1946: 579) notes that ‘phonetically [æ] is far the most likely transitional sound between [a] and [ε].’ This is my position, not only because it is the most direct, but also because (as discussed below) it provides the front vowel necessary as the most plausible trigger for the palatalisation of velars.

(13) á > á: > áε: (> έ, έ)

Diphthongisation is not inconsistent with fronting, of course; one might propose a combination (cf. Matte 1982: 104). In such a case, however, diphthongisation is not the primary phenomenon.

(14) a: > æ: > æε > ε

Here, non-contrastive lengthening in a stressed open syllable was a precondition for fronting (rather than for diphthongisation). The study of vowel shifts in general shows that long vowels typically move up in the vowel space, and back vowels move forward (Labov 1994: 116); thus it is typologically natural for [a:] to move to [æ:] and [ε:].

Note that the fronting of /u/ to /y/, another striking fact of French, does not seem related to the Gallo-Romance fronting of /a/. Most importantly, the fronting of /u/ is later than

palatalisation of K, perhaps starting in the eighth century (Fouché 1958: 203ff., Bourciez 1967a: 94f., Matte 1982: 102). Otherwise the front vowel /y/ should have palatalised K as well; that would predict outcomes such as *CURA* > **chure* /ʃyr/ rather than *cure* /kyr/. In addition, /u/-fronting applies to all tokens of Gallo-Romance /u/, not just in stressed open syllables (where the vowel would be long in Gallo-Romance). Finally, this fronting is in the opposite region of the vowel space, and was most likely caused locally by crowding in the high back space as mid /o/ rose to high /u/ (Haudricourt & Juilland 1949: 109, 1970: 114).

3. PALATALISATION OF VELARS IN (GALLO-)ROMANCE

3.1. *The First Palatalisation*

Before describing the Gallo-Romance or ‘Second Palatalisation’, it is important to distinguish it from the earlier but similar First Palatalisation, which affected Proto-Romance in the third century (with the notable exception of Sardinian; cf. Hall 1976: 67f.). This change applied to /k, g/, but only before the front vowels of Proto-Romance, namely /i, e, ε/. The eventual outcome of the First Palatalisation was /ts, tʃ/ in Old French, /s, ʒ/ in the modern language.

(15)	Proto-Romance	Old French	Modern spelling	
a.	CĪ.LIU	/tsi ^l /	<i>cil</i>	‘eyebrow’
b.	CĒ.RA	/tsirə/	<i>cire</i>	‘wax’
c.	CĒN.TU	/tsent/	<i>cent</i>	‘hundred’
d.	GIN.GĪ.VA	/tʃentsivə/ ⁴	<i>gencive</i>	‘gum’
e.	GĒ.LU	/tʃjel/	<i>gel</i>	‘frost’
f.	AR.GĒN.TU	/arʃent/	<i>argent</i>	‘silver, money’

The output for voiceless /k/ does not merge with the result of the First Palatalisation of Proto-Romance, which at this stage had

⁴By dissimilation, the second /g/ of Proto-Romance GINGIVA has been devoiced in Old North French, hence the outcome /ts/ rather than /tʃ/; the same occurs in GIGERIU > *gésier* ‘gizzard’ (Dauzat et al. 1971: 337, 341), although the latter may reflect influence of *gosier* ‘throat’ (Meyer-Lübke 1911: 280). Similar devoicing in /gingiwa/ also occurs in a few other Romance languages (Meyer-Lübke 1911: 281).

become /ts/ in Gallo-Romance. Voiced /g/ does, however, have the same outcome /dʒ/ in both palatalisations. The following chart outlines the stages, with sound changes highlighted.

(16) Latin	k	g
First Palatalisation second–third century	ts k	dʒ g
Second Palatalisation fifth–sixth century	ts tʃ k	dʒ dʒ g
Deaffrication thirteenth century	s ʃ k	ʒ g

An important question, then, is why the Second Palatalisation, two centuries later in Gallo-Romance, was triggered not only by the expected front vowels but also by reflexes of /a/.

3.2. *The Second Palatalisation*

As mentioned above, the Gallo-Romance or Second Palatalisation was a new process in the late fifth or early sixth century (Meyer-Lübke 1890: 354ff.). Its most striking aspect is that it changed /k, g/ to Old French /tʃ, dʒ/ primarily when followed by /a/, which is not a typical trigger for such a change. The Second Palatalisation occurred before all reflexes of A, including those that stayed non-fronted as /a/ in a closed syllable (17) and those that were eventually reduced to /ə/ in an initial (18) or final (19) open syllable.

(17) a.	CÁR.RU	/ʃar/	<i>char</i>	‘cart, wagon’
b.	CÁM.PU	/ʃamp/	<i>champ</i>	‘field’
c.	CAR.BÓ.NE	/ʃarbɔn/	<i>charbon</i>	‘coal’
d.	CAN.TÁ.RE	/ʃantær/	<i>chanter</i>	‘to sing’
e.	GÁM.BA	/dʒambə/	<i>jambe</i>	‘leg’
f.	GÁL.BI.NU	/dʒalnə/	<i>jaune</i>	‘yellow’

- (18) a. CA.BÁL.LU /tʃəval/ *cheval* ‘horse’
 b. CA.NŪ.RA /tʃənurə/ *chenure* ‘gray hair’
 c. GA(L).LÍ.NA /tʃəlinə/ *geline* ‘hen’
- (19) a. VÁC.CA /vaʃə/ *vache* ‘cow’
 b. BŪC.CA /boʃə/ *bouche* ‘mouth’
 c. LĀR.GA /larʃə/ *large* ‘broad (f.)’

Reduction of unstressed open /a/ to schwa necessarily follows palatalisation, since the /a/ triggers the change in the preceding velar in words like CABALLU > *cheval* and VACCA > *vache* (Bourciez 1967a: 43ff., Fouché 1958: 448f., Matte 1982: 103).

Where the vowel A fronted, we of course also find palatalisation; Old French spellings are shown along with the modern forms.

