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Phonological Relations Between Palatalizers and the Phonemic System: A Case Study on Czech

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Abstract

This paper examines palatalization in Czech, focusing on its behaviour in the domain of noun-deriving suffixes. It argues that Czech palatalization is not an assimilatory process, but a repair mechanism triggered by structurally and lexically deficient phonological units, referred to as *palatalizers*. These units lack an independent phonetic counterpart and can be identified only through their systematic phonological effects. The analysis proposes that palatalizers and phonemes form a coherent, interactive system whose interrelations determine the surface outcomes of palatalization. The study first introduces a new typology of Czech palatalization patterns, then rejects the assimilatory interpretation and develops a model in which palatalizers are reconstructed as independent but deficient phonological objects. The analysis adopts the framework of Substance-Free Phonology, which allows phonological processes to be modelled without direct dependence on phonetic data. This approach is particularly suitable given that palatalization exhibits widely varying phonetic realizations across languages. Building on this, the paper specifies the internal structure of palatalizers and the representation of their deficiency, and proposes a computational mechanism that predicts the interaction between palatalizers and target consonants. The resulting model predicts which phonemic classes undergo palatalization and which resist it.

Keywords: palatalization; repair; substance-free; Czech

1. Introduction

This paper investigates the phonological behaviour of palatalization in Czech, focusing specifically on the domain of noun-deriving suffixes. The central claim challenges the traditional assimilatory approach to palatalization, arguing that this process is non-assimilatory in Czech and functions as a repair mechanism for illicit phonological objects: palatalizers. We propose a model in which these palatalizers are independent but deficient phonological units, whose properties must be derived from their systematic phonological behaviour. Our goal is to demonstrate that palatalizers and phonemes form a coherent system that interacts to determine the resulting surface form.

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The paper is structured as follows. Section 2 introduces a novel typology for organizing Czech palatalization data in the nominal domain. This organization reveals systematic distinctions, showing that palatalization treats coronal plosives and fricatives differently (Section 2.1), and provides evidence for two phonologically distinct types of the consonant /r/ based on its syllabic position (Section 2.2). Crucially, this section demonstrates how the varying interaction of consonants with palatalizers divides the entire phonemic inventory into distinct phonological classes.

Section 3 argues against the traditional assimilatory view by presenting empirical cases in which palatalization occurs without an overt phonological trigger. This supports the conclusion that the process is driven by an independent phonological unit that remains invisible in the surface form.

Section 4 develops the idea that palatalizers lack an independent phonetic counterpart and, without the repairing process of palatalization, cannot be pronounced. It follows that palatalizers are not directly visible in the surface phonetic form; only their palatalizing effects can be observed. Consequently, their internal structure must be reconstructed solely on the basis of their systematic phonological behaviour.

Section 5 summarizes a related theoretical approach that explains the deficiency of the palatalizer as the absence of a crucial structural property. While Cavirani and Vanden Wyngaerd (2024) assume that this deficiency arises from the lack of association with syllabic structure, we assume that palatalizers are deficient because they lack one of the basic phonological features. As a result, they form phonological structures that are theoretically possible but have no phonetic counterpart in the lexicon, because the language simply does not contain such units. Our own formalization of this deficiency and the corresponding repair mechanism is presented in Section 6, which determines the phonological features required to capture the observed contrasts (Sections 6.1 and 6.2) and defines the structural and lexical representation of the palatalizer's deficiency (Section 6.3). It also introduces a computational mechanism for modelling the interaction between palatalizers and target consonants (Section 6.4). Section 7 summarizes the main findings and outlines directions for future research.

2. New organization of data uncovers palatalization patterns in Czech

When analysing palatalization, it is essential to organize the data systematically, as poorly organized data can obscure key patterns and relationships. Without clear structure, regularities remain hidden, preventing the identification of consistent patterns. In this study, we propose a new way of organizing palatalization data in Czech, specifically in the domain of noun-deriving suffixes[1], aiming to uncover new patterns in the representation of palatalization.

[1] Palatalizing processes in Czech are not confined to the domain of *noun-deriving suffixes*. They also occur with *verb-deriving suffixes* and within *declensional morphology* (case endings). These three morphological domains share a common basis but differ in several domain-specific properties, which makes it necessary to treat them separately. In all three, palatalization yields parallel outcomes for coronals (*t, d, n*) and labials (*p, b, f, v*), while sibilants (*s, z*) and velars (*k, g, x, ɦ*) behave differently. Some *verb-deriving suffixes* can trigger palatalization of

In Czech, palatalization occurs synchronically at morphological boundaries. This paper focuses specifically on instances where it is triggered by noun-deriving suffixes. The interaction between these suffixes and stem-final consonants gives rise to systematic phonological alternations. Table 1 presents a typology of these alternations, based on three assumptions: first, each morphological unit is associated with a single palatalizer; second, two distinct morphological units may share the same palatalizer and thus trigger the same palatalizing effect; and third, in each palatalizing context, some consonants undergo palatalization while others do not. The table does not provide an exhaustive list of suffixes but offers a representative overview of all attested palatalization patterns in this morphological domain. Due to space constraints, only one example per phoneme class is included. However, if one phoneme from a given class undergoes palatalization, all other members of that class exhibit the same behavior under the same process.

In Table 1, we present four suffixes, which differ with respect to the palatalization effect triggered in their presence. Firstly, we introduce the derivational suffix *-yně*, which does not involve any palatalization at all. This is illustrated in the column no-PAL marked by the red shape of the cells and the sign "X". This suffix is included in the table to demonstrate that not all derivational suffixes in the nominal domain trigger palatalization. In contrast, the remaining three columns contain derivational suffixes whose presence triggers palatalization.

Table 1: *Czech palatalization patterns in the domain of noun-deriving suffixes*

palatalizer type	**no-PAL**	**PAL0**	**PAL1**	**PAL2**
derivational suffix	***-yně*** feminine derivative nouns or toponyms	***-ek*** nouns bearing a property of the source word	***-ice*** female zoonyms	***-ě / -e*** juvenile zoonyms
COR3 [s z]	X *	X ***pa*[s]*–pá*[s]*ek*** "waist" – "belt"	X ***pe*[s]*–p*[s]*ice*** "dog"	X ***hu*[s]*a–hou*[s]*e*** "goose"
LAB [p b f v]	X ***hra*[b]*ata–Hra*[b]*yně*** "counts" – name of town	X ***výro*[b]*a–výro*[b]*ek*** "production" – "product"	X ***sla*[v]*ík–sla*[v]*ice*** "nightingale"	✓[pj] ***čá*[p]*–čá*[pj]*ě*** "stork"
COR2 [t d r$_2$]	X ***hospo*[d]*ář–hospo*[d]*yně*** "homesteader" – "female homesteader" X ***cho*[r]*ý–Cho*[r]*yně*** "ill" – name of town	X ***žlu*[t]*ý–žlou*[t]*ek*** "yellow" – "yolk" X ***veče*[r]*–večí*[r]*ek*** "evening" – "party"	✓[c] ***levhar*[t]*–levhar*[c]*ice*** "leopard" ✓[r] ***ještě*[r]*–ještě*[r̝]*ice*** "lizard"	✓[ɟ] ***mla*[d]*ý–mlá*[ɟ]*ě*** "young/cub" ✓[r̝] ***ku*[r]*–ku*[r̝]*e*** "hen/cock"
COR1 [r$_1$]	X ***ob*[r]*–ob*[r]*yně*** "giant" – "female giant"	✓[r] ***(v)nit*[r]*o–vnit*[r]*ek*** "inner self" – "interior"	✓[r] ***tyg*[r]*–tyg*[r]*ice*** "tiger"	✓[r] ***tyg*[r]*–tyg*[r]*e*** "tiger"
VEL & LAR [k g x ɦ]	X ***žá*[k]*–žá*[k]*yně*** "pupil" – "female pupil"	✓[ʒ] ***je*[ɦ]*la–je*[ʒ]*ek*** "needle" – "hedgehog"	✓[ʃ] ***hro*[x]*–hro*[ʃ]*ice*** "hippo"	✓[c͡ʃ] ***ptá*[k]*–ptá*[c͡ʃ]*e*** "bird"

sibilants, unlike *noun-deriving* or *declensional suffixes* (e.g. *zku*[s]*-i-t* 'to examine' > *zkou*[ʃ]*-en 'examined'*). Case endings, by contrast, show a qualitatively distinct type of velar palatalization, producing *alveolars* (e.g. [k] > [t͡s]) rather than *palatals* (e.g. [k] > [c͡ʃ]). Since this article aims to introduce a new method for analysing palatalization, it focuses on *noun-deriving suffixes*, the least complex of the three domains. The same approach can be (and will be) applied to *verb-deriving* and *declensional suffixes* but doing so would require a more detailed and contrast-rich analysis. Developing such an extension lies beyond the scope of this paper, whose aim is not to resolve Czech palatalization as such, but to demonstrate a way of approaching it that can yield new insights into its behaviour.

Table 1 shows that the resulting palatalization effect varies depending on the suffix attached. Thus, in column PAL0, only velars, laryngeals[2] and coronals of the first type are palatalized, which is demonstrated by the data in the green cells with the sign "✓". The remaining consonants do not undergo palatalization when attached to the suffix *-ek* which is marked by the red shade of the cells and the sign "X". In column PAL1, all velars, laryngeals and coronals of the first type and second type are palatalized when the suffix *-ice* is attached, simultaneously, all labials and coronals of the third type resist palatalization in this context. As for column PAL2, all velars, laryngeals, coronals of the first and second type and labials are palatalized when the suffix *-ě*/*-e* is attached, and the only class of consonants resisting PAL2 are coronals of the third type.

In addition to distinguishing the three major places of articulation (velars/laryngeals, coronals, and labials), the patterns summarized in Table 1 reveal an important point about the internal structure of coronals. When viewed through the lens of palatalization, coronals do not form a uniform class. Their behaviour allows us to divide them into three distinct subclasses, which we label COR1, COR2, and COR3.

We begin by showing the relevance of manner of articulation. As Table 1 demonstrates, coronal plosives /t d/ (which form COR2) and their fricative counterparts /s z/ (which make up COR3) do not pattern alike under the various palatalization processes. Coronal plosives are considerably more susceptible to palatalization in Czech, whereas fricatives show a much higher degree of resistance. We claim that this difference in palatalizability provides evidence that COR2 and COR3 must be treated as separate classes. To support this division, we will draw on palatalization data from other languages, which point in the same direction.

Turning to the difference between COR2 and COR1, we argue that Czech has two phonologically distinct types of /r/, which we label /r_1/ and /r_2/. COR2 includes the coronal plosives /t d/, the coronal and the sonorant /r_2/, while COR1 contains only a single consonant: the sonorant /r_1/. The data reveal that syllabic position plays a role in palatalization. PAL0 applies to those instances of /r/ that occur as part of a branching onset (/r_1/). When /r/ forms the onset on its own (/r_2/), it resists PAL0 and palatalizes only in the context of PAL1 or PAL2, together with the coronal plosives and the nasal. To account for this contrast, we propose to distinguish two variants of the Czech /r/ phoneme, defined by their position within the syllable. Our argumentation will draw on theories of branching onsets, which predict different phonological behaviour for /r/ depending on its syllabic position. Unlike in the case of COR2 and COR3, however, we cannot support this split by appealing to cross-linguistic palatalization patterns, as no language is currently known to exhibit the same contrast. This is

[2] There are two conflicting types of evidence regarding whether Czech /ɦ/ and /x/ should be classified both as velars, or rather whether /ɦ/ is a laryngeal and /x/ a velar, as in German (Trubetzkoy 1969). On the one hand, it has been argued that /ɦ/ and /x/ belong to the same class of velar consonants, since /ɦ/ undergoes devoicing to [x] under the influence of a voiceless obstruent in regressive voicing assimilation. From this perspective, /ɦ/ and /x/ form a voicing pair and thus belong to the same phonological class. On the other hand, when /x/ becomes voiced in regressive assimilation under the influence of a following voiced obstruent, it surfaces as [ɣ], which would suggest that /ɦ/ and /x/ do not form a voicing pair. We leave this debate open, since /ɦ/ and /x/ behave identically with respect to palatalization, and resolving this issue lies beyond the scope of the present paper.

not surprising, given how few languages both allow branching onsets with special behaviour of sonorants and also have palatalization processes that affect sonorants. Polish would be the closest candidate for such a system, but to our knowledge, no such evidence has been documented in the available literature.

The following subsection will focus on the contrast between COR2 and COR3 and examine how cross-linguistic palatalization patterns support treating these two groups as phonologically distinct.

2.1. Palatalization treats plosives and fricatives differently

Czech palatalization data show that coronal plosives and coronal fricatives behave differently: the plosives /t d/ undergo palatalization under PAL1 and PAL2, while the fricatives /s z/ do not. This suggests that the coronal series must be divided into two groups, COR2 and COR3, and raises the question of whether this distinction is supported cross-linguistically.

Evidence from other languages confirms that this type of split is not unique to Czech. Bateman (2007: 286) reports that in Tohono O'odham, coronal plosives /t d/ palatalize in the presence of the vowels /i e u/, while the coronal fricative /s/ does not. A similar asymmetry is found in Polish: Czaplicki (2013: 27) shows that in the context of the suffix *-em*, velar plosives /k g/ palatalize, while the velar fricative /x/ remains unchanged. Malambe (2006: 123) describes a parallel split in siSwati (Bantu): when the suffix *-iw-* is attached, labial plosives palatalize, whereas labial fricatives do not. The opposite pattern also exists: Chen (1973: 182) reports that in the Lesbian dialect of Greek, coronal fricatives palatalize before the glide /y/, while coronal plosives do not.

These cross-linguistic patterns confirm that the Czech division between COR2 and COR3 is not arbitrary: plosives and fricatives often differ in how they interact with palatalization processes. This confirms that separating these two coronal groups in Czech is not only justified but also expected.

A second set of cases supports the same conclusion, showing that the systematic difference between plosives and fricatives may lie not only in whether palatalization applies, but also in how it applies. Specifically, it may result either in full palatalization or in secondary palatalization.

Munteanu (2017) and Bateman (2007) report that in Moldovan (a dialect of Romanian), labial plosives and labial fricatives behave differently when they occur before the adjectival plural marker *-i*: the plosives undergo secondary palatalization, while the fricatives undergo full palatalization. A parallel pattern is found in Standard Romanian, where /s z/ undergo full palatalization, whereas /t d r/ undergo secondary palatalization before any *i-* or *e*-initial suffix.

Further examples are given in Bateman (2007). In Nupe (Nigeria), coronal plosives, fricatives, and affricates behave differently when they occur before the front vowels /i/ and /e/. Fricatives and affricates undergo full palatalization, while plosives undergo secondary palatalization. In Mandarin, coronal segments show a similar asymmetry before the high front vowels /i/ and /y/. Dental affricates and /s/ undergo full palatalization, whereas the remaining coronals undergo secondary palatalization. In Carib (Brazil), the suffix *-ila*/*ile* triggers

different outcomes depending on the preceding consonant. Fricative /s/ undergoes full palatalization, while plosives /t d/ undergo secondary palatalization. In Yagua (Peru), a similar pattern is found when the relevant consonants occur at a morphological boundary preceding the glide /y/. Fricative /s/ is fully palatalized, while plosive /t/ undergoes secondary palatalization.

Taken together, these cases show that the contrast between plosives and fricatives is not an accidental property of individual languages but a recurrent pattern in how palatalization operates cross-linguistically. This strongly suggests that treating the two manners of articulation as having different phonological representations is both empirically motivated and necessary for an adequate model of palatalization. In the Czech system, the distinction observed in Table 1, where coronal plosives and coronal fricatives participate in different palatalization processes, fits squarely within this broader tendency. Although it may seem non-intuitive at first glance, the Czech coronal domain must therefore be divided into two groups, COR2 and COR3, because their palatalization behaviour clearly diverges.[3] To make this distinction explicit and to reflect the broader generalizations discussed above, we will refer to COR3 as SIB from this point on. This relabelling is also reflected in the updated version of Table 1, where the tag COR3 has been replaced with SIB.

Table 2: *Czech palatalization patterns in the domain of noun-deriving suffixes (COR3 replaced with SIB)*

palatalizer type	**no-PAL**	**PAL0**	**PAL1**	**PAL2**
derivational suffix	***-yně*** feminine derivative nouns or toponyms	***-ek*** nouns bearing a property of the source word	***-ice*** female zoonyms	***-ě / -e*** juvenile zoonyms
SIB [s z]	**X** *	**X** ***pa*[s]*ek* – *pá*[s]*ek*** "waist" – "belt"	**X** ***pe*[s] – *p*[s]*ice*** "dog"	**X** ***hu*[s]*a* – *hou*[s]*e*** "goose"
LAB [p b f v]	**X** ***hra*[b]*ata* – *Hra*[b]*yně*** "counts" – name of town	**X** ***výro*[b]*a* – *výro*[b]*ek*** "production" – "product"	**X** ***sla*[v]*ík* – *sla*[v]*ice*** "nightingale"	**✓[pj]** ***čá*[p] – *čá*[pj]*ě*** "stork"
COR2 [t d r$_2$]	**X** ***hospo*[d]*ář* – *hospo*[d]*yně*** "homesteader" – "female homesteader" **X** ***cho*[r]*ý* – *Cho*[r]*yně*** "ill" – name of town	**X** ***žlu*[t]*ý* – *žlou*[t]*ek*** "yellow" – "yolk" **X** ***veče*[r] – *večí*[r]*ek*** "evening" – "party"	**✓[c]** ***levhar*[t] – *levhar*[c]*ice*** "leopard" **✓[r]** ***ještě*[r] – *ještě*[ɾ]*ice*** "lizard"	**✓[ɟ]** ***mla*[d]*ý* – *mlá*[ɟ]*ě*** "young/cub" **✓[r]** ***ku*[r] – *ku*[r]*e*** "hen/cock"
COR1 [r$_1$]	**X** ***ob*[r] – *ob*[r]*yně*** "giant" – "female giant"	**✓[ɾ]** ***(v)nit*[r]*o* – *vnit*[ɾ]*ek*** "inner self" – "interior"	**✓[r]** ***tyg*[r] – *tyg*[ɾ]*ice*** "tiger"	**✓[r]** ***tyg*[r] – *tyg*[ɾ]*e*** "tiger"
VEL & LAR [k g x ɦ]	**X** ***žá*[k] – *žá*[k]*yně*** "pupil" – "female pupil"	**✓[ʒ]** ***je*[ɦ]*la* – *je*[ʒ]*ek*** "needle" – "hedgehog"	**✓[ʃ]** ***hro*[x] – *hro*[ʃ]*ice*** "hippo"	**✓[ʃ]** ***ptá*[k] – *ptá*[ʃ]*e*** "bird"

[3] We do not currently know why the contrast between plosiveness and fricativeness in Czech is distinguished specifically within the coronal series. However, cross-linguistic patterns suggest that this kind of behaviour tends to be localized in just one of the three basic phonemic groups. In Czech, it is the coronals; in languages like siSwati, it appears to be the labials; and in Polish, the velars. While we do not explore this issue further here, it likely reflects a deeper structural property of phonological systems. What we do assume to be cross-linguistically stable, however, is the possibility of grouping phonemes into such categories and constructing tables similar to the one presented here for Czech. Based on such structural patterns, it is possible to build language-specific analyses which may differ in their details but are founded on the same core principles, developed in the following sections.

Having established the motivation for distinguishing COR2 and SIB, we now turn to the second issue: why we propose that Czech /r/ must be split into two phonologically distinct subtypes /r_1/ and /r_2/, and why /r_1/ forms a distinct phonological group from COR2.

2.2. Palatalization reveals two phonologically distinct /r/s in Czech

Table 2 clearly shows that /r/ displays two different patterns, which strongly suggests that we are dealing with two phonologically distinct objects. This line of reasoning aligns with Kaye's (2005) *epistemological principle*, which holds that phonological identity is revealed through observable phonological behaviour. In other words, if there is a segment which behaves in two distinct and systematically predictable ways, then it corresponds to two separate phonological objects.

As shown in Table 2, /r_1/ undergoes palatalization in all three contexts: PAL0, PAL1, and PAL2. In contrast, /r_2/ is affected only by PAL1 and PAL2. This indicates that /r_1/ and /r_2/ must be treated as phonologically distinct, since they differ systematically in their behaviour with respect to palatalization. The next question is whether this difference is predictable. Crucially, there is a consistent phonological factor that unifies the distribution: only those instances of /r/ that form a branching onset with a preceding consonant are targeted by PAL0 (these are labelled r_1, see 1a). In contrast, /r/ that appears in a simple onset position is not affected by PAL0 (these are labelled /r_2/, see 1b).

(1) a. /r/ in the branching onset is palatalized by -ek (O=onset, N=nucleus)

O	N	**O**	N	⇒	O	N	**O**	N	O
/\	|	/\	|		/\	|	/\	|	|
vn	i	**tr**	o		vn	i	**tr_1**	e	k

b. /r/ in the simple onset is not palatalized by -ek (O=onset, N=nucleus)

O	N	O	N	**O**	⇒	O	N	O	N	**O**	N	O
|	|	|	|	**|**		|	|	|	|	**|**	|	|
v	e	tʃ	e	**r**		v	e	tʃ	iː	**r**	e	k

Because the examples illustrating this pattern in the domain of nominal derivational suffixes are relatively few in number, we supplement the analysis with data from a different morphological domain: nominal declension. Specifically, we turn to the masculine vocative suffix *-e*, where the same syllabic conditioning of /r/-palatalization can be observed. As shown in Table 3, only /r/ that forms a branching onset with a preceding consonant undergoes palatalization, while /r/ in a simple onset position does not. This provides direct evidence that the syllabic position of /r/ in Czech has a phonological effect on whether palatalization applies or not.

Table 3: *Distribution of /r/-palatalization in the context of vocative suffix -e based on syllabic position*

/r/ in the branching onset is palatalized by *-e*				**/r/ in the simple onset is not palatalized by *-e***			
NOM.SG.		VOC.SG.		NOM.SG.		VOC.SG.	
bra[tr]	⇒	bra[**tr̰**]**e**	“brother”	tvo[r]	⇒	tvo[**r**]e	“creature”
šva[gr]	⇒	šva[**gr̰**]e	“brother in law”	kašpa[r]	⇒	kašpa[**r**]e	“clown”
o[br]	⇒	o[**br̰**]**e**	“giant”	upí[r]	⇒	upí[**r**]e	“vampire”
ma[xr]	⇒	ma[**xr̰**]e	“poser”	ca[r]	⇒	ca[**r**]e	“tsar”

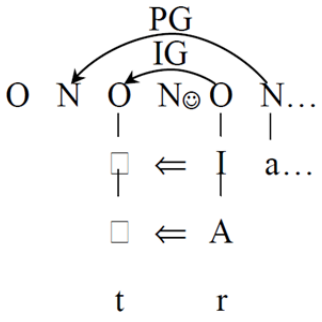
These data show that although the two surface variants of /r/ are phonetically identical, they display systematically different phonological behaviour with respect to palatalization. This difference is not random but follows from their syllabic position and is therefore phonologically conditioned. We have thus shown that the two variants of /r/ can be treated as distinct phonological objects.

We now turn to the question of what might underlie this distinction and how it relates to the special status of /r/ in branching onsets.

The ability of /r/-sounds to form a branching onset has been already intensively studied in phonological models such as Strict CV (Scheer 2004). This property is formally represented through the mechanism of *infrasegmental government* (Scheer 1999), a development of earlier *constituent government* proposed by Kaye, Lowenstamm & Vergnaud (1990).

The crucial part of Scheer’s infrasegmental government, relevant to our proposal about Czech /r/, is that when /r/ follows an obstruent, a special relationship between the two is established. Scheer models this within the framework of Element Theory (Kaye, Lowenstamm & Vergnaud 1985, Backley 2011) as element sharing between the two consonantal positions, where /r/ shares its melodic elements with the preceding obstruent. The original idea was that the obstruent lacks some elements, which can be provided by the following sonorant /r/. In doing so, they form a special phonological constituent: the branching onset.[4] See the model in (3).

(3) Model of infrasegmental government[5] in Scheer (1999)



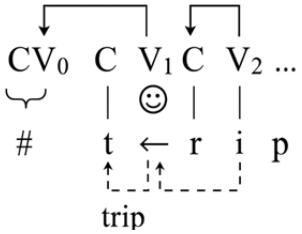
[4] Other consequences of this configuration will not be discussed here but are described in detail in Scheer (1999) and Scheer (2004). Our focus will instead be on the nature of infrasegmental government itself and how it can be understood.

[5] Annotation of the model: O = onset, N = nucleus, IG = infrasegmental government, PG = proper government.

However, even after 20 years, Scheer & Cyran (2018) acknowledge that the true nature and conditioning of infrasegmental government still remain to be fully understood. Nevertheless, we observe a shift in how infrasegmental government is represented: attention has gradually turned to the nucleus (vocalic) position between the consonants forming the branching onset. In earlier models, this position was entirely suppressed, as it was overshadowed by the operation of infrasegmental government and did not participate in any government relations (we can see in (3) that N inside the branching onset is "happy" to be omitted from government relations). In contrast, in the structure shown in (4), this position plays an active role: although being empty, it governs the preceding vocalic position and at the same time licenses the adjacent consonantal position occupied by the obstruent of the branching onset.

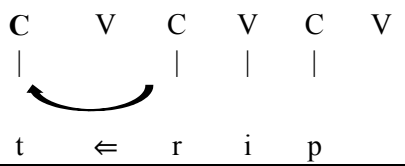
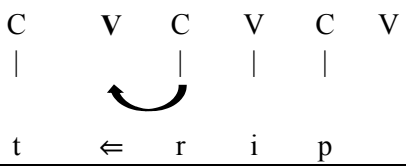
As we can see, what is collectively referred to as infrasegmental government turns out to be a highly complex procedure. It involves not just a relation between two consonantal positions, but rather a configuration of four positions – two consonantal and two vocalic– and their governing and licensing properties.

(4) Model of infrasegmental government[6] in Scheer & Cyran (2018)



Since in this newer model, the intervening vocalic position acquires a unique status not shared by other empty V slots — specifically, it gains the ability to govern the preceding empty V position (V_0), and like other occupied V slots, it is not governed by the following V position (V_2) — this raises the question of with which position exactly the melodic material provided by the sonorant /r/ is shared. Is it truly the preceding C slot already occupied by the obstruent that receives this material (scenario in 5a), or could it instead be the intervening empty V slot (scenario in 5b)? The latter seems plausible, especially given that this V position now behaves as if it is associated with subsegmental content. Moreover, if the obstruent in a branching onset were indeed receiving some shared material from /r/, we would expect it to undergo some phonological modification, but to our knowledge, this never happens. The only position that shows unexpected behaviour or signs of modification is precisely the intervening vocalic position.

(5)

a. ***transfer of elements according to model in Scheer (1999)***	**b.** ***transfer of elements according to model in Scheer & Cyran (2018)***
	

[6] Annotation of the model: C = consonantal slot, V = vocalic slot, ⟵ = proper government, ⇠ = licensing.

Whether the melodic material of /r/ is linked to the preceding C slot (scenario 5a) or to the intervening V slot (scenario 5b), both scenarios imply that /r/ shares its subsegmental content with another position. This brings us to a broader theoretical question: what exactly is the nature of what has traditionally been described as element sharing? Is the emergence of branching onsets best captured as a case of shared phonological content, or might an alternative model be more appropriate? In what follows, we argue that the traditional assumption of sharing presents a fundamental problem. If the subsegmental material were truly shared, the identity of /r/ should remain unchanged — /r/ in a branching onset would then behave identically to /r/ in a simple onset in subsegmental processes, since sharing should not alter the phonological properties of the segment that provides the material. Yet Czech /r/-palatalization in branching onsets contradicts this expectation. The behaviour of /r/ under PAL0 suggests that what has been described as sharing may in fact involve full transmission of phonological material to the adjacent position. Only such transmission results in a modified subsegmental profile for /r/ in branching onsets, which explains its sensitivity to PAL0 and contrasts with the stability of /r/ in simple onsets.

What we conclude is that /r_1/ can be analysed as a positional allophone of /r_2/.[7] The contrast between the two is not arbitrary but systematically conditioned by syllabic structure and reflected in their subsegmental representation. When we come back to our data set in Table 2, this finding provides further support for treating COR1 as phonologically independent from COR2. To make this distinction fully explicit, we relabel COR1 as R, referring to those instances of /r/ that occur in branching onsets. Since COR3 has already been relabelled as SIB and COR1 as R, there is no longer a need to maintain the label COR2 – we now refer to this remaining group simply as COR. The updated labelling is reflected in Table 4.

[7] More on the special behaviour of /r/ and rhotic phonemes with respect to syllable structure can be found, for example, in Chabot (2019) or Wiese (2011). Further, we do not treat examples of palatalization that interact with syllable structure as "fake" palatalization, as proposed by Scheer & Ségéral (2001). It is quite common for palatalization to show such interactions, whether they are triggered by hiatus resolution or by parametrically defined settings for consonant clusters in a given language (Kirundi, Latvian, Moldavien, Xhosa, Somali, Tswana, Zoque, etc.).

Table 4: *Czech palatalization patterns in the domain of noun-deriving suffixes (COR1 replaced with R, COR2 replaced with COR)*

palatalizer type	no-PAL	PAL0	PAL1	PAL2
derivational suffix	***-yně*** feminine derivative nouns or toponyms	***-ek*** nouns bearing a property of the source word	***-ice*** female zoonyms	***-ě / -e*** juvenile zoonyms
SIB [s z]	X *	X ***pa[s] – pá[s]ek*** "waist" – "belt"	X ***pe[s] – p[s]ice*** "dog"	X ***hu[s]a – hou[s]e*** "goose"
LAB [p b f v]	X ***hra[b]ata – Hra[b]yně*** "counts" – name of town	X ***výro[b]a – výro[b]ek*** "production" – "product"	X ***sla[v]ík – sla[v]ice*** "nightingale"	✓[pj] ***čá[p] – čá[pj]ě*** "stork"
COR [t d r$_2$]	X ***hospo[d]ář – hospo[d]yně*** "homesteader" – "female homesteader" X ***cho[r]ý – Cho[r]yně*** "ill" – name of town	X ***žlu[t]ý – žlou[t]ek*** "yellow" – "yolk" X ***veče[r] – večí[r]ek*** "evening" – "party"	✓[c] ***levhar[t] – levhar[c]ice*** "leopard" ✓[ɾ] ***ještě[r] – ještě[ɾ]ice*** "lizard"	✓[ɟ] ***mla[d]ý – mlá[ɟ]ě*** "young/cub" ✓[ɾ] ***ku[r] – ku[ɾ]e*** "hen/cock"
R [r$_1$]	X ***ob[r] – ob[r]yně*** "giant" – "female giant"	✓[ɾ] ***(v)nit[r]o – vnit[ɾ]ek*** "inner self" – "interior"	✓[ɾ] ***tyg[r] – tyg[ɾ]ice*** "tiger"	✓[ɾ] ***tyg[r] – tyg[ɾ]e*** "tiger"
VEL & LAR [k g x ɦ]	X ***žá[k] – žá[k]yně*** "pupil" – "female pupil"	✓[ʒ] ***je[ɦ]la – je[ʒ]ek*** "needle" – "hedgehog"	✓[ʃ] ***hro[x] – hro[ʃ]ice*** "hippo"	✓[ʧ] ***ptá[k] – ptá[ʧ]e*** "bird"

A closer look at the Czech data reveals that, in the context of palatalization, the class labelled VEL & LAR becomes indistinguishable from the class R. Specifically, both sets of segments undergo palatalization in exactly same morphological environments (PAL0, PAL1 and PAL2). Just as /r$_2$/ patterns with coronals (/t d/), /r$_1$/ patterns with velars and laryngeals (/k g x ɦ/). For this reason, the data table is further simplified by collapsing R and VEL & LAR into one unified phonemic group. Since the resulting label would otherwise be too complex and impractical for repeated use, we abbreviate this group as VLR. The final version of the table is given below as Table 5.

Table 5: *Czech palatalization patterns in the domain of noun-deriving suffixes (VEL & LAR + R replaced with VLR)*

palatalizer type	no-PAL	PAL0	PAL1	PAL2
derivational suffix	***-yně*** feminine derivative nouns or toponyms	***-ek*** nouns bearing a property of the source word	***-ice*** female zoonyms	***-ě / -e*** juvenile zoonyms
SIB [s z]	X *	X ***pa[s] – pá[s]ek*** "waist" – "belt"	X ***pe[s] – p[s]ice*** "dog"	X ***hu[s]a – hou[s]e*** "goose"
LAB [p b f v]	X ***hra[b]ata – Hra[b]yně*** "counts" – name of town	X ***výro[b]a – výro[b]ek*** "production" – "product"	X ***sla[v]ík – sla[v]ice*** "nightingale"	✓[pj] ***čá[p] – čá[pj]ě*** "stork"
COR [t d r$_2$]	X ***hospo[d]ář – hospo[d]yně*** "homesteader" – "female homesteader" X ***cho[r]ý – Cho[r]yně*** "ill" – name of town	X ***žlu[t]ý – žlou[t]ek*** "yellow" – "yolk" X ***veče[r] – večí[r]ek*** "evening" – "party"	✓[c] ***levhar[t] – levhar[c]ice*** "leopard" ✓[ɾ] ***ještě[r] – ještě[ɾ]ice*** "lizard"	✓[ɟ] ***mla[d]ý – mlá[ɟ]ě*** "young/cub" ✓[ɾ] ***ku[r] – ku[ɾ]e*** "hen/cock"
VLR [k g x ɦ r$_1$]	X ***ob[r] – ob[r]yně*** "giant" – "female giant" X ***žá[k] – žá[k]yně*** "pupil" – "female pupil"	✓[ɾ] ***(v)nit[r]o – vnit[ɾ]ek*** "inner self" – "interior" ✓[ʒ] ***je[ɦ]la – je[ʒ]ek*** "needle" – "hedgehog"	✓[ɾ] ