

A unified account of Velar Palatalization in Italian*

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1. Introduction

This paper presents a synchronic account of Velar Palatalization in Italian, a segmental alternation causing a velar stop (the target) to surface as an alveopalatal affricate before a front vocoid (the trigger). The alternations in (2) are best described by (1).¹ The opposite process is unlikely given (3).

(1) $\left[\begin{array}{l} +\text{cons} \\ +\text{dorsal} \end{array} \right] \rightarrow \left[+\text{strident} \right] / - \left[\begin{array}{l} -\text{cons} \\ +\text{front} \end{array} \right]$ Simple Palatalization Rule

(2) Manifestations of palatalization:

mónak-o	‘monk’	m.sg.	
mónatʃ-i		m.pl.	*mónak-i
diríg-o	‘to direct’	1sg. pres.	
diríç-i		2sg. pres.	*diríg-i
diríç-e		3sg. pres.	*diríg-e

(3) Alveopalatal affricates surface before any vowel:

ʃambéll-a	‘donut’	mántʃ-a	‘tip’
ʃúff-o	‘lock of hair’	láʃʃ-o	‘string’
çáll-o	‘yellow’	spjáçç-a	‘beach’
çók-o	‘game’	áč-o	‘comfort’

However, (1) misapplies in different ways across the lexicon—and it never applies morpheme internally. While these facts have been used to claim that the process is not phonological (a.o. Celata and Bertinetto 2005, Krämer 2009) I will argue here that the opposite is true: palatalization is applied productively (Giavazzi 2010) and in a unified way across the entire lexicon, in spite of the superficial irregularity. In section 2 I present the three factors that

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¹For convenience, I distinguish between velar stops and alveopalatal affricates referring only to $[\pm\text{strident}]$.

control the application of (1): the Height, Stress and Voicing effects. I will argue that distributional facts along the lines of these effects, which are reflected in the typology (Bhat 1978, Bateman 2011), are expected to exist given the substantive auditory properties of the [KE]~[TʃE]² contrast (Guion 1998, Wilson 2006, Giavazzi 2010). Steddy (2015) offers an OT analysis of the application of palatalization in the verbal paradigms, making crucial use of faithfulness to free derivational Bases (Benua 1997, Kenstowicz 1996). A similar approach can be fruitfully applied outside of the verbal domain, once the correct assumptions are made. The result is an account with a unique constraint ranking that derives palatalization across the inflectional and derivational³ paradigms of verbs, nouns and adjectives.

2. Distribution of palatalization and factors controlling misapplication

2.1 Basics of Italian

Italian palatalization is a derived environment effect (Kiparsky 1982, 40) that only ever applies across morpheme boundary. As (4) shows, [KE]~[TʃE] contrast is preserved morpheme-internally.

- (4) *tʃím-a* ‘peak’ *tʃén-a* ‘dinner’ *ǫ́ír-o* ‘loop’ *ǫ́étt-o* ‘gesture’
kín-o ‘bent’ *ke* ‘what’ *gíz-a* ‘cast iron’ *gétt-o* ‘ghetto’

Inflected words in Italian consist of a bound root, optional derivational suffix(es), and one or more required inflectional suffix(es). Given a root whose final segment is a velar stop (a potential target of palatalization), the relevant cells of a paradigm are those where the suffix attaching to that root creates a derived marked /K-E/ sequence. The surface realization of that sequence tracks the (mis)application of palatalization. Plural suffixes of nouns and adjectives are all front vowels:

- (5) The three nominal/adjectival classes with palatalization triggers as suffixes (shaded):

	e-class	o-class	a-class
Sg.	-e	-o	-a
Pl.	-i	-i	-e

In underived words of these classes, stress is either on the penultima or antepenultima (as a matter of lexical stress). If syllables are added via suffixation, stress is attracted so as to fall on the ultima, penultima or antepenultima (depending on the suffix). (6) shows this:

- (6) Sg. Pl. Superlative
amár-o *amár-i* *amari-íssim-o* ‘bitter’/‘very __’ (m.)
pávid-a *pávid-e* *pavid-íssim-a* *pavid-itá* ‘coward’/‘very __’ (f.) / ‘cowardice’

²I use the convention of marking underspecification with capitalization: [K] and [Tʃ] stand for velar stops and palato-alveolar affricate respectively which are underspecified for [voice] (k, g, tʃ, ǫ́), while [E] stands for a [+front,±high] vocoid (e, ε, i, j).

³For reasons of space, I am not going to discuss derivational paradigms. Flor (in prep.) shows that palatalization applies there just as the analysis I present here predicts.

A unified account of Velar Palatalization in Italian

Four conjugations are identified according to the form of the infinitive.⁴

(7) Four conjugations (áre, ére, ěre, íre):

Theme Vowel	a	e	i
Stress on TV	am-áre ‘to love’	kad-ére ‘to fall’	part-íre ‘to leave’
Stress on root	kórr-ere ‘to run’		

The position of stress alternates across the paradigm, while always being on one of the last three syllables. For reasons of space I will only consider the present indicative paradigms.

(8) The present indicative suffixes (shaded cells are potential palatalization triggers):

	áre		ére		ěre		íre	
	sg.	pl.	sg.	pl.	sg.	pl.	sg.	pl.
1p.	-o	-jámo	-o	-jámo	-o	-jámo	-o	-jámo
2p.	-i	-áte	-i	-éte	-i	-éte	-i	-íte
3p.	-a	-ono	-e	-ono	-e	-ono	-e	-ono

2.2 Misapplication in nouns/adjectives and verbs

Underapplication of palatalization (i.e., surfacing of [K-E]) in nouns/adjectives is determined by three factors. The first is the Stress effect, and it concerns the o-class: items like (9a) with the root final velar in post-tonic position (i.e., with penultima stress) do not palatalize in the plural, while all other words palatalize as expected.⁵

(9) a. No palatalization of post-tonic /K/—the Stress effect:

sprék-o	spré-i	‘waste’
pók-o	pók-i	‘few’ (m.)
antík-o	antík-i	‘ancient’ (m.)

b. Palatalization (as expected) with antepenultima stress:

klássik-o	klássitʃ-i	‘classic’ (m.)
púbblík-o	púbblitʃ-i	‘public’ (m.)
mónak-o	mónatʃ-i	‘monk’

This is a case of prosodically conditioned underapplication. Underapplication is also Height conditioned: the plural suffix /-e/ of the a-class never triggers palatalization. The roots exemplifying this fact in (10) are the same roots that regularly palatalize before /i/ in (9b):

(10) Plural suffix /-e/ never triggers palatalization—the Height effect:

klássik-a	klássik-e	‘classic’ (f.)
púbblík-a	púbblík-e	‘public’ (f.)
mónak-a	mónak-e	‘nun’

⁴I will refer to the vowel between the root and the infinitive suffix as Theme Vowel.

⁵This effect is noted in descriptive grammars (cf. Serianni 2000). Importantly, nonce words experiments reported in Giavazzi (2010) have proved that this is a productive rule.

A root final affricate surfaces in the plural of the a-class only if it surfaces in the singular too, in which case it can be assumed to be an underlying affricate. Finally, a Voicing effect controlling application is also observed. Root final [g] is retained in the plural even when palatalization is not blocked by either the Stress or the Height effect:⁶

(11) /g-i/ resists palatalization even in non post-tonic position—the Voicing effect:

prófug-o	prófug-i	‘refugee’
sárag-o	sárag-i	‘porgy’
monólog-o	monólog-i	‘monologue’

The existence of similar effects is not surprising. First of all, that high front vowels are more probable triggers and unvoiced velars more probable targets of palatalization is a typological fact emerging from implicational universals (Bhat 1978, Bateman 2011). This is in turn explained under a certain phonetically grounded view of phonological contrast, according to which neutralization is the result of too high a degree of perceptual confusability (Flemming 2002, Steriade 1997). Velar stops and alveopalatal affricates are perceptually more similar before high front vowels and when they are unvoiced than otherwise (Guion 1998). The existence of substantive bias of the learner who generalizes from a [e] trigger to a [i] trigger more consistently than the reverse is also demonstrated by artificial language learning studies (Wilson 2006). Finally, Giavazzi (2010) presents experimental evidence pointing to the fact that in post-tonic position cues to the [KE]~[TʃE] distinction are stronger than in other contexts, which is a substantively grounded explanation of the Stress effect observed in Italian nouns and adjectives.

Remarkably, none of these effects is active in the e-class, which is the only one where both the singular and the plural suffix is a front vowel. Palatalization applies regularly in that class. The affricates are not underlying in (12): the velar surfaces in a non palatalizing context in derived words.

