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RESEARCH

Revis(it)ing French palatalization

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This paper explores the diachrony of French and reconsiders the classical analysis of French palatalizations. It is widely admitted that the transition from Latin dorsal stops to French palatal fricatives is triggered by an external palatalizing object which affects the constitution of the targeted consonant. While this analysis can satisfyingly explain the palatalization of dorsals before /i/, it makes the palatalization before /a/, which occurred a few centuries later, completely opaque. Revising the internal structure and the melody used to describe segments (Government Phonology 2.0 – Pöchtrager 2006) allows us to give a unified analysis of both palatalizations: whether /i/ or /a/, the vocalic environment is indeed the trigger, as it interferes with the structure of dorsals and lead to internal changes. However, while /i/ adds palatality to the consonant, /a/, by its lack of melody (Pöchtrager & Živanović 2010), leads to an internal reconfiguration of the dorsal, which already contains <I>. In other words, we face two kinds of palatalization: an external one and an internal one. Furthermore, our analysis takes the intermediate stages from Latin dorsals to French palatals into consideration and attested dialectal variations observed in Northern France.

Keywords: Romance; French dialects; Diachrony; Structure; Element Theory; Government Phonology 2.0.

1 Introduction

The aim of this paper is to provide a unified representation of the palatalization of dorsals in French. This process targeted dorsals before front vowels during the course of the 3rd century, and the explanation has always been straightforward: the palatalizing agent present in front vowels is the trigger of the modification. However, the second palatalization occurred before /a/ two centuries later. In this case, no palatalizing agent can be invoked while it is evident that the vocalic environment is the trigger. We argue that using tools provided by Government Phonology allows us to give a unified analysis. Revising the internal structure and the melody used to describe segments leads us to reconsider the triggers and results of both palatalizations, and shed new light on this process. Our proposal is an answer to the so-called unpredictability of the second palatalization in French making use of general principles of phonology to enlighten diachronic data.

The article is organized as follows: in section 2, we give some data concerning palatalization and the reflexes of dorsals in Modern French and across dialects. We then look at the reflexes of the Latin dorsals in order to understand their elemental structure and provide an internal representation of this structure. In section 3, we present the formal framework we are using to represent palatalization – namely Government Phonology 2.0 (GP 2.0). This section will provide theoretical background on the structures we use for

both consonants and vowels. We will present the hypotheses concerning affricates and /a/. Finally, in section 4, we show how this model applies to explain the first and the second palatalization.

2 French palatalizations and elements

In this section, we describe the different steps of the palatalization of dorsals as it has been described in the classical litterature (Pope 1934; Dauzat 1950; Bourciez 1958; Bourciez & Bourciez 1967; Martinet 1975; Zink 1986; Jacobs 1993). We then have a look at the different reflexes of Latin dorsals in French and propose a representation of the internal content of these segments couched in an Element framework.

2.1 Palatalization

French underwent two processes of palatalization targeting the dorsal stops in strong position, word-initially and post-coda (Scheer & Ségéral 2001). These two palatalizations took place at different times as shown in Table 1.

stages		**(a)**	**(b)**	**(c)**	**(d)**	**(e)** 13th c.	
				modern French	t͡s →	s	I
first palat.	[-voice]	k →	k' →	t' →	t͡ʃ →	ʃ	
3rd c.	[+voice]	g →	g' →	d' →	d͡ʒ →	ʒ	
second palat.	[-voice]	k →	k' →	t' →	t͡ʃ →	ʃ	A
5th c.	[+voice]	g →	g' →	d' →	d͡ʒ →	ʒ	

Table 1: Palatalization across Northern dialects in France.

The first palatalization took place during the 3rd century, when Latin dorsals palatalize under the influence of front vowels <I>, see (b) in Table 1. The palatalized dorsals are then fronted into palatalized coronals (c) and, next, become palatal affricates (d). In the 13th century, the affricates lose the stop closure and are reduced to coronal fricatives (e). The following examples in (1) illustrate the path in modern French, where, contrastively to the northern Romance dialects, the palatalized coronal becomes a coronal affricate.

(1) *cera* > *cire* [siʁ] 'wax'
cervu(m) > *cerf* [sɛʁ] 'deer'
argila > *argile* [aʁʒil] 'clay'

The second palatalization is quite unexpected (Bhat 1978) because it took place in a non palatal environment, namely before /a/ (<A> in Table 1, cf. examples in (2). During the course of the 5th century, dorsal stops palatalize (see (b) in Table 1), then undergo fronting (c) and turn into affricates (d). As in the first palatalization, in the 13th century, affricates are simplified to a fricative (e).

(2) *carolus* > *charles* [ʃaʁl] 'Charles'
castellum > *château* [ʃato] 'castle'
gamba > *jambe* [ʒɑ̃b] 'leg'
galbinu > *jaune* [ʒon] 'yellow'

Note that, for now, we use the standard notation for both palatalizations: k' and g'. We will see that step (b) in Table 1, although it has been classically described as an identical mechanism, is actually radically different in the second palatalization.

Recall from Table 1, that the change to [t͡s] is specific to Modern French: [t͡ʃ] is still the reflex of dorsals in northern dialects like Picard (Dawson 2001), Normand (Montreuil 2000) and Gallo (Deriano 2005).

Table 2 exemplifies the various diachronic steps of the palatalization across Gallo-Romance varieties of the Northern part of France today. The process occurred to different degrees across varieties: from the absence of palatalization to deaffrication. We underline the fact that there is a fair amount of intradialectal variation and it is likely that some of the forms are recent borrowings from Standard French.[1] For each dialect, we present separately palatalization before a segment containing an <I>-element and segments containing an <A>-element. Each step of the palatalization from Table 1, is illustrated whenever it is attested in a dialect. For instance, in Picard, we gave the example of Latin *camera*, which can yield several realizations where both palatalized and non-palatalized variants are attested (see line 2 in Table 2). These synchronic variants fall within the general palatalization path established for diachronic change.

Of importance in Table 2 is that the step (c), the palatalized coronal, does not seem to be present at all in Picard or Normand. Gallo is still under investigation. Chauveau (1984) notes that palatalized coronals, while underrepresented, are "not rare" – however, no examples are provided. We will see, in section 4, the proper treatment of this alleged stage: our hypothesis is that palatalized coronals are an artefact of reconstruction. We claim that there is no intermediate stage between palatalization (stage (b)) and affrication (stage (d)).

2.2 Internal content of dorsal segments

In order to understand both palatalizations, we will first have a look at the reflexes of Latin dorsals in French. The changes affecting dorsals are indications of their internal makeup. As can be seen in Table 3, the lenition of dorsals led to a wide diversity of reflexes: dorsal and coronal fricatives ([+anterior] and [–anterior]), palatal and dorsal glides, and vocalization to <I> or <U>, inducing coloration of the preceding vowel.

Table 4 summarizes the set of reflexes with some of the triggering environments. It reveals the close relationship between the Latin dorsals stops and the French palatal fricatives, jod and the labial glide.

How to account for the plasticity of dorsals in a privative framework, in other words, what are they made of? In standard Element Theory, <I> stands for coronality (see also Hume 1996, in a binarist framework) and <U> for labiality (Backley 2011). To represent velarity, Harris (1994), Angoujard (1997; 2006) and Árnason (2011) use <v>: the empty element. Scheer (1996; 1999) uses both {v U} while Backley proposes that velarity contains an unheaded {U}. Recently Schwartz (2010) proposed that the only necessary element in dorsals is {I}.