- (20) a. CĀ.SA /tʃjæzə/ *chiese* > *chez* ‘house (of)’
 b. CĀ.RU /tʃjær/ *chier* > *cher* ‘dear’
 c. CĀ.NE /tʃjæn/ *chien* ‘dog’
 d. PUR.GĀ.RE /purʃjær/ *purgier* > *purger* ‘to purge’
 e. NAV(I).GĀ.RE /naʃjær/ *nagier* > *nager* ‘to swim’

The introduction of the onglide [j] in these forms is due to Bartsch’s Law, a subsequent change, probably in the sixth or seventh century (Meyer-Lübke 1890: 236f., Fouché 1958: 449, Matte 1982: 166, Machonis 1990: 96); for related discussion, see section 6. This effect of a palatal consonant on a following vowel has parallels in several languages discussed below – Franco-Provençal, Old English and Zuni. In Middle French, the glide was ‘absorbed’ by the palatal (*chier* > *cher*); an exception is *chien*, perhaps attributable to vowel nasalisation.

The palatalisation triggered by A was also triggered by /i, e, ε/, but there are rather few examples of the change in this context, because the First Palatalisation in Proto-Romance had eliminated inherited sequences of a velar plus a front vowel (KI or KE). But subsequent borrowings of /k/, primarily from Germanic, undergo the Second Palatalisation to produce /tʃ/ in these contexts (Meyer-Lübke 1890: 356, Fouché 1958: 197, 1961: 554f., 701, Pope 1934: 128, Bourciez 1967a: 130).

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|------|----|-------------|------------|---------------------------------|-----------------------|
| (21) | a. | skerpa | /ɛstʃɛrpə/ | <i>écharpe</i> | ‘scarf’ |
| | b. | skîna | /ɛstʃinə/ | <i>échine</i> | ‘spine’ |
| | c. | kip(f)ɛ | /ʃipə/ | <i>chiffe</i> | ‘rag’ |
| | d. | re + kînan | /rɛʃinjær/ | <i>rechigner</i> | ‘to grimace,
balk’ |
| | e. | meskin | /mɛstʃin/ | (<i>meschin</i>) ⁵ | ‘a youth’ |
| | f. | sakk + ettu | /sɑʃɛt/ | <i>sachet</i> | ‘small bag’ |

Newer derivations such as *sachet* in (21) also show the Second Palatalisation (Martinet 1973: 483). Loanwords containing /ka/ also undergo the change, of course (Nyrop 1935: 396, Bourciez 1967a: 136).

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|------|----|-------|----------|----------------|------------------|
| (22) | a. | marka | /marʃə/ | <i>marche</i> | ‘border country’ |
| | b. | Karl- | /ʃarləs/ | <i>Charles</i> | ‘Charles’ |
| | c. | gard- | /ʒɑrdin/ | <i>jardin</i> | ‘garden’ |

The inherited sequence /au/ monophthongised to /ɔ/ soon after the Second Palatalisation, as reflected in the Old French pronunciation: It was clearly /a/, the first half of the diphthong, that triggered the rule (Matte 1982: 104).

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|------|----|---------|--------|--------------|---------|
| (23) | a. | CÁU.SA | /ʃɔzə/ | <i>chose</i> | ‘thing’ |
| | b. | GÁU.DIA | /ʒɔjə/ | <i>joie</i> | ‘joy’ |

This Gallo-Romance /au/, now spelled *o*, is distinct from the Middle French /au/ that developed from /al/ in words like *chaud* ‘hot’; but both begin with a reflex of A that triggered palatalisation, and have ended as Modern French /o/ in words such as CAUSA > *chose* and CALDU > *chaud*.

It should be noted that after the Second Palatalisation, possibly as late as the twelfth century (Bourciez 1967a: 146, 1967b: 302, Zink 1986: 148) though perhaps much closer to the time of the palatalisation (Meyer-Lübke 1890: 375, Fouché 1961: 704ff., Matte 1982: 185f., Joly 1995: 94), inherited /kw, gw/ were simplified to /k,

⁵The Old French spelling is given. Modern French *mesquin* /meskɛ̃/ ‘stingy, petty’ lacks palatalisation because it is a later borrowing from Italian *meschino* /meskino/. Both the Old French and the Italian words originate in Arabic *miskīn* ‘poor, humble’.

g/, so that sequences such as /ka, kə, ki/ arose again, and /tʃ, dʒ/ certainly became contrastive.

- (24) a. QUÁT.TO.RO /katrə/ *quatre* ‘four’
 b. QUÁ.LE /kæɫ/ *quel* ‘which’
 c. QUÍ /ki/ *qui* ‘what’
 d. GUÉR.RA /gerrə/ *guerre* ‘war’ (Germanic)

Posner (1997: 245f.) suggests that palatalisation of K may be part of a push-chain initiated by the loss of the labial element in /kw, gw/, but does not give a detailed argument. I offer an account of the change that does not attribute any causation to the loss of rounding here.

3.3. *A unified change*

Because [a] is cross-linguistically unusual as a palatalisation trigger, and yet very well attested as one in the history of French, KA is typically emphasised in the literature discussing this change. But the Second Palatalisation was in fact triggered by *all* front vowels, and the rule must be understood from that perspective. Some authors, such as Pope (1934: 124) and Martinet (1973: 483), clearly treat the Second Palatalisation as a new, independent process that was triggered by all the front vowels. This is my position as well. Many others, however, minimise the facts regarding KI, KE and treat the Second Palatalisation as a kind of weaker continuation of the First that simply added KA to the set of triggers (Wartburg 1951: 63f., Straka 1965: 142f., de la Chaussée 1974: 69f., Blondin 1975: 157, Geisler 1992: 128). A common operative notion is apparently the following: Since the vowel A is less anterior, it causes a less dramatic change in the consonant, i.e., to palatal /tʃ/ rather than dental /ts/.

This perspective has no real phonetic basis: [tʃ] is *more* palatal than [ts], albeit less ‘front’ in an unhelpful sense. I suspect that the Proto-Romance change, because attested throughout the family, is taken to be the norm. But the real difference in outcome for the velars seems to lie in the fact that Proto-Romance palatalised [k^j] merged in Gallo-Romance with the palatalised [t^j] from other sources (cf. PLATTIA > *place*, FACIA > *face*), and from there [t^j] > [ts] (Ringenson 1922, Pope 1934: 120ff., Fouché 1961: 911f.).

The ‘delay’ in A asserting its palatalising nature is, I claim, due to the fact that Á[was not fronted until this later period.

3.4. *The trigger*

In my view, then, the reason KA undergoes palatalisation is that many of these sequences were actually [kæ] at the time, not [ka]. As Posner (1997: 245) puts it: ‘For this [palatalisation] to have happened as an assimilatory process, we must assume a front articulation of *a*...’ By the well known coarticulatory effect of vowels such as front [e] versus central [a], the place of articulation of [k] will be naturally palatalised by an adjacent front vowel (Keating & Lahiri 1993, Ladefoged & Maddieson 1996: 34). Other authors have argued that the motivation behind this type of palatalisation is at least partly acoustic-perceptual rather than based primarily on coarticulation (Ohala 1989, 1992, Guion 1996, 1998). Under the perceptual analysis as well, however, the frontness of the adjacent vowel is still crucial.

Although [i] and [e] are more typical triggers for this process cross-linguistically, palatalisation of velars next to [æ] is well attested. For example, in Persian, /k, æ/ are palatalised allophonically next to a tautosyllabic front vowel /i, e, æ/ (Nye 1954: 9, Majidi 2000: 19).⁶

- | | | | | |
|------|--------------------|------------|-----|---------|
| (25) | k ^j if | ‘bag’ | kur | ‘blind’ |
| | k ^j erm | ‘worm’ | kon | ‘make’ |
| | k ^j æm | ‘a little’ | kar | ‘work’ |

Notably, in related Kurdish, which lacks the contrast between front and back low vowels, palatalisation occurs before /i, e/ but not before /a/ (McCarus 1997: 692f.).

Similarly, the Old English fricative /ɣ/, written *g*, became /j/ after a front vowel and /w/ after a back vowel, whether long or short (Luick 1929: 415ff., Campbell 1959: 174f.). The Modern English spellings indicate which change occurred; clearly /æ/ patterns with the other front vowels.

⁶Palatalisation also occurs syllable-finally regardless of adjacent sounds: [xok^j] ‘earth’, [susk^j] ‘beetle’. This aspect of the alternation is not assimilatory, but can be attributed to the nature of the consonant release. Palatalisation before front vowels is a widespread areal feature of the region (Windfuhr 1997: 681).

- (26) stiyel ‘stile’ fuyol ‘fowl’
 wey ‘way’ boya ‘bow’
 dæy ‘day’ layu ‘law’

Palatalisation in Old English is also discussed in section 5.2.

Compare this with Modern Greek, a language lacking /æ/ but with allophonic palatalisation of the velars /k, g, x/ before /i, e/ but not /a/ (Eleftheriades 1985: 15).

- (27) kⁱiklos ‘circle’ kunó ‘move’
 k^ee ‘and’ kózos ‘world, people’
 – kalós ‘good’

In each language, it is all and only the front vowels that trigger the process. In particular, the Greek and Kurdish central vowels /a/ do not trigger palatalisation. The same is true for the /a/ of Proto-Romance during the First Palatalisation. These vowel charts show the phonological systems, with palatalisation triggers boxed in boldface.

- (28) Persian Old English Greek Proto-Romance

i	u
e	o
æ	ɑ

i	u
e	o
æ	ɑ

i	u
e	o
	a

i	u
e	o
ɛ	ɔ
	a

If Gallo-Romance *Á* similarly had a truly front articulation as [æ], then the Second Palatalisation makes phonetic sense. Otherwise, it stands in surprising contrast to the more usual pattern illustrated by Greek and Proto-Romance. (For related discussion about Zuni, see section 8.)

4. A IN GALLO-ROMANCE

The question then arises: Were all tokens of A that triggered palatalisation themselves fronted? This matter is often unclear

in the historical literature. Part of the problem appears to be a general lack of distinction made between two potential phonetic realisations.

- (29) a. [a], a central vowel unlikely to trigger palatalisation
(cf. Proto-Romance)
b. [æ], a front vowel more likely to trigger it
(cf. Gallo-Romance)

That is, much of the literature assumes a concept of the vowel space with one or two low vowels – cf. the traditional IPA notation, with two cardinal low vowels (Pullum & Ladusaw 1986: 3). However, with the inclusion of /æ/ as a low vowel – as in typical Americanist use of these symbols – we might expect different effects on adjacent velar consonants.

- (30) One low vowel Two low vowels Three low vowels
-

In particular, a one- or two-vowel scheme does not accommodate the notion of a vowel that has moved forward from central [a], but remains low. (See also the French charts of Bourciez 1967a: 8, Matte 1982: 51, 72, Fagyal et al. 2006: 25, which treat /a/ as front.)

Consider three scenarios for the vowel inventory of Gallo-Romance at the time of palatalisation: that all tokens of A were central; that all tokens were fronted; and that only some of them were fronted, as an allophonic property of /a/. The phonetic triggers of palatalisation are here boxed in bold.⁷

⁷I omit schwa from these vowel inventories; it is clear that the eventual schwa in words such as *CABALLU* > *cheval* and *VACCA* > *vache* was still part of the category /a/ at the relevant point in the history of Gallo-Romance, since it triggered palatalisation. Matte (1982: 98ff.) proposes that certain other vowels were present as schwa in the fifth century, for example, in the infinitive suffix *-ærə* from Latin *-ARE* (p. 100); however, these vowels do not interact with palatalisation and the question is not crucial here.

- (31) I. No fronting II. Complete fronting III. Allophonic fronting

i		u
e		o
ɛ		ɔ
	a	

i		u
e		o
ɛ		ɔ
æ		

i		u
e		o
ɛ		ɔ
æ	a	

I discuss each of these approaches in turn.

4.1. No fronting

Under Scenario I, there was no fronting of \acute{A} [at the time of the Second Palatalisation. This position is apparently the most widespread view in the Romance literature, though the assumption is often inexplicit. In this camp we find, for example, the proposal of diphthongisation and then smoothing as the mechanism of vowel fronting (cf. (12)), where the first element remains central (e.g. Fouché 1958: 224f., Joly 1995: 55f.).

- (32)
- $a > a\acute{e} > \acute{e}$

For Zink (1986: 116f), palatalisation cannot be caused by fronting, since fronting (via diphthongisation) occurs later (similarly Nyrop 1935: 200, Bourciez 1967a: 134, Joly 1995: 91).

- (33) a. CARU $k^j\acute{a}ru > \text{ʃ}ero > \text{ʃ}ier$
 b. CARRU $k^j\acute{a}rru > \text{ʃ}arro > \text{ʃ}ar$
 c. CABALLU $k^j\acute{a}v\acute{a}llu > \text{ʃ}evallo > \text{ʃ}eval$
 d. BACCALARE $bakk^j\acute{a}lare > batt\text{ʃ}ela\acute{e}re > batt\acute{e}ler$

This approach assumes that /a/ triggers palatalisation without the benefit of fronting, and that Bartsch's Law in (20) causes fronting just in the post-palatal context. More general fronting, such as MARE > *mer*, occurs by completely different means, i.e. diphthongisation. This analysis therefore fails to give palatalisation a single (and phonetically plausible) cause.

There are two other fundamental problems. First, it lacks a good explanation for why central [a] should participate as a trigger of palatalisation, despite ill defined reference to 'articulatory force' and the like (cf. Straka 1965). This leads us to the second and more

important objection to the ‘No fronting’ view: It fails to relate the process of A-fronting to palatalisation by A. Consequently I reject this scenario.

A somewhat different account of fronting attributes it to the overall structure of the phonological system, in which /ki, ke, kɛ/ have largely disappeared from the lexicon due to the First Palatalisation (Haudricourt & Juilland 1949: 86ff., 1970: 95ff.; criticism by Spence 1965, Matte 1982: 56f.). In particular, Haudricourt & Juilland argue that KA moves to /kæ/ because KE is absent (like KI, from native words, at least); then palatalisation is triggered by the newly fronted vowel. But here again, the problem is that fronting of /a/ occurs regardless of the preceding consonant, and only in stressed open syllables where that vowel is lengthened. This means that attributing the fronting to the effect of /k/ predicts too much change (since it does not apply in closed syllables) and not enough (since it applies in open syllables beginning with any other consonant as well).

4.2. Complete fronting

Under Scenario II, there was wholesale fronting of A by the time of the Second Palatalisation, regardless of whether the A eventually merged with E. For example, Matte (1982: 103) claims that by the fifth century all tokens of A had become either [æ], when stressed or initial, or [ɛ], when pretonic or final. It is specifically these front vowels that trigger palatalisation.

- (34) a. vakka > vækk^jɛ > væʃʃɔ ‘cow’
 b. kapra > kapræ > kabrɛ > k^jævrɛ > ʃjɛvrɔ ‘goat’

For Matte, only in the seventeenth century do the remaining [æ] vowels revert to central [a].⁸ Other scholars have generally assumed

⁸Matte (1982: 103) cites Pope (1934: 212) for the late preservation of front [æ], based on comments by sixteenth century grammarians stating an affinity between *a* and *ɛ*. However, the same time period sees the development of the back vowel /a/ from earlier /a:/; in this context, even a central vowel /a/ bears comparison to /ɛ/. See also section 7 for the realisation of /a/ in this time period. At any rate, the phonetic realisation in late Middle French cannot be motivation for fronting of closed-syllable /a/ in Gallo-Romance.

that Proto-Romance /a/ survives unchanged in Modern French as [a] (Joly 1995: 42; similarly Bourciez 1967a: 57).⁹

Note that specific intermediate stages such as those in (40) and (41) may not be well motivated (Scheer 2004: 80ff.), and some changes may be more ‘quantal’ (Lass 1997: 221) in that one sound may replace another without passing through an intermediate articulation. My hypothesis depends only on the question of whether the A in seemingly non-fronting forms had undergone any fronting at all, rather than the particular steps taken once fronting had been initiated; all that is crucial is that the beginning of the vowel acquired a more anterior articulation.

There are three problems with the scenario of complete fronting. First, there is no independent Gallo-Romance or Old French evidence for fronted [æ] in contexts where it did not later merge with /ɛ/: closed-syllable \acute{A} is distinct in fate from open-syllable \acute{A} . Second, this approach assumes a skewed vowel inventory where the only low vowel that exists is front. Such an inventory is not impossible, but it is highly marked (Maddieson 1984). Third and most importantly, complete fronting cannot account for the assonance classes of Old French in (10) without assuming either contrastive length or five front vowels: /i, e, ɛ, æ₁, æ₂/.¹⁰ In the absence of persuasive evidence for fronting and then backing of /a/, and in the face of these problems, I assume the null hypothesis: this reflex [a] remained faithful to Proto-Romance.

4.3. Allophonic fronting

Finally, under Scenario III, there was allophonic fronting of \acute{A} in open but not closed syllables. Specifically, the low vowel /a/ had two allophones, front [æ] and central [a]. While these sounds split into separate phonemes by the time of Old French, in

⁹Pope (1934: 90) assumes fronting of all A’s as well, but from a poorly motivated Proto-Romance back /ɑ/ (p. 74) to arrive at a vowel like the modern central /a/. It is this central vowel, called ‘front’ and ‘palatal’ (p. 127), that for her triggered palatalisation of /k, g/. For Pope, true fronting of \acute{A} [to /ɛ:/ was subsequent to palatalisation (p. 106), thus similar to Scenario I.

¹⁰Matte’s specific approach seems unable to account for the Old French assonance facts, since he represents words from different classes with /ɛ/ at this time period, e.g. *apporter* from Proto-Romance /a/ and *belle* from /ɛ/. An alternative is almost immediate re-centralisation of phonetically short /a/ in Gallo-Romance.

Gallo-Romance the syllable structure allows predictable allophones. The interpretation of the Second Palatalisation then has two distinct parts. First, palatalisation of /ki, ke, kɛ/ was always phonetically conditioned, but for /ka/ the necessary environment was found only in stressed open syllables, where the phoneme /a/ was realised phonetically as lengthened [æ:]. Second came phonologisation of the rule – the incorporation of a phonetic alternation into the grammar of a specific language as a potentially abstract rule (Hyman 1975: 171f., 1976: 408ff., Anderson 1981: 513). This abstraction of the rule led to its application before all tokens of the phoneme /a/, whether fronted or not. In other words, it is essentially overgeneralisation to [ka] from [k^jæ] based on the identity of [a] with [æ] in the category /a/.

This position is necessary if we accept two assumptions, motivated above. First, fronting of Á[was a precondition for its participation in palatalisation of /k, g/. (This position is shared by Scenario II.) Second, other tokens of A were not fronted, but rather remained [a]. (This position is more or less shared by Scenario I.) Given speakers' knowledge that [æ] was just a variant of the category /a/, the process was extended to all variants of /a/, including those that were not fronted. In other words, once the phonetic fact of palatal coarticulation in [k^jæ] had been phonologised as a rule of velar fronting, it was susceptible to the abstract connection between the fronted allophone [æ] and the non-fronted [a], both variants of the phoneme /a/. Most likely, children exposed to fronted [k^j] before some tokens of the phoneme /a/ learned the alternation as a rule that applied to all instances of /a/.

This explanation relies on a clear distinction between the phonetic origin of a sound change – in this case the coarticulatory or acoustic effect between the fronted vowel and a fronted velar consonant – and the abstract phonological structure of the grammar that is created by the learner. Possibly this generalisation was supported by the fact that for the non-low front vowels /i, e, ɛ/ every allophone was a front vowel, i.e. these phonemes consistently triggered the rule without any kind of phonological extension; and thus the palatalisation rule was seen as applying at the level of phonemes, making more general /a/ rather than more limited [æ] the relevant trigger.

From this perspective, the extension of the palatalised variant of K to contexts in which the following A is not fronted, and

therefore not a phonetic trigger for palatalisation of the consonant, is a characteristically phonological change rather than phonetic (see Scheer 2004: 102). As such, the extension might even have happened after the development of the affricate realisation [tʃ] from presumed [kʲ]. Because a phonological change is not required to be ‘minimal’ in the sense of Scheer, I remain neutral on the question of whether the change [kʲ] > [tʃ] preceded the extension of the palatalisation from the phonetically motivated context preceding the [æ] allophone to the phonetically unmotivated context preceding the [a] allophone; my analysis requires only that the extension preceded the merger of [æ] into the phonemic category represented by /ɛ/. This ordering is not in doubt, since the merger with /ɛ/ had not happened even in Old French, as shown by the assonance classes, but /tʃ/ was clearly already present before non-fronted [a], as shown by the spelling of words such as *chat*.

5. GENERALISATION OF SOUND CHANGES

In this section I discuss several examples from the history of West Germanic that shed some light on allophones within a phonemic category, and how they can play a role in sound change. The first example demonstrates the generalisation of one allophone beyond the original triggering environment. The second similarly demonstrates the generalisation of an allophone beyond the original environment, but only in a specific environment. I then consider the Gallo-Romance change in this broader context.

5.1. *Generalisation of an allophone*

In most Old High German dialects, proto-Germanic */θ/ eventually became /d/ (Braune & Eggers 1975: 161ff.). There was, not surprisingly, an intermediate stage with the voiced fricative [ð], attested in some cases by the spellings *dh* and *d̄* but often to be inferred. The voiced fricative arose originally as a contextual variant word-internally, first in positions following the sonorants /l, n/, which is a natural context for voicing, as well as in the intervocalic context. The fricative [ð] then underwent a general occlusion and merged with /d/. The Lombard dialect

preserves a distribution of voiceless /t/ in word-initial position, and /d/ elsewhere, supporting the intermediate stage: Lombard did not generalise the voiced allophone to initial position (Bruckner 1895: 169ff.). These changes can be seen in the following representative examples, **θeuda* ‘nation, people’ and **aiθ* ‘oath’.

(35)		Franconian		Lombard	
a.	Inherited form	* <i>θeuda</i>	* <i>aiθ</i>	* <i>θeuda</i>	* <i>aiθ</i>
b.	High German Consonant Shift	<i>theota</i>	–	–	–
c.	Voicing	–	<i>eidh</i>	–	* <i>aið</i>
d.	Generalisation of allophone	<i>dheota</i>	–	–	–
e.	Occlusion	<i>diota</i>	<i>eid</i>	<i>Teude-</i>	<i>aidos</i> (pl.)

The final voicing in *eidh* is surprising, since that is a prime place for devoicing; but this distribution surely results from generalisation of intervocalic voicing through the paradigm: the nominative–accusative singular is the only case form lacking a vowel after the stem-final consonant. By contrast, for example, the nominative–accusative plural **aiθa* > *eiða* has the phonetic context for intervocalic voicing.

The crucial observation is that in Franconian, as in most of the High German dialects, all instances of */θ/ ultimately become /d/, including word-initial position which is not susceptible to paradigm analysis. Older spellings such as *dheota* indicate that the intermediate stage was the voiced fricative /ð/, followed by occlusion (*θ > ð > d). If there were just occlusion of the original voiceless */θ/, we of course expect /t/ as the direct outcome (*θ > t); this is exactly what we find for word-initial tokens in Lombard, which had become isolated from the other dialects after the late sixth century. How then to explain the initial /d/ in Franconian and elsewhere? Evidently, in most of the dialect continuum an extra change occurred: the intervocalic voiced allophone [ð] was generalised to all contexts, including word-initial position. In Franconian, the stage at which the voicing does not yet occur word-initially is attested in the ninth century, with *th* initially and *d(h)* elsewhere, while in the second half of that century the *d* takes over in initial position as well (Braune & Eggers 1975: 163). That is, the allophones [θ] and [ð]

formed a unit in the phoneme */θ/, which was reanalysed as voiced /ð/ based perhaps on a preponderance of [ð] allophones. The generalisation of the voiced allophone resembles the proposed extension in Gallo-Romance of the palatalised allophone [kʲ] beyond the phonetic context of fronting in which it first occurred; the difference is that in Gallo-Romance, the generalisation was restricted to the context of the phoneme /a/, rather than all tokens. The High German change nevertheless supports the view that an allophonic alternation can extend beyond its original triggering environment.

5.2. *Contextual generalisation of an allophone*

Another type of example comes from parallel developments in Old English and in High German, where the inherited Proto-Germanic cluster */sk/ became palato-alveolar /ʃ/.¹¹ For Old English, we must also consider a related change particularly apt for the current topic: the voiceless velar /k/ was palatalised to /tʃ/, no doubt via the stage [kʲ], when adjacent to a front vowel, as in /tʃild/ ‘child’ and /tʃēosan/ ‘to choose’ (Brunner 1965: 173, Campbell 1959: 173ff).¹² At least for word-initial */sk/ followed by a front vowel, palatalisation leading eventually to /ʃ/ appears to have occurred at the same time as palatalisation of simple */k/ in the same position, indicating that they were related processes. This can be seen by the West Saxon diphthongisation of */æ/ to /ēa/, which occurred only after a palatalised velar (Campbell 1959: 69; cf. /sæd/ ‘seed’ without diphthongisation); this resembles Bartsch’s Law in (20). The examples shown are ‘cheek’, ‘sheep’ and ‘should’.

¹¹It is not my point here, but some have suggested that contact with certain articulations in Germanic may have played a role in the Gallo-Romance palatalisation of K and perhaps even the fronting of A (Martinet 1973: 483ff.). My concern is not the actuation of either change – both are in themselves well attested elsewhere – but rather in their interaction, in particular palatalisation in the apparent absence of a front vowel articulation.

¹²The specific conditions are somewhat complex: palatalisation applies to initial /k/ followed by any of the front vowels /i, e, æ/, long or short, alone or as the first elements of diphthongs; to word-final /k/ preceded by any of these vowels; and to intervocalic /k/ flanked by two front vowels. The voiced velar /ɣ/ was palatalised to /j/ (see (26)) in somewhat broader environments.

(36)		/k/	/sk/	
a.	Inherited form	*k ^h æka	*sk ^h æp	*skolde
b.	Palatalisation	*k ^h æke	*sk ^h æp	–
c.	Generalisation after /s/	–	–	*sk ^h olde
d.	Eventual outcome	f ^h æke	f ^h æp	folde

Forms such as /f^hæp/ ‘sheep’ motivate a parallel development of /k/ palatalisation whether or not /s/ precedes, with */sk^hæp/ > */sk^hæp/ necessary to trigger diphthongisation. Later, however, the fates of simple */k/ and the cluster */sk/ are distinct; /k/ remains non-palatal outside the fronting environment, whereas initial */sk/ becomes /f/ as a general outcome, as in */skolde/ > /folde/. A plausible analysis is that at some point in the development of */sk^h/ to /f/, other tokens of /sk/ were brought into the change, perhaps as learners attributed the fronted allophone [k^h] or [f] to the preceding /s/. Campbell (1959: 177) and Brunner (1965: 169f.) indicate that palatalisation of initial */sk/ occurred first when followed by a front vowel (*scip* ‘ship’); and indeed in word-final */sk/ palatalisation occurred only when the preceding vowel was front (*fisc* ‘fish’).¹³

In Middle High German, inherited */sk/ similarly yielded /f/, a change that occurred in the absence of the general /k/ palatalisation found in Old English. However, even here the change appears to have begun in the front-vowel context and spread from there (Braune & Eggers 1975: 137). In other words, palatalisation by a front vowel did occur in High German, but was restricted to the narrower context following the sibilant /s/; just as in Old English, it began as a phonetically motivated allophone and spread from there to contexts that ignored the quality of the following vowel. Extension of the rule on the basis of the preceding /s/ is all the more to be expected in the High German instance, where that /s/ was actually a necessary part of the environment for the original palatalisation, whereas in

¹³The lack of palatalisation means the /sk/ cluster can, in West Saxon and neighbouring areas of Kent, undergo metathesis to /ks/, as in *fixas* for */fisk-as/ ‘fish (pl.)’ and *tux* for ‘tusk’ (Campbell 1959: 177f., Brunner 1965: 165f.). The ultimate outcome in Modern English is partly determined by dialect mixture.

Old English palatalisation existed independently of the /sk/ cluster.¹⁴

5.3. Generalisation in Gallo-Romance

In the Old High German voicing of */θ/, we find the generalisation of one allophone [ð] to all tokens of a phoneme. In the palatalisation of */sk/, the generalisation occurs within a restricted context: tokens of */k/ that are preceded by the phoneme /s/. In Gallo-Romance, all tokens of /k/ were generalised to match the allophone [k^j], again only in one context, but here the context is defined by the phoneme /a/ that does sometimes trigger the rule, in its [æ] allophonic realisation.

Many cases of context-free palatalisation of velars could be cited. For example, Proto-Semitic */g/ is realised in Classical Arabic as the affricate /ǧ/; further, the voiceless dorsal consonants /k, q/ are also realised in some modern varieties of Arabic as outcomes of palatalisation such as /tʃ/ (Martinet 1959, Lipiński 1997: 138f., Mitchell 1993: 18ff., 39ff.). The Classical Arabic change */g/ > /ǧ/ likely originated in front-vowel contexts and spread from there; some of the vernacular Arabic examples of /k/ > /tʃ/ are indeed restricted to such contexts.

The logical distinction between the Gallo-Romance extension and examples such as High German */sk/ is that in Gallo-Romance, the change that might have happened – palatalisation of all tokens of /k/ – did not go to completion. Instead, the extension began with the narrowest context, i.e. other tokens of the /a/ phoneme, and stopped. This incomplete change can be compared to examples of lexical diffusion that begin to spread through a language but do not in the end affect all words that seem to fit the pattern (Wang 1969, Wang & Cheng 1977). In Gallo-Romance, the point of stopping is not random but principled, based on the phonemic category /a/ present in words like *chat* that lacked the fronting in words like *chef*.

¹⁴No doubt related to the change of */sk/ > /ʃ/ is the shift of dental /s/ to palato-alveolar /ʃ/ in initial clusters such as */sp, st/ to /ʃp, ʃt/ (Braune & Eggers 1965: 168). Even if this shift in the place of articulation of the sibilant was partly responsible for the palatalisation in */sk/, the argument in the text remains the same: The change began in the front-vowel context and was sensitive to the presence of a preceding sibilant.

Labov (1994: 542) proposes that regular sound change is gradual and phonetic, while lexical diffusion is abrupt phoneme substitution, word by word. Further, phonetically based sound change is 'from below' the level of social awareness, happening unconsciously in a community of speakers; while lexical diffusion is 'from above' and subject to conscious awareness of the relative prestige of variant forms that may not match the phonetic patterns already operating in a particular community.

In the analysis presented here, the original palatalisation that occurred in Gallo-Romance was a change from below, motivated by the phonetically fronted reflex of Latin \acute{A} [. The extension to other tokens of KA, those in which the A did not front, may represent a sort of lexical diffusion sensitive to the phonemic (rather than phonetic) context. This diffusion is quite similar to the way in which sound changes in progress are seen to add gradually to the set of triggering contexts; a well studied instance is the tensing of /æ/ in American English and the varying conditions that trigger it in different dialects (Labov 1994 and references therein).

Another example of likely lexical diffusion, in a situation of dialect contact, comes from geographical spread of French palatalisation to the neighbouring varieties of Occitan, discussed in the next section.

6. DIALECTAL CONTEXT

I have argued that fronting of \acute{A} [was a crucial impetus for the palatalisation of preceding K. In large degree, the two changes overlap in their dialectal distribution, which is what this analysis predicts. However, at the edges of the French core, evidence of each change is found independently. The existence of fronting without palatalisation, as in Norman and Picard to the north, presents no difficulty, since my claim is unidirectional. However, to the immediate south we find the opposite situation – palatalisation without fronting – and this requires explanation.

The essential distribution of palatalisation and fronting is illustrated by the forms in (37), from González (1985: 195ff.). For Norman and Picard, the early spelling *kie-* suggests coarticulation before fronted A, but no affrication (Meyer-Lübke 1890: 356f., Nyrop 1934: 397).

(37)	Old French	N. Occitan	S. Occitan	Picard	
a.	<i>chievre</i>	<i>chevra, chavra</i>	<i>cabra</i>	<i>kièvre</i>	‘goat’
b.	<i>chier</i>	<i>cheira</i>	<i>cara</i>	<i>kier</i>	‘dear’
c.	<i>chien</i>	<i>chen, chin</i>	<i>can</i>	<i>kien</i>	‘dog’
d.	<i>chiese</i>	<i>chas, chies</i>	<i>casa</i>		‘house (of)’
e.	<i>champ</i>		<i>camp</i>	<i>camp</i>	‘field’

North Occitan forms such as *chas* and *chavra* show palatalisation without fronting, consistent with its status as a transitional zone between French and Occitan (Lafont 1971: 107). Forms in *cha-* are attested from the earliest written records, including the eleventh-century *Poëme sur Boece* (Meyer-Lübke 1890: 358); but this still leaves many centuries for the Gallo-Romance palatalisation to propagate from the north, as I suggest happened (cf. Bourciez 1967b: 162, 301f.). For a brief survey of French (*langue d’oïl*) and Occitan (*langue d’oc*), and their written attestation, see Lafont (1971: 112ff.).

Given the limitations of historical dialect data, the modern dialects can make an important contribution. The clearest picture of the modern dialects comes from the data in the *Atlas linguistique de la France* (ALF), first published in the early twentieth century (Gilliéron & Edmont 1902–1910). I draw from Brun-Trigaud et al. (2005), where hundreds of ALF maps are reproduced with commentary. For example, their map 13 (ALF 272) for *chèvre* ‘goat’ shows, moving southeast from the centre of France, the forms *chèbre*, *chabra*, *cabra*. This classic distribution has both fronting and palatalisation in French; neither process in South Occitan; and palatalisation without fronting in the intermediate region of North Occitan. But it is hardly the case that every location can be uniformly categorised as falling into one of these patterns for all relevant words; for instance, map 260 (ALF 269) shows that nearly all of Southern France, not just North Occitan, has a palatalised reflex of the initial /k/ from Romance *CABALLU* ‘horse’, mainly /tʃ/ or /ts/. Such distributions show that an affricate articulation has migrated well beyond its place of origin. Map 368 synthesises data for nearly fifty lexical items and demonstrates that while North Occitan has significantly less palatalisation than South Occitan, neither is entirely uniform in this regard (see also Wartburg 1950: map 6, and Hall 1949: 7f.). In the medieval Occitan of the troubadours, one even finds variant forms such as *castel* and

chastel ('castle') from the same author, sometimes in the same work; less often examples that include fronting (*che-*) also occur, showing even stronger French influence (González 1985: 197). Similar variation is found in (37), including some vowel fronting. The overall picture indicates varying degrees of influence from the north, strongest in nearby North Occitan but not complete even in that region, and not excluded from South Occitan.

The borrowed *ch*, *j* are merged with *ch*, *j* already present in Occitan. These sounds are realised with the same variation attested for the native categories: not only /tʃ, dʒ/ but also /ts, dz/ or /s, z/, more rarely /θ, ð/ (Bec 1973: 154). This pattern is consistent with a historical borrowing of the pronunciation in terms of the existing affricates, shifting lexical items from the /k, g/ classes to /tʃ, dʒ/ or whatever sound was present in the borrowing dialect. Striking support also comes from observations reported in Dauzat (1927: 115f), namely regions where palatalised *cha-* is found in ordinary vocabulary, but *ca-* in local placenames, which naturally reflect an older state of affairs. This situation shows that palatalisation was a result of later dialect contact, which spread irregularly by lexical diffusion that tended to leave placenames intact (cf. also Dauzat 1922: 52f., Labov 1994: 473).

A parallel picture emerges for Franco-Provençal, wedged between French and Occitan at the eastern edge of the Gallo-Romance area. Martinet (1988: 18) writes that the presence of palatalisation for most KA words in Franco-Provençal is difficult to reconcile with the usual back pronunciation of A in that variety. Instead, he suggests that the presence of /tse/ or /θe/ in these words, rather than /ka/, 'resulted from an imitation of the palatalised products of the prestige language, and the occasional retention of [k] before [a] appears as the true local reflex.' Doublets such as *θevra* ~ *kabra* ('goat') result from this dialect contact (Martinet 1973: 482). Whereas in Old North French the independent fronting of A led to palatalisation in KA, the introduction of the palatalised K in Franco-Provençal is what led to the fronting of immediately following A in those words. This would then correspond to the effect of Bartsch's Law in North French (20), and the similar processes in Old English (section 5.2) and Zuni (section 8). Hall (1949: 12) argues based on Franco-Provençal data in the ALF that 'the spread between the developments of *á* in free syllables after palatal and after non-palatal is simply one of the numerous

flarings-out which we find in a typical transitional or graded area, and which are evidence for linguistic borrowing in one direction or the other.’

In sum, I consider the presence of palatalised K in the North Occitan and Franco-Provençal areas adjacent to the French-speaking region to be the result of borrowing, rather than indigenous development requiring independent explanation. The nature of this process is potentially of great interest, but not probative of how palatalisation arises in the first place.¹⁵

7. MODERN FRENCH PALATALISATION

A final point is that some varieties of Modern French, in particular among the working class of Paris, have a fronted [kʲ] or true palatal [ç] in words like *quatre* ‘four’. Palatalisation of /k, g/ before all the front vowels, as well as /a/, is attested at least from the late nineteenth century (Lennig 1978: 140f.).¹⁶ Similar palatalisation of /t, d/ could (and still can) result in mergers such as *piqué* /pike/ ‘stitched’ and *pitié* /pitje/ ‘pity’ both as [pice]. The inclusion of /a/ as a trigger is of course strikingly similar to the Second Palatalisation; and it appears that just as in the fifth century, this new palatalisation resulted from a fronted /a/.

Mettas (1975) and Lennig (1978: 135ff.) provide valuable historical surveys of the French pronunciation of /a/. In particular, as Lennig notes: ‘Since the sixteenth century, the phonetic value of /a/ seems to have carried a meaning of social identification’, where a frontier articulation was at times associated with groups as diverse as upper-class women or the working class (see also Mettas 1979: 260, Fagyal et al. 2006: 31). The back articulation of /a/, derived from /a:/ as illustrated in (11), certainly arose no later than the seventeenth century (Mettas 1975: 41, Lennig 1978: 138f.); other evidence indicates that this pronunciation was already in place by the sixteenth century or earlier (Fouché 1958: 243f.). It is therefore

¹⁵Palatalisations similar to the Gallo-Romance pattern also occurred in Rhetic and Lombard-Alpine dialects; these changes may have a common origin with that of Old North French, but afterwards developed independently (Meyer-Lübke 1890: 355, Wartburg 1950: 51ff., Fouché 1961: 556, Bourciez 1967b: 611f.).

¹⁶Ringenson (1922) gives a survey of other palatalisations in Modern French dialects, but not before /a/. For a discussion of the possible origins of palatalised /k, g/ before /a/ in Caribbean and Irish dialects of English, see Harris (1996: 9f.).

probable that the new opposition between /a/ and /ɑ/ was a crucial factor in the development of the anterior [æ] realisation of /a/, in contrast with /ɑ/. One conclusion to draw here is that the front articulation of Modern French /a/, which may date only from around the fifteenth or sixteenth century, cannot tell us whether the reflexes of Gallo-Romance A that failed to undergo fronting in the fifth century had a similar articulation.

It is important to remember that the front /æ/ phoneme proposed for Old French corresponds to modern /ɛ, e/ rather than /a/, so to find [æ] as a realisation of /a/ centuries later is not a matter of continuity based on that earlier fronting. Nevertheless, this modern pattern supports my claim that phonetically conditioned palatalisation requires a front articulation. In the same time period when modern palatalisation is first in evidence, fronted articulations of /a/ as extreme as [ɛ] are also described (Lennig 1978: 144). In nineteenth-century Parisian French, the opposition with /ɑ/, combined with varying sociolinguistic pressures, appears to be responsible for the general fronted articulation of /a/ that directly triggered the palatalisation found today – a separate question from whether the palatalisation, once established, is phonetically motivated by the modern realisation of /a/. In Gallo-Romance, however, it was fronting of stressed A in open syllables that provided the context for palatalisation; from there it was the phonemic structure that caused spread to contexts in which phonetic fronting did not apply.

8. CONCLUSION

I do not claim that my proposal for Gallo-Romance is the only way that /a/ might participate as a palatalising trigger; there may be other structural factors that lead to a similar outcome. An interesting example is found in Zuni, a Native American language of New Mexico (Newman 1958, 1965). Zuni has a five-vowel system like Modern Greek, but shows palatalisation of /k/ before the three vowels /i, e, a/. It is clear that /a/ in the language is not simply a front vowel in its basic realisation, and therefore a phonetic trigger for palatalisation, because /a/ is fronted allophonically to [æ] precisely when preceded by the palatalised velar (unlike the general fronting of Gallo-Romance); in other contexts it is a central vowel, as in /kufʌ/.

- (38) kⁱihe ‘ceremonial brother’ kuf^a ‘cloth, rag’
 kⁱefⁱ ‘fur, skin, leather’ koni ‘be short’
 kⁱæwu ‘older sister’

A crucial fact about Zuni is that the contrast between plain /k/ and rounded /k^w/ is neutralised before the rounded vowels /u, o/ (Newman 1965: 20). As a result, the possible phonemic sequences are: /ku, ko/ with no rounding contrast; /k^wi, k^we, k^wa/ which are the only possible CV sequences for /k^w/; and /ki, ke, ka/ which undergo palatalisation to [kⁱ, k^e, kⁱæ].¹⁷ In my view, the fact that unrounded /i, e, a/ were the only vowels to permit rounding on a preceding velar was the essential structural condition that caused them to pattern together with respect to palatalisation on a preceding velar. This palatalisation was phonetically motivated for /i, e/ but not for /a/; instead, extension to /a/ was based on their phonological patterning. Indeed, the fronting of /a/ to [æ] when preceded by [kⁱ] happens precisely because central [a] is a poor phonetic match to the fronted velar. In the history of Zuni, then, the steps can be broken down into: the phonetic change /ki, ke/ > [kⁱ, k^e]; the phonologically motivated generalisation of the rule to include /ka/ > [kⁱa]; and the subsequent phonetically motivated adjustment [kⁱa] > [kⁱæ]. The final step resembles the Russian allophonic fronting of /a/ to [æ] between palatalised consonants (Jones & Ward 1969: 48f), as well as Bartsch’s Law from Gallo-Romance (20) and the vowel fronting after palatalised velars in Franco-Provençal (section 6).¹⁸

¹⁷My appeal to existing sequences bears some resemblance to the work of Haudricourt & Juilland (1949, 1970); however, I refer not to the set of permissible or existing contrasts, but rather to the relations of categories and their realisations, independently of any potentially empty spaces in the system. Also, it should be mentioned that there are complications in Zuni resulting from later developments, in particular borrowings of /ka/ without palatalisation, such as [melika] ‘white man’ from *America*, as well as vowel elision that leads to opacity in the trigger of palatalisation; but these are not germane to the question of how the original pattern arose. The complications for a synchronic analysis have been discussed by several authors (Davis 1966, Walker 1966, 1972, Newman 1967, Michaels 1971).

¹⁸As illustrated in (24), at the time of the Second Palatalisation there was similarly a contrast between /kwa/ and /ka/ in Gallo-Romance. It was also the case in Proto-Romance that /kwu/ was not possible, and /kwo/ hardly existed. However, because /ki, ke/ were also barely in existence in Gallo-Romance, the contrast with /kwi, kwe/ would have been far weaker than what is found in Zuni, making application of the same scenario to Gallo-Romance less convincing, especially compared to the fact of fronted [æ].

Because the stages of Gallo-Romance fronting and palatalisation are not directly attested, we may never know exactly what happened. I have argued for a particular view of the change that respects the usual phonetic motivation of velar palatalisation, but also requires us to posit an extension based not on phonetics but on the phonological structure of the language. The present analysis of the Second Palatalisation helps us tease apart the respective contributions of phonetics and cognition to the course of language change. Phonetic coarticulation or perceptual reanalysis created the original alternation between [k] and [kʲ], while phonological categorisation enabled the extension from the sound context [æ] to [a] within the mental construct /a/. Notably, this extension was unimpeded by the lack of phonetic motivation for the change in the new environment, emphasising the abstract nature of the cognitive system of language.

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