(12) Singular and plurals of the e-class palatalize regularly:

a.	... K-e	(sg.)	not attested
	... K-i	(pl.)	
b.	vótf-e	(sg.)	‘voice’
	vótf-i	(pl.)	
	vok-ál-e		‘vocal’
c.	kónjudʒ-e	(sg.)	‘spouse’
	kónjudʒ-i	(pl.)	
	konjug-ál-e		‘conjugal’

⁶Voicing conditioned underapplication is optional for some o-class items that belong to a closed class of roots formed with the Greek pseudosuffixes -lɔgo and -fago. For example, both filólɔg-i and filólɔʒ-i ‘philologists’ are attested. The only thing I say here is that the Voicing effect is still reflected as a distributional asymmetry: there is no optionality in the palatalization of the unvoiced velar.

A unified account of Velar Palatalization in Italian

The most striking fact about the verbal paradigms is that there is no trace of these three effects at all. First, all underived infinitives palatalize regularly:⁷

- (13) a. No form [... {k/g}-ére]
taʎ-ére 'to be silent'
pjaʎ-ére 'to please'
- b. No form [... {'k/g}-ěre]
diríɕ-ere 'to direct'
vínɕ-ere 'to win'

Underapplication is systematic across the áre paradigms. In the other conjugations palatalization occurs as in (15), without being constrained by the Stress, Height and Voicing effects.

- (14) Underapplication in the áre conjugations:
valik-áre 'to cross' inf.
válik-o 1sg. pres.
válik-i 2sg. pres.

- (15) Normal application in the ěre conjugations:
diríɕ-ere 'to direct' inf.
diríg-o 1sg. pres.
diríɕ-i 2sg. pres.
diríɕ-e 3sg. pres.

Given these facts, there seem to be two distinct systems of palatalization: one, regulated by the three effects, for the nominal/adjectival domain (modulo the e-class), and another one in the verbal domain. Both systems show non trivial misapplication patterns. As we shall see next, this is not the correct characterization of the phenomenon.

3. The analysis

The analysis I am going to present is one where misapplication of a regular process is the result of Base-Derivative Faithfulness (Benua 1997). Phonological derivation of a form *d* consists of evaluation of candidates against a ranked set of constraints: some faithfulness constraints make reference to the Input form /d/, and some to a Base, which I take to be a free Output form in the paradigm of *d*.⁸ The fundamental assumption is that for each paradigm, there is only one form, *b*, that does not have a Base: *b* itself is the Base of all other forms of its paradigm. As a consequence, BD faithfulness is not active in deriving a Base form *b*: BD faithfulness constraints are simply not defined without an accessible Base.

The infinitive and the singular are the Base forms in verbal and nominal/adjectival paradigms respectively. The fact that palatalization applies regularly in these forms across

⁷I ignore here the íre-conjugation because all the relevant forms except for one (kuʎ-íre 'to sew') are denominal or deadjectival derivations.

⁸I sidestep the issue of how the Base is selected (cf. Albright 2002a)—the success of the analysis is strong enough a motivation of this choice for present purposes.

all paradigms is thereby straightforwardly captured. Infinitives and singulars do not have a Base, and are thus exempt from BD-Faithfulness which generates misapplication. Regular application of this kind is then the result of a constraint ranking like (21) enforcing neutralization, with all markedness outranking IO Identity.

- (16) *ki := penalize sequence of unvoiced velar stop and [+front,+high] vowel.
- (17) *ke := penalize sequence of unvoiced velar stop and [+front,-high] vowel.
- (18) *gi := penalize sequence of voiced velar stop and [+front,+high] vowel.
- (19) *ge := penalize sequence of voiced velar stop and [+front,-high] vowel.
- (20) IO Id [\pm str] := *x_[- α str] if the Input correspondent⁹ of x is [α str].
- (21) *ki ; *ke ; *gi ; *ge \gg IO Id [\pm str] (Partial ranking)

Splitting markedness in four allows for the Voicing and Height effects to be stated in terms of constraint interaction. Both these effects can now be recast in terms of faithfulness to the velar in the singular (which is the Base) outranking certain markedness. The intersection of the two effects amounts to say that only when the trigger is /i/ and the target is the unvoiced /k/ a /K/ surfacing as [K] in the singular palatalizes in the plural. This is what the ranking in (23) expresses.

- (22) BD Id [-str] := *x_[+str] if the Base correspondent of x is [-str].
- (23) *ki \gg BD Id [-str] \gg *ke ; *gi ; *ge \gg IO Id [\pm str] (Partial ranking)

This is not going to yield wrong results with verbs: the only conjugation class where the infinitive (the Base) can surface with a velar is the *áre* class, characterized by underapplication, (see (14)). Voicing and Height effects are shown in (24) and (25) respectively.

	/prɔfug/+o/,/i/	BD Id [-str]	*gi	*ge	IO Id [\pm str]
(24)	(Base) \Rightarrow prɔfugo				
	prɔfudʒo				*!
	\Rightarrow prɔfugi		*		
	prɔfudʒi	*!			*

	/mɔnak/ + /-i/ , /-e/	*ki	BD Id [-str]	*ke	IO Id [\pm str]
(25)	(Base) \Rightarrow mɔnak-o/a				
	mɔnatʃ-o/a				*!
	mɔnaki	*!			
	\Rightarrow mɔnatʃi		*		*
	\Rightarrow mɔnake			*	
mɔnatʃe		*!		*	

No stipulation is required to account for the fact that these two effects are not visible in the e-class. As the singulars of that class—the Base—palatalize regularly, BD Id [-str] cannot

⁹Here and throughout in the sense of McCarthy and Prince (1999).

A unified account of Velar Palatalization in Italian

be violated because there is no [-str] in the Base in the first place. Regular application then ensues in the plural as well. The same holds for verbal conjugations other than the underapplying *áre*.

Finally, the Stress effect is best captured in terms of BD-Faithfulness too. The critical forms here are those where the stress is shifted away from the root: this is regularly the case with the superlative as in (26). All superlative forms have antepenultima stress, and it is the superlative suffix [-íssim-] that bears the stress. This suffix triggers palatalization in some cases, and it does not in others. The prosodic properties of the Base form (the positive singular) predict whether the superlative palatalizes or not, according to the stress effect. What is needed is thus a constraint like (27) outranking all markedness.

(26) a. Post-tonic target in the Base \Leftrightarrow Underapplying superlative:

póko póki ‘few’
 pok-íssim-o pok-íssim-i ‘very __’ (*potfíssimi)

b. Non post-tonic target in the Base \Leftrightarrow Palatalizing superlative:

púbbliko púbblitfi ‘public’
 pubblitf-íssim-o pubblitf-íssim-i ‘very __’

(27) BD Id [-str]/V́(C)_B := x_[+str] if the Base correspondent of x is [-str] and the vowel preceding it is stressed.

(28) BD Id [-str]/V́(C)_B \gg *ki (Partial ranking)

(29) Post-tonic [K] in the Base is preserved across paradigm:

/pók/ , + __	BD Id [-str]/V́(C)_B	*ki	BD Id [-str]	*ke	IO Id [\pm str]
(Base) pók-o/a					
pótj-o/a					*!
póki		*			
pótji	*!		*		*
pokíssimo		*			
potfíssimo	*!		*		*

(30)

/púbblík/ , + __	BD Id [-str]/V́(C)_B	*ki	BD Id [-str]	*ke	IO Id [\pm str]
(Base) púbblík-o/a					
púbblitf-o/a					*!
púbblíki		*!			
púbblitfi			*		*
púbblíke				*	
púbblitfe			*!		*
pubblíkíssimo		*!			
pubblitfíssimo			*		*

Here again, the absence of the Stress effect in verbs comes out naturally from one property of the infinitive forms, without any further assumption. The only conjugation where the

root final segment is in post-tonic position in the infinitive is ěre, e.g. *diríĉgere* ‘to direct’. An underlying velar there will always undergo palatalization, and the Stress effect really is faithfulness to a velar stop in the Base.

As for the distribution of palatalization in verbs, I essentially adopt the analysis in Steddy (2015), which can be naturally integrated in the general picture of palatalization in the nominal/adjectival domain (*pace* Steddy 2015). Again, the insight here is to derive the difference in application between conjugations from the difference in some crucial aspect of the form of the Base (the infinitive).

(31) $BD\ Id\ [\pm str]/[\sigma_s]_B := *x_{[-\alpha str]}$ if the Base correspondent of *x* is $[\alpha str]$ in stressed syllable.

(32) $BD\ Id\ [\pm str]/[\sigma_s]_B \gg *ki$ (Partial ranking)

This ranking preserves the value for [strident] in stressed syllable¹⁰ in the Base across the paradigm. (31) will only ever matter in the derivation of verbs simply because root final segments are never in the stressed syllable in the singular of nouns and adjectives. In other words, the difference between the two domains with respect to the application of palatalization is not stipulated in any way: it results from the definition of (31) and basic facts about the morphology and stress placement in Italian. The ranking in (32) is what derives the conjugation dependent misapplication in the verbal domain (see Steddy 2015): (33) summarizes the relevant facts. Interestingly, overapplication is predicted for the *ére* conjugation (where an affricate is in the stressed syllable of the infinitive): (32) enforces faithfulness to it even when it surfaces before a non front vowel. There are only three verbs of the *ére* conjugation that have a root final [tʃ/ĉ] in the first place, but all show overapplication in the paradigm.

	Form of the Infinitive	Stress on root	Stress on T.V. (Root final segment in σ_s)
(33)	[-front] Theme V.		áre–Underappl.
	[+front] Theme V.	ěre–Normal Appl.	ére–Overappl.

(34) Underapplication in the *áre* conjugation (*valikáre* ‘to cross’):

/valik/ ‘to cross’	BD Id $[\pm str]/[\sigma_s]_B$	*ki	BD Id [-str]	*ke	IO Id $[\pm str]$
(Base) \rightarrow valikáre				*!	
valitʃáre					*
\rightarrow váliko					
válitʃo	*!		*		*
\rightarrow váliki		*			
válitʃi	*!		*		*

¹⁰Output-Output faithfulness constraints with a prosodically defined context have precedents in the literature. For instance one is used in Kager (2000) to derive (pseudo)-cyclic aspects of syncope in Levantine Arabic (Brame 1974, Kenstowicz and Abdul-Karim 1980).

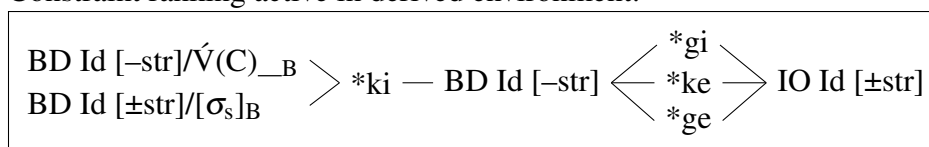
A unified account of Velar Palatalization in Italian

(35) Overapplication in the *ére* conjugation (taʃére ‘to be silent’):

/tak/ ‘to be silent’	BD Id [\pm str]/[σ_s] _B	*ki	BD Id [-str]	*ke	IO Id [\pm str]
takére				*!	
(Base) [☞] taʃére					*
táko	*!				
[☞] táʃo					*

The constraint ranking we arrived at is (36). It generates all the patterns of misapplication and normal application found in the inflectional and derivational paradigm—the only empirical assumption needed was the privileged status of underived infinitives and singulars as not having a Base.¹¹

(36) Constraint ranking active in derived environment:



Thus, the reason why the verbal and the nominal/adjectival domains appear as if they were regulated by two fundamentally different systems of palatalization is simply that underived infinitives and singulars are formally different from each other in some crucial way. Singulars of nouns and adjectives bear stress on the root, so that the root final segment cannot be in the stressed syllable. On the other hand, this is the case in certain verbal conjugations, and the effect of paradigm uniformity that results on account of (31) determines misapplication.

4. Conclusion

Previous work on Italian Palatalization concluded either that the phenomenon is a non phonological residue of a diachronic process (Celata and Bertinetto 2005, Krämer 2009), or that there are two distinct systems active in different parts of the lexicon (Steddy 2015). That the former thesis is wrong is proven in Giavazzi (2010): speakers have a productive rule of palatalization. I showed here that the latter is wrong too: assuming two different systems misses an important generalization, namely the fact that misapplication derives from transderivational Faithfulness to a free Base. This assumption results in a system that covers the entire lexicon without any further assumption in the form of cophologies or indexed constraints. Thus, the Italian case is one argument (among many others) for a theory of phonology in which asymmetric similarity between output forms is the result of faithfulness to privileged free forms, rather than of cyclic application of processes.

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¹¹However, cf. Albright (2002b) for a different case pointing to the status of Bases of infinitives in Italian.

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