[1] We emphasized the example [siʁ] (column (e), line 3) in Gallo, which is the only attested form in which a Latin dorsal changes to [s]. However, we assume it is a recent borrowing from French *cire* [siʁ] and it does not correspond to the prefered treatment of dorsals in Gallo.

stages		(a)		(b)	(c)	(d)	(e)
		k		k’	t’	t͡ʃ	ʃ
Picard (data from Dawson 2001)	I	possible according to Dawson (2001), but no examples are provided.				possible according to Dawson (2001)	[duʃ] < *dulcis* ‘soft’
	A	[kãmb] < *camera* ‘room’ [kɛr] < *cadere* ‘fall’		[k’ãmb] < *camera* ‘room’ [k’ɛr] < *cadere* ‘fall’		[t͡ʃãmb] < *camera* ‘room’ [t͡ʃɛr] < *cadere* ‘fall’	
Gallo (data from Chauveau 1984; Deriano 2005)	I	[ki] < *qui* ‘who’		“[…] *affricates* t͡ʃ *and* d͡ʒ *represent the most frequent result* [of palatalization] *in Gallo. But* k’ *and* g’ *or* t’ *and* d’ *are not rare. These consonants appeared before i, e, ɛ, y, ø, œ, ɛ̃, œ̃*” (Chauveau, 1984:136)		[t͡ʃi] < *qui ‘who’* [t͡ʃes] < *coxa ‘thigh’*	**[sir] < cera ‘wax’**
	A	[kənə] < *canis* ‘dog’ [gɛ̃n] < *gaaing* (< **waida*) ‘gain’				[d͡ʒɛ̃n] < *gaaing* (**waida*) ‘gain’	[ʃɛ̃] < *canis* ‘dog’ [ʃva] < *caballus* ‘horse’ [ʃmɛ̃z] < *camisa* ‘shirt’
Normand (data from Montreuil 2000)	I			[k’ør] < *cor* ‘heart’ [arg’il] < *argilla* ‘clay’		[t͡ʃɛ̃z] < *quindecim* ‘fifteen’ [t͡ʃit] < *quietus* ‘finished’	[ʃir] < *cera* ‘wax’ [ʃɑ̃] < *centum* ‘hundred’
	A	N	[gva] < *caballus* ‘horse’ [kmɛ̃] < *caminus* ‘way/path’ [gɛ̃ãb] < *gamba* ‘leg’	*No palatalization North Joret Line*[2]			
		S		[k’erbõ] < *carbonis ‘coal’* [k’ewen] < *carnis* ‘rotting carcass’ *[g’erb]* < **garba* ‘sheaf/spray’		[et͡ʃel] < *scalae* ‘ladder’	

Table 2: Palatalization and synchronic variation across three Gallo-Romance dialects.
Legend: [k’erbõ] phonetic transcription of the actual word in the given dialect.
carbonis Latin form, from which the modern form derived; Germanic forms are preceded by *.
‘coal’ English translation.

Following Lass (1984), we consider that lenition is a loss of content. In a privative framework, namely in Government Phonology (Kaye, Vergnaud & Lowenstamm 1985; 1990; Harris 1990), lenition is clearly rendered as element loss. For example vocalization can be seen as the loss of mode (both <ʔ> and <h>) and of one of the melodic primes (<I> or <U>). In other words, we should expect to find both <I> and <U> in dorsals.

[2] The isogloss "Joret" splits Normandy in two: palatalization is active south of the Joret Line whereas north of the Joret Line, there is no palatalization before /a/.

/K/	[k, g] dorsal	*cor > **c**œur ‘heart’; angustia > an**g**oisse ‘anxiety’; cubitu > **c**oude ‘elbow’; cumulare > **c**ombler ‘(ful)fill’; clave > **c**lef ‘key’; credere > **c**roire ‘believe’; grana > **g**raine ‘seed’; strangulare > etran**g**ler ‘strangle’*
	[s, z] coronal [+ant]	*cinere > **c**endre ‘ash’; cervu > **c**erf ‘deer’; civitate > **c**ité ‘city’; facia > fa**c**e ‘face’; vinacea > vina**ss**e ‘bad wine’; lancea > lan**c**e ‘spear’; dulcia > dou**c**e ‘sweet’ ; licere > loi**s**ir ‘leasure’*
	[ʃ, ʒ] coronal [– ant.]	*arca > ar**ch**e ‘arch’; cancellare > **ch**anceler ‘stagger’; mercatu > mar**ch**é ‘market’; pertica > per**ch**e ‘pole’; causa > **ch**ose ‘thing’; berbicariu > ber**g**er ‘shepherd’; planca > plan**ch**e ‘plank’; caballus > **ch**eval ‘horse’; carruca > **ch**arrue ‘plow’; caminu > **ch**emin ‘path’; argentu > ar**g**ent ‘money/silver’;*
	[j] > ∅ pal. glide > loss	*crescere > cro**i**stre > croître ‘grow’ ; nascere > na**i**stre > naître ‘born’; *pascere > pa**i**stre > paître ‘graze’; veracu > *vera**j**u > vrai ‘true’; amicu > *ami**j** > ami ‘friend’; macula > ma**ill**e ‘mesh’; vigilare > ve**ill**er ‘watch over”*
	[w] > ∅ dors. glide > loss	*lucore > *lu**w**or > lueur ‘light’; august > *a**w**ustu > août ‘august’; securum > *se**w**ur > sëur > sûr ‘safe’*
	U V backing	*fantagma > fant**ô**me ‘ghost’; pigmentu > pi**u**mentu > piment ‘chili’; phlegma > fle**u**me > flegme ‘phlegm’*
	I V fronting	*factu > f**ai**t ‘fact’; lacte > l**ai**t ‘milk’; lactuta > l**ai**tue ‘lettuce’; tectu > t**oi**t ‘roof’*

Table 3: Reflexes of /K/ in French (Bourciez 1958; Bourciez & Bourciez 1967; Zink 1986; Jacobs 1993).[3]

/K/	[s,z]	coronal/palatal 3rd – 13th cent.	/ #_ [–back]
	[ʃ,ʒ]	palatal 5th – 13th cent.	/ #_[+low]
	[j]	glide *3rd cent.*	/ _ {[+coronal]}
	[w]	vocalization (post-spirantization)	/ _ {[–low, +back], [+labial]}
	*[ɣ]	spirantization	/ V_V

Table 4: Latin > French dorsals.

Our proposal is that the reflexes of /K/ in French should answer to the Extended Projection Principle (EPP):[4]

(3) **Extended Projection Principle** (Scheer 1999: 214)
Observable objects on the surface have a lexical origin or are the result of a derivation based on lexically present material. “Nothing falls from heaven”.

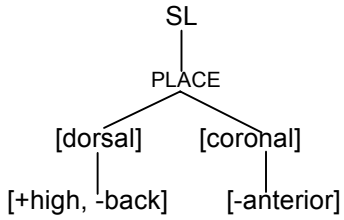
In accordance with this principle, we consider that because dorsals can yield to consonants containing either <I> or <U>, those two elements are part of their definition. Dorsals are indeed “complex” and already contain the required material to generate palatal and labial glides (simpler segments) as shown in (4). Note that this representation is provisional:

(4)

[3] The segments that are concerned by the change are emphasized in bold.
[4] As one of our reviewers pointed out, the EPP could be mixed up with the Non-Arbitrariness Principle (KLV 1990: 194): “There is a direct relation between a phonological process and the context in which it occurs”. However while EPP is a condition on lexical representations, NAP is a condition on processes.

This type of representation has already been put forth in a feature geometry framework (Clements 1985; Clements & Hume 1995). In order to explain cases of palatalization triggered by Latin jod, Jacobs (1993) assumes that this segment, [+coronal, –anterior], is specified for both [coronal] and [dorsal] under the PLACE node:

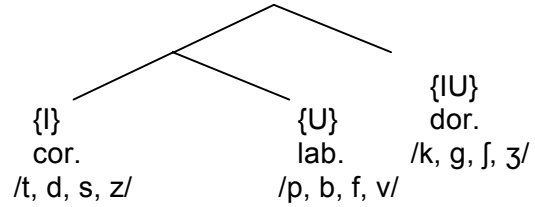
(5) [dorsal, coronal] specification of Latin jod



2.3 {IU} for dorsals

Although Elements cannot be seen as a direct translation of binary features, we will assume that the Latin dorsal shares both the <I> and <U> specification and that these two elements are grossly equivalent to [coronal] and [dorsal] in a binary framework.[5] <I> and <U> can be used for vowels as much as for consonants. They can combine or be interpreted phonetically as vowels or glides when used alone. Our hypothesis is that those two elements are sufficient to describe the obstruents in French (Hall 2007; Dresher 2009; 2014; Tifrit & Voeltzel 2014) and they are the only ones involved in both palatalizations.[6]

(6)



For now, the aim will be twofold: first, to explain how to reduce the number of primes, second, to account for all the intermediate stages shown in Table 1.

If we restrain the number of melodic primes, the contrasts between consonants have to be built up somewhere else. We support the idea that this contrast is structural. That is the reason why we adopt Government Phonology 2.0 (henceforth GP 2.0).

[5] A reviewer mentioned the fact that <U> is not equivalent to [+dorsal], but rather to [+back]. In our view, <U> refers to [grave] and <I> to [acute] in acoustical terms in Jakobson, Fant & Halle (1951); Jakobson & Halle (2002). In their paper devoted to the French phonemic system, Jakobson & Lotz (1949) proposed that coronals and labials are both [diffuse] while dorsals, including /k, g, ʃ, ʒ/, are [compact]. Tifrit & Voeltzel (2014) proposed that compactness is equivalent to the union of <I> and <U> in Element Theory.

[6] A reviewer questioned the prediction that figure (6) makes, namely that /k, ʃ/ should be able to yield [p, f] respectively. Such changes are partly attested in Romanian and Albanian, where Lat. kt/ks → Rom. pt/ps, Alb. it, ft/ʃ, fʃ (Sala 1976: 172f). Nandris (1963: 261) points out that it is still the case in Romanian: "*kluksa* Bulg. > *clupsâ*, *doctor* > *doptor* et *doftor*, *Octea* (prénom [surname]) > *Optea*, *Oftea […] acte* > *afte, actor* > *aftior*)." In Huave (Kim 2008: 37f), front and high vowels /i,e,u/ trigger "palatalization" of coronals, while back non-high vowels /a, o/ do not. The palatalization before [u] is quite interesting: to the augmentative form *–sonong* 'pile up', corresponds the diminutive form *xuŋung*. To the augmentative form *-sopop* 'drizzle' corresponds the diminutive *-xupup* (Ibid: 42). The palatalazation of "x" ([ʃ]) can be explained as s+U (or I+U).

3 GP 2.0: More structures and less melody

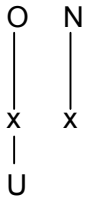
While our proposition makes use of Element Theory, the inventory of primes is reduced to <I> and <U> in (4). The consequence is that the relevance of the segmental structure has to be increased. This section gives theoretical background on the version of Government Phonology we use.

3.1 Occlusion, voice and aspiration

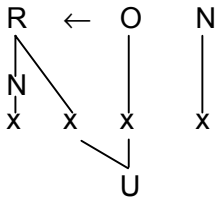
It is widely aknowledged that segments, whether vocalic or consonantal, are made of the same ingredients – what differentiates them is their syllabic position.[7] However, Jensen (1994) points out that some elements are restricted to specific positions: occlusion (<?> element) and noise (<h>), for instance, are not suitable for nuclei. If we formulate constraints on the distribution of primes according to their position, we lose the main rationale for autosegmental phonology. The independence between melody and structure implies that skeletal or syllabic tiers are devoid of segmental/melodic information. There should be no restriction on the identity of the elements inserted in a given position. To avoid this paradox, Jensen (1994), Carvalho (2002) and Pöchtrager (2006) propose that some properties are *structural* and not *melodic* – they are encoded in the syllabic representation of the segments and do not belong to the prime inventory.

Jensen (1994) shows that the Mode distinction ([±continuant]) results from an inter-syllabic configuration: stops and fricatives do contain the same melody but stops are characterized by *Interconstituent Government* between an onset and a preceding coda. This is illustrated in (7) with an example in Fula:

(7) a. [fɛrlo] 'hill.SG'



b. [pɛrle] 'hill.PL'



The distinction between the labial fricative [f] and the stop [p] results from the space allocated to the same <U> element. The idea here is that the plural is expressed through the fortition of the initial fricative. The plural marker is present structurally and provides extra space at the left of the word so that the initial consonant can spread. In other words, occlusion occurs whenever an element is associated to two syllabic positions (here Onset and Coda).[8]

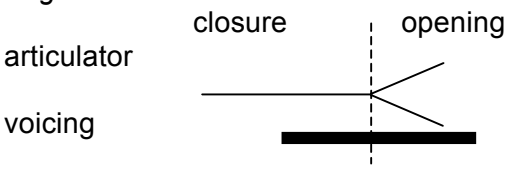
Turning to laryngeal properties, Carvalho (2002) points out that consonants should not be considered voiced nor aspirated *per se*, but that these properties result from

[7] For example, when inserted in a nucleus <I> is interpreted [i], while when inserted in an onset position, it is realized as [j]. The same goes for <U>: [u] in nucleus postion, [w] in onset position.

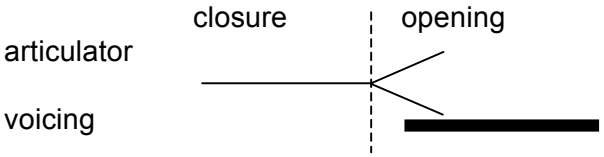
[8] Jensen (1994: 74) also cites the case of Sesotho, where the nasal prefix marker of class 5 regularly triggers fortition of the initial fricatives. There are many cases where, for historical reasons, nasality is lost in this marker – however, fortition remains.

vowel-consonant interactions. Phonetically, it corresponds to a *Voice Onset Time* anticipation or delay. Here, voicing in consonants is seen as an anticipation of the vocal folds' vibration required by the following vowel (8a). Aspiration is the delayed vibration of vocal folds, which begins after the release of the preceding consonant (8b). The presence of vowels is thus essential to characterize these laryngeal properties. It follows that using voicing, <L>, and aspiration, <H>, as primes in the stucture of consonants is redundant. Those properties should rather be represented with *contour* relations between segments and their skeletal positions (8):

(8) a. *negative VOT*



b. *positive VOT*



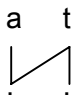
a'. /da/

b'. /t^ha/

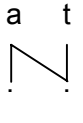
Since vowels are the "source" of voicing, when they spread to the skeletal slot of a consonant, we obtain a voiced consonant, as in (8a').[9] Contrastively, when a consonant targets the slot of a vowel, it delays the voicing and results in an aspiration noise, as in (8b').

In the reversed interval, VC, we obtain gemination and vocalic length:

(9) a. /att/



b. /aat/



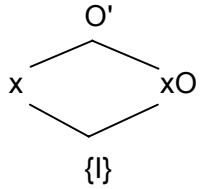
Both Jensen (1994) and Carvalho's (2002) propositions make use of place available in order to distinguish qualities usually attributed to a melodic element (or feature). In other words, occlusion, aspiration and voicing are not phonological primes (features or elements) for they are encoded in structural relations. Consequently, the traditional elements <?, h, L, H> are discarded.

[9] As a reviewer underlines, Carvalho's model does preclude final voiced consonants: they always imply vocalic content at the right. While voiced consonants are attested in final position, this framework suggests that they are highly marked.

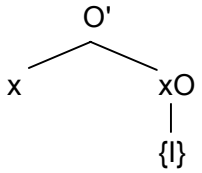
3.2 GP 2.0: The structure of stops and fricatives

In the same perspective, i.e. reducing the number of primes required to qualify segments, Pöchtrager (2006) distinguishes fortis from lenis consonants on the basis of their phonological length: a fortis and a lenis do contain the same melodic primes, however, a fortis needs more space (two positions) to express than a lenis. An additional slot comes with every onset: fortis consonants use it to express their own content (as in (10a)) and lenis leave it empty (as in (10b)).

(10) a. fortis /t/

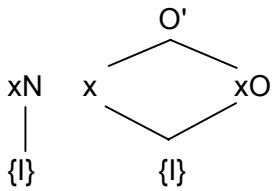


b. lenis /d/

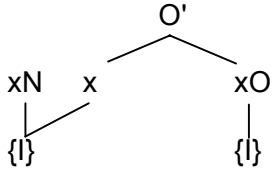


The extra slot in the stops has to be occupied – if the onset does not spread its material to it, then the preceding nucleus will – hence the extra vocalic length preceding voiced consonants, as in (11b):

(11) a. [bɪt]



b. [bɪːd]

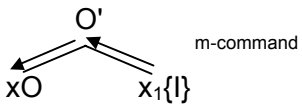


In order to represent contentless segments, the association lines in (11) are replaced by a specific relation: *melodic command* (Pöchtrager 2006: 68). We propose in (12) a revised version following Pöchtrager & Živanović (2010).

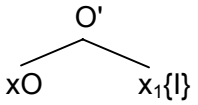
(12) **Melodic command (revised)**
m-command is a binary relationship between two terminals, an m-commander and an m-commandee.
Only annotated x's can be m-commanders.
Only unannotated x's (heads, xO, xN) can be m-commandees.
An m-commandee can be m-commanded only once, but an m-commander can m-command several times.
An m-commanded point receives the same interpretation as its m-commander.

This definition of the m-command is a revised version of Pöchtrager (2006): it reflects the changes proposed for nuclei in Pöchtrager & Živanović (2010) where the m-commander is the highest in the structure. The highest annotated x, i.e. bearing melodic content, in a structure is the m-commander. Stops in (11) are now represented as in (13):

(13) a. fortis



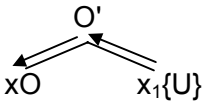
b. lenis



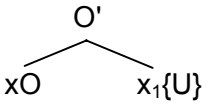
When a terminal node is m-commanded, it receives the same interpretation as its commander. Note that the head (xO in (11)) does not bear any element content. Being devoided of melody does not prevent the head from being the main object of the structure – it gives the whole structure its category.

If we consider Jensen's (1994) analysis, according to which stops occupy more positions than fricatives, then we have to increase the number of projections: fricatives have one and stops have two. The main consonant types for labials are illustrated in (14).

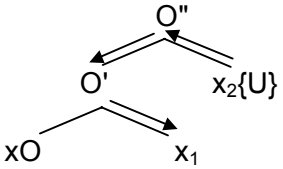
(14) a. fortis fricative [f]



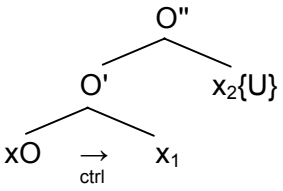
b. lenis fricative [v]



c. fortis stop [p]



d. lenis stop [b]



e. glide [w]

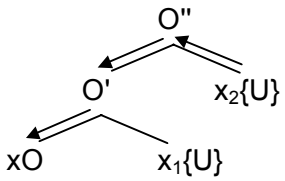
xO{U}

In (14d), x_1 is unannotated (i.e. it does not bear any element content) and free from m-command. According to Pöchtrager, in a licit representation, all terminal nodes must be

licensed, either by *command* or by *control*. When a terminal is controlled, it does not receive any interpretation. In (14e), glides do not need an entire projection but only a head.

We will see, when we will come back to palatalization (in section 4), that affricates do have the same structure as stops: the only difference is that they bear content in both x positions and that they are linearized $x_2 > xO > x_1$ (spec. > head > compl.) For instance, a labial affricate like [p͡f] would have the following structure:

f. affricate [p͡f]



Let us now turn to the melodic primes that we are going to use in the structures presented in this section.

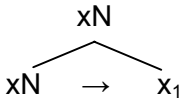
3.3 Melodic primes

Since we replaced the function of laryngeal primes (<h, H, L, ʔ>) with structures, only the melodic primes remain – namely <A, I, U>.

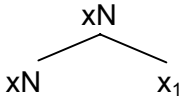
Until now, we illustrated the structure of consonants only. In Pöchtrager's model, vowels are represented the same way, i.e. using a projection with a head and a complement. The stucture is labelled with N instead of O.

We will not make use of the prime <A>, neither for consonants nor vowels. Instead – and this is a central point in our analysis – we will follow Pöchtrager & Živanović (2010) stating that some vowels are *adjunction structures*: the structure itself is interpreted as a segment, even if it is empty. Two vowels are concerned here: /a/ and schwa. Both are represented with empty nuclear structures containing a head and an unannotated complement (see (15)). The difference between the two vowels is the control relation present in /a/ only – schwa is completely empty.

(15) a. Representation of /a/

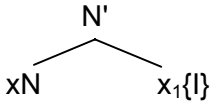


b. Representation of /ə/

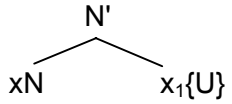


The vowels /i/ and /u/ in (15c, d) have element content but they have one level of projection: N'. The mid-vowels /e/ and /o/, in (15e, f), are complex vowels mixing the structure of /a/ and a melodic prime (respectively <I> and <U>). They have one projection (N') but, by the presence of the adjunction structure, are structurally more complex than high vowels.

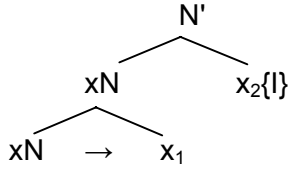
(15) c. Representation of /i/



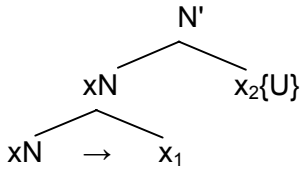
d. Representation of /u/



e. Representation of /e/



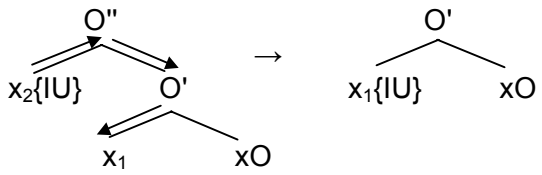
f. Representation of /o/



4 Application

Diachronical changes such as the French palatalization can be explained with help of the framework that we introduced in the previous section. Modern French palatals come from dorsals which underwent a *pruning* process – they lost a part of their structure and of their melody, leading to the surfacing of a weaker segment.

(16) French: /k/ → /ʃ/



However, there are intermediate stages, visible in Gallo-Romance dialects, that we must take into consideration. We thus propose to reinterpret palatalization as a reconfiguration of the m-command where only the last step is the result of structure loss or pruning.

In this section, we will first take a closer look at the intermediate stages attested in the first palatalization. Next, we show how the triggering conditions are different in the second palatalization and give our interpretation of the process. We then explore some cases where palatalization does not occur despite meeting similar conditions *a priori*.

4.1 First palatalization

Using the improved GP framework, we can now explain how the first palatalization proceeded. For the sake of clarity, examples in (1) are repeated in (17):

(17) k > k' > t' > t͡s > s / _ {I}
g > g' > d' > d͡ʒ > ʒ / _ {I}
cera > *cire* 'wax', *cervu(m)* > *cerf* 'deer', *argila* > *argile* 'clay'

Table 5 illustrates the path leading to the coronal (steps (a–e)).

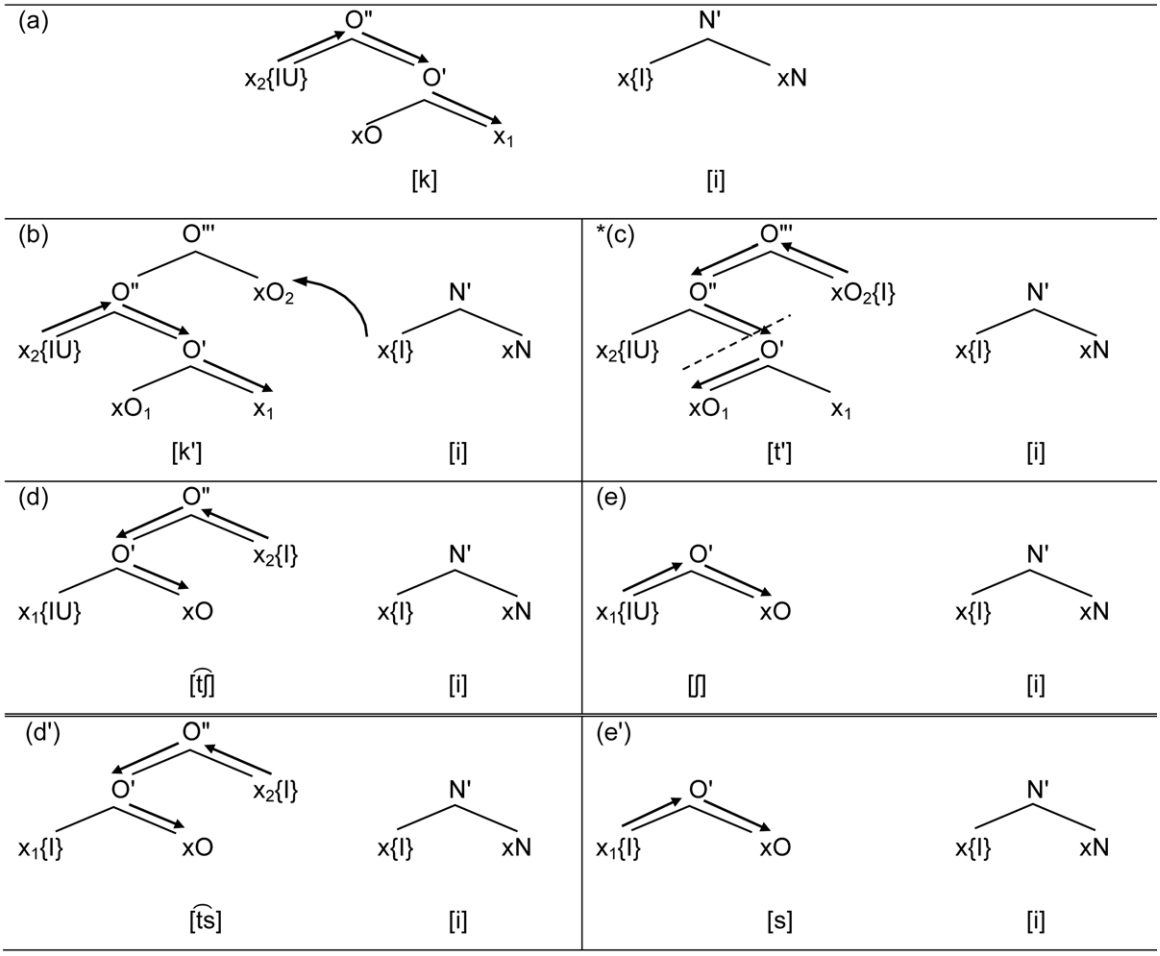


Table 5: The first palatalization and the intermediate stages.

The figure in (16) is equivalent to the stages (a) and (e) in Table 5. However, as shown in Table 5 (a–e), there are many intermediate stages and pruning is the last step on the trajectory. Bear in mind that the structures represent the dependency relations betweek components in a given representation. The structures are also a way to represent the complexity of segments classes. The number of layers for a given class of segments is not significant *per se*, but contrastively/comparatively to another class of segments. In (a), an m-command relation between the annotated x_2 and x_1 expresses the fact that the content is interpreted in both positions in the onset. In (b), the nucleus containing {I} rejects a palatalizing component. This palatalizing component is denoted by xO_2. This is the structure of a glide but it is at this moment devoided of content: the nucleus m-commands this structure. It means that {I} in the nucelus is also interpreted in this position. Because xO_2 belongs to the onset: both project a third level (O"'). This structure is interpreted as a palatalized dorsal, noted as [k'], it is actually, a [k] with a jod extension [ʲ].

As we said previously, there is still doubt about the existence of the step (c) in Table 5, which has no equivalent in modern dialects (See Table 2). We thus put it in the scenario only for explanatory reasons. In (c), there is no more m-command relation between xO_2 and the nucleus and the content is now settled in xO_2. In order to clarify this step, we linger over an example from Carvalho (2008) about phonologization of palatalization from Slavonic to Russian. In an autosegmental framework, the sequence /ti/ is represented by two feature matrices, each linked to its own skeletal position. /i/ triggered

the palatalization of the coronal (/t'i/): the representation is equivalent *modulo* the association line between the matrix of /i/ and the preceding position. The position lexically assigned to /i/ disappeared, while its content remained attached to the consonantal position. We thus obtain a palatalized consonant (/t'/) without explicit triggering environment. Similarly, in (c), the content from the nucleus settles in the preceding onset.

xO_2 now has element content, it is able to m-command the head of the onset. This modification of the m-command relations triggers *pruning* of the structure (symbolized by a dotted line in (c)). The onset is reduced – the unlicensed part of the structure, namely x_1, drops.[10]

In (d), the onset is now well-formed: it is made of two projections. In this structure, x_2 is the remnant of xO_2: it bears the element {I}. And x_1 also bears element content: {IU}. x_2 can only m-command xO: the latter has no element content and has to be m-commanded in order to be licenced. x_1 has to be interpreted too because it bears element content. (18d) is interpreted as an affricate: [t͡ʃ]. The element <I> associated to x_2 m-commands the head xO. This part of the structure in (d) constitutes the stop part of the affricate ([**t**͡ʃ]). <I,U> elements associated to x_1, in the complement position refer to the continuant part of the affricate ([t͡**ʃ**]). This representation of affricates encapsulates the representations of stops and fricatives in terms of number of projections for each class. The particularity of affricates lies in the specific m-command relation toward the head and the presence of element content at both levels.

The last step is represented in (e) where, in the 13th century, deaffrication occurs as pruning of the structure.

As we already underlined, Modern French, as opposed to other Gallo-Romance dialects, followed another path which is illustrated in Table 5 (d') and (e'). The structure in (d') is identical to that of (d) but with loss of the <U> element in x_1 which is followed by the pruning of the structure.

4.2 Second palatalization

We turn now to the second palatalization. This time the dorsal is palatalized before /a/. We recall examples in (2) as (18):

(18) k > k' > tʃ > ʃ / _ {A}
g > g' > d' > d͡ʒ > ʒ / _ {A}
carolus > *charles* 'Charles', *castellum* > *château* 'castle', *gamba* > *jambe* 'leg', *galbinu* > *jaune* 'yellow'

There has been speculation on the status of /a/: many consider that it was raised to /ɛ/ in the course of the 5th century and then lowered at the end of the palatalization (see references in Buckley 2009). We do not subscribe to this analysis. First, because /a/ is supposed to have raised to /ɛ/ during the 7th century – in other words, post palatalization (for example when followed by a nasal (manus > main [mɛ̃] 'hand')). Second, all the /ɛ/ coming from /a/ in open syllable come from palatalization: as the result of Bartsch's law, palatalized consonants tend to raise the subsequent vowel if it is in an open syllable (karum > t͡ʃero > ʃɛʀ cher 'dear/expensive') but not in a closed syllable (karru > t͡ʃarru > ʃaʀ char 'car').

In the amended version of GP 2.0 we use, /a/ is devoid of content (15a): it is an empty structure, just like schwa (the only difference is the control relation between the head xN and its dependent). In the previous case, <I> was the trigger of palatalization – it was

[10] This can be analyzed as an instantiation of the Structural Minimality Principle (Pöchtrager 2006: 65; Úlfsbjörninn 2008: 132): in this case, unlicensed x's (i.e. free from m-command and control) are "removed from the representation" (Úlfsbjörninn 2008: 132) Consequently, we end up with a unary branch in the structure, which cannot be maintained.

present in the following vowel /i/ and was able to spread to the preceding consonantal structure. In the present case, a-palatalization, no element can be emitted nor shared. Consequently, the only possible way to get palatalizing elements comes from the dorsal itself. /a/ only constitutes the trigger of the process which looks similar to the first palatalization. In other words, there is nothing palatalizing in /a/: palatalization results from the conjunction of dorsals and the empty adjunction structure.

In Table 6 (a), the content in x_2 is also interpreted in x_1 and (b) illustrates the same case of content settlement in an unannotated x as in the first palatalization. x_2 now c-commands xO only: this is the structure of an affricate where the content is the same on the specifier and the complement. x_2{IU} is interpreted as the [-continuant] part of the affricate, while x_1{IU} is interpreted as the [+continuant] part of the affricate.

Step (c) in Table 6 is a stage of *differentiation* resulting in content loss in x_2 at the expense of {U}. As in the preceding case, we do not consider the representation we give in (c) as a step in dorsal palatalization: as shown in Table 2, there are no traces of this stage in the Romance dialects spoken in France.

The loss of <U> between (b) and (d) in Table 6 is explored in the next section. In Table 6 (d), following the loss of <U>, we obtain an affricate [t͡ʃ], as in the i-palatalization with melodic content in both levels of the structure.

The last step is the pruning of the structure in (e) where there is deaffrication by loss of one of the projections.

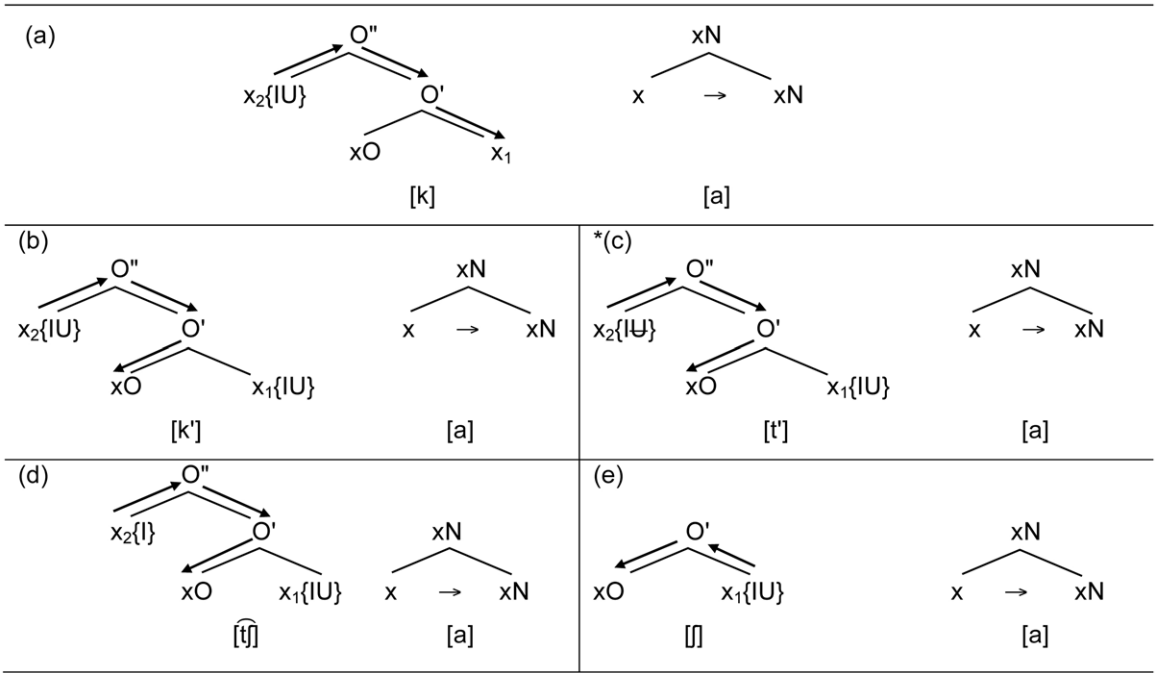


Table 6: The second palatalization and the intermediate stages.

If we come back to (b) in Table 6, contrary to what we underlined in the first palatalization in Table 5 (b), [k'] denotes [k] with a palatal fricative extension [ʃ]. In other words, what has been classically considered as the same output of the two palatalizations is in fact structurally two different objects: [kʲ] in the first palatalization and [k͡ʃ] in the second.

This result provides arguments in favor of the distinction between:

– *true palatalization* with a palatalizing element coming from "outside" and where <I> is the palatalizing agent (Table 5 (b–e)) *versus*

– *pseudo-palatalization* with no element sharing/adding, where the accessible adjunction structure is the trigger (Table 6(b–e)).

4.3 U-loss

In order to understand the step between (b) and (d) in Table 6, we compare palatalizing and non-palatalizing environments. Table 7 sums up the path in strong initial position and in weak intervocalic position.

	#KI	#KA	#KU	IKA	UKA	ÍKU	IKÚ
Lat.	[k]*era*	[k]*arlus*	[k]*ubitu*	ne[k]are	lo[k]are	ami[k]u	se[k]urum
3rd	[k’]						
	[t’]						
	[t͡s]						
4th				[g]	[g]	[g]	[g]
5th		[k’]		[V]	[V]	[V]	[V]
		[t’]		[jj]	[w]	[jj]	[w]
		[t͡ʃ]			[ø]		[ø]
9th				[j]		[j]	
13th	[s]	[ʃ]					
Fr.	[s]ire	[ʃ]arles	[k]oude	no[j]er	lou[ø]er	ami[ø]	s[ø]ur
	cire ‘wax’	*Charles*	*coude* ‘elbow’	*noyer* ‘drown’	*louer* ‘hire’	*ami* ‘friend’	*sûr* ‘safe’

Table 7: Initial and intervocalic /K/ (Bourciez 1958; Bourciez & Bourciez 1967; Zink 1986).

Intervocalically, <A> never triggers palatalization. The lenition we observe is typical of intervocalic position and the steps are well documented: voicing, spirantization, semi-vocalization, deletion. Interestingly, the glide’s color depends on the color of the preceding vowel: [j] when the preceding vowel contains <I>, [w] when it contains <U>.

What happens, in terms of structure, when {I} or {U} precedes /KA/? In Table 8, /K/ and the preceding vowel, [o], both contain <U>: *sharing* material (Honeybone 2005), they support each other. This is represented in Table 8 (a) by the double-headed arrow. (b) represents the voicing stage in intervocalic position, (c) the spirantization stage and (d) the semi-vocalization. Sharing is active in all stages even if the structure is affected. In (b), m-command is lost – the stop hence surfaces as voiced. In (c), the structure is reduced, which translates into spirantization. The last step is the complete loss of the complement, only the head remains and retains the shared melodic content.

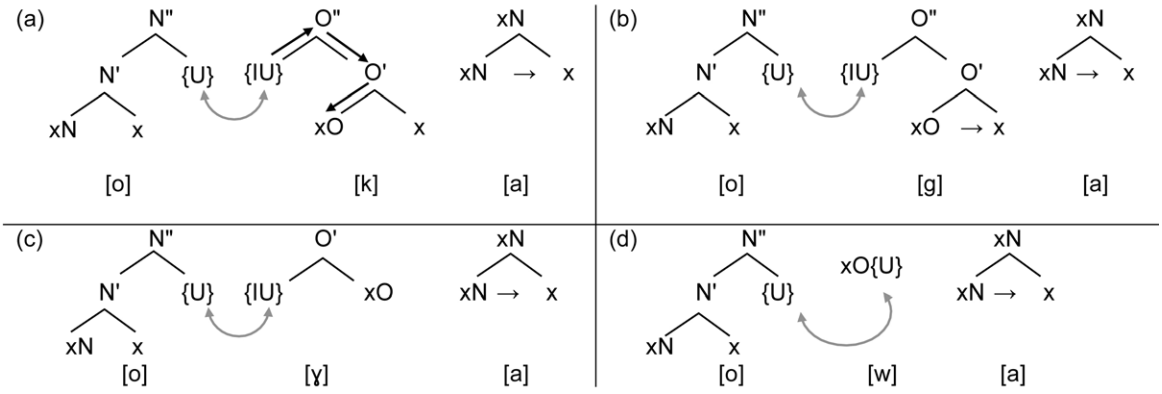


Table 8: {o, U} + K + A >> 4th c. [g] → 5th c. [ɣ] → 5th c. [w] → ∅.

But, if we now compare the cases in Table 8 with the cases in Table 9, where the preceding vowel contains <I>, as in *necare*, it appears that dorsals undergo the same treatment: voicing (b), spirantization (c), semi-vocalization (d).

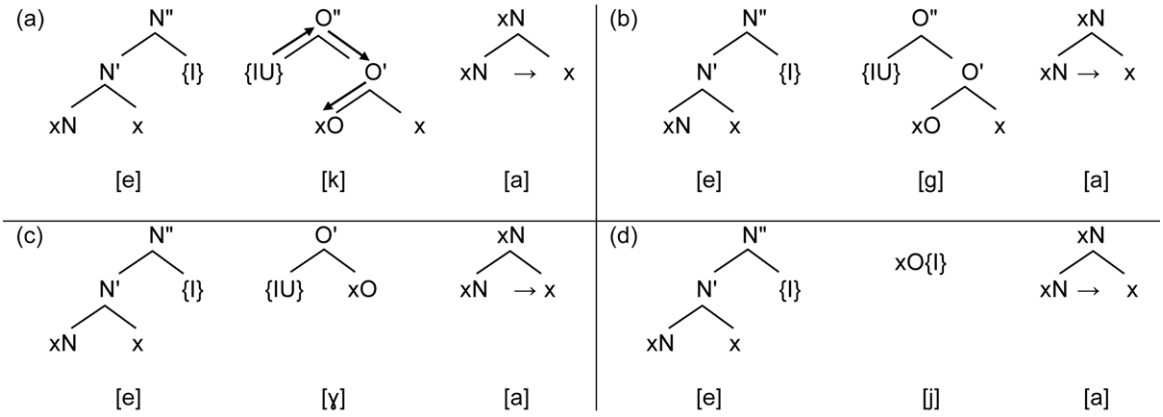


Table 9: {I, e, A} + K + A >> 4th c. [g] → 5th c. [ɣ] → 5th c. [jj] → [j].

The only difference lies on the quality of the resulting glide. In other words, dorsals are realized:

(i) [w] when the preceding vowel contains <U> or
(ii) [j] when the preceding vowel contains <I>.

In Table 9, sharing may also be active. However, if the preceding vowel is /a/, the result of lenition is the palatal glide [j], as in *pacare*, shown in the following Table.

Lat.	*carruca #KA UKA*			*necare* = IKA			*pacare* = AKA		
	[k]	*arru*	[k]*a*	*ne*	[k]	*are*	*pa*	[k]	*are*
4th			[g]		[g]			[g]	
5th	[k']		[ɣ]		[ɣ]			[ɣ]	
	[t']		[w]		[jj]			[jj]	
	[t͡ʃ]		[ø]						
9th					[j]			[j]	
13th	[ʃ]								
	[ʃ]	*arru*	[ø]e	*no*	[j]	*er*	*pa*	[j]	*er*
Fr.	*charrue* 'plow'			*noyer* 'drown'			*payer* 'pay'		

Table 10: IKA and AKA (Bourciez 1958; Bourciez & Bourciez 1967; Zink 1986).

The diachronic data lead to the assumption that <U> is weak and can only be maintained if there is another accessible <U> to share content with. In other words, <U>-loss during the second palatalization (Table 6 (c)) is due to this weakness. Even if <I> is not supported by sharing, namely in the case of a preceding /a/, it is strong enough to resist lenition. This discrepancy in the behavior of <I> and <U> does not seem to be structural and is observed in many other unrelated languages (Turkish: Pöchtrager 2010; Putonghua: Pöchtrager & Živanović 2010; Japanese: Nasukawa 2014). Further research may explain why the two melodic elements trigger different reactions.

5 Conclusion

In this paper, we showed that if /a/ does not contain any element, palatalization can only rely on the internal content of dorsals. We have shown the mechanisms leading to palatal fricatives and we gave explicit representation of the intermediate stages that are attested across Gallo-Romance dialects.

We claimed that affricates share the same structure as stops in GP 2.0: both have two projections. The main difference is that affricates host element material on both levels of the structure.

While classical representations of first and second palatalizations tend to consider that the structure of the palatalized dorsal is identical whether it happens before <I> or <A>, we have shown that their underlying structures are radically different. The distinction between true and pseudo palatalization is now clearly rendered. In the first palatalization, there is an external palatalizing agent which modifies the structure of the dorsal. In the second palatalization, the process is induced by the presence of the adjunction structure of /a/, but all the material comes from the dorsal itself.

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Competing Interests

The authors declare that they have no competing interests.

References

Angoujard, Jean-Pierre. 1997. *Théorie de la syllabe: rythme et qualité*. Paris: CNRS éditions.

Angoujard, Jean-Pierre. 2006. *Phonologie déclarative*. Paris: CNRS éditions.

Árnason, Kristján. 2011. *The phonology of Icelandic and Faroese*. Oxford; New York: Oxford University Press. DOI: http://dx.doi.org/10.1093/acprof:oso/9780199229314.001.0001

Backley, Phillip. 2011. *An introduction to element theory*. Edinburgh: Edinburgh University Press.

Bhat, Darbhe NS. 1978. A general study of palatalization. *Universals of Human Language* 2. 47–92.

Bourciez, Edouard. 1958. *Précis historique de phonétique française*. Paris: Klincksieck.

Bourciez, Edouard & Jean Bourciez. 1967. *Phonétique française: Etude historique*. Paris: Klincksieck.

Buckley, Eugene. 2009. Phonetics and phonology in Gallo-Romance palatalisation. *TRPS Transactions of the Philological Society* 107. 31–65. DOI: http://dx.doi.org/10.1111/j.1467-968X.2008.00212.x

Carvalho, Joaquim Brandão de. 2002. *De la syllabation en termes de contours CV*. Ecole des Hautes Etudes en Sciences Sociales (EHESS) (Habilitation à diriger des recherches).

Chauveau, Jean-Paul. 1984. *Le gallo : une présentation*. Brest: Université de Bretagne occidentale.

Clements, Nick G. 1985. The Geometry of Phonological Features. *Phonology Yearbook* 2. 225–52. DOI: http://dx.doi.org/10.1017/S0952675700000440

Clements, Nick G. & Elizabeth V. Hume. 1995. The internal organization of speech sounds. In John A. Goldsmith, Jason Riggle & Alan C. L. Yu (ed.), *The handbook of phonological theory*, 245–306. Oxford; Cambridge: Blackwell.

Dauzat, Albert. 1950. *Phonétique et grammaire historiques de la langue française*. Paris: Larousse.

Dawson, Alain, 2001. Palatalisation et affrication des occlusives vélaires en picard: Approche d'une variation dialectale en Théorie de l'Optimalité. Paper presented at the Actes du Colloque «Picard d'hier et d'aujourd'hui», Villeneuve d'Ascq.

Deriano, Patrik. 2005. *Grammaire du gallo*. Ploudalmézeau: Label LN.

Dresher, Elan B. 2009. *The contrastive hierarchy in phonology*. Cambridge; New York: Cambridge University Press. DOI: http://dx.doi.org/10.1017/CBO9780511642005

Dresher, Elan B. 2014. Contrastive Hierarchies in Element Theory. Paper presented at the Theoretical Issues in Contemporary Phonology: Reading Tobias Scheer, EHESS, Paris.

Hall, Daniel Currie. 2007. *The role and representation of contrast in phonological theory*. University of Toronto dissertation.

Harris, John. 1990. Segmental complexity and phonological government. *Phonology* 7. 255–300. DOI: http://dx.doi.org/10.1017/S0952675700001202

Harris, John. 1994. *English sound structure*. Cambridge: Blackwell.

Honeybone, Patrick. 2005. Sharing makes us stronger: process inhibition and segmental structure. *Headhood, elements, specification and contrastivity: Phonological papers in honour of John Anderson*, 167–92.

Hume, Elizabeth. 1996. Coronal consonant, front vowel parallels in Maltese. *Natural Language & Linguistic Theory* 14. 163–203. DOI: http://dx.doi.org/10.1007/BF00133405

Jacobs, Haike. 1993. La palatalisation gallo-romane et la représentation des traits distinctifs. In Bernard Laks & Annie Rialland (ed.), *Architecture des représentations phonologiques*, 147–71.

Jakobson, Roman, Gunnar Fant & Morris Halle. 1951. *Preliminaries to speech analysis. The distinctive features and their correlates*. Cambridge: MIT Press.

Jakobson, Roman & John Lotz. 1949. Notes on the French phonemic pattern. *Word. Journal of the International Linguistic Association* 5. 151–58.

Jakobson, Roman & Moris Halle. 2002. *Fundamentals of language*. Berlin: Walter de Gruyter. DOI: http://dx.doi.org/10.1515/9783110894264

Jensen, Sean. 1994. Is ʔ an Element? Towards a Non-segmental Phonology. *SOAS Working Papers in Linguistics and Phonetics* 4. 71–78.

Kaye, Jonathan, Jean Lowenstamm & Jean-Roger Vergnaud. 1985. The internal structure of phonological elements: A theory of charm and government. *Phonology Yearbook* 2. 305–328. DOI: http://dx.doi.org/10.1017/S0952675700000476

Kaye, Jonathan, Jean Lowenstamm & Jean-Roger Vergnaud. 1990. Constituent structure and government in phonology. *Phonology* 7. 193–231. DOI: http://dx.doi.org/10.1017/S0952675700001184

Kim, Yuni. 2008. *Topics in the phonology and morphology of San Francisco del Mar Huave*. University of California at Berkeley dissertation.

Lass, Roger. 1984. *Phonology: An introduction to basic concepts*. Cambridge: Cambridge University Press.

Martinet, André. 1975. La palatalisation du roman septentrional. In André Martinet (ed.), *Evolution des langues et reconstruction*, 217–225. Presses universitaires de France.

Montreuil, Jean-Pierre. 2000. Inventaires et contraintes consonantiques. *Langue Française* 126. 73–91.

Nandris, Octave. 1963. *Phonétique historique du roumain*. Paris: Klincksieck.

Nasukawa, Kunyia, 2014. Syllabification issues in Japanese: the case of the palatal glide. Paper presented at the Theoretical East Asian Linguistics *9 (TEAL)*, University of Nantes.

Pöchtrager, Markus A. 2006. *The structure of length*. University of Vienna disseration.

Pöchtrager, Markus. 2010. Does Turkish diss harmony? *Acta Linguistica Hungarica* 57. 458–73. DOI: http://dx.doi.org/10.1556/ALing.57.2010.4.7

Pöchtrager, Markus & Sašo Živanović. 2010. GP 2, and Putonghua too. *Acta Linguistica Hungarica* 57. 357–80. DOI: http://dx.doi.org/10.1556/ALing.57.2010.4.1

Pope, Mildred Katharine. 1934. *From Latin to Modern French with especial consideration of Anglo-Norman: Phonology and morphology*. Manchester: Manchester University Press.

Sala, Marius. 1976. *Contributions à la phonétique historique du roumain (Contributii la fonetica istoriča a limbii române)*. Paris: Klincksieck.

Scheer, Tobias. 1996. *Une théorie de l'interaction directe entre consonnes: contribution au modèle syllabique CVCV. Alternances e-ø dans les préfixes tchèques, structure interne des consonnes et la théorie X-barre en phonologie*. University of Paris 7 dissertation.

Scheer, Tobias. 1999. A theory of consonantal interaction. *Folia Linguistica* 32. 201–37.

Scheer, Tobias & Philippe Segeral. 2001. La coda-miroir. *Bulletin de la Société de Linguistique de Paris* 96. 107–52. DOI: http://dx.doi.org/10.2143/BSL.96.1.503739

Schwartz, Geoff. 2010. Auditory representations and the structures of GP 2.0. *Acta Linguistica Hungarica* 57. 381–97. DOI: http://dx.doi.org/10.1556/ALing.57.2010.4.2

Úlfsbjörninn, Shanti. 2008. The formal dynamism of categories: Stops vs. fricatives, primitivity vs. simplicity. *Poznań Studies in Contemporary Linguistics* 44. 121–46. DOI: http://dx.doi.org/10.2478/v10010-008-0006-y

Zink, Gaston. 1986. *Phonétique historique du français*. Paris: PUF.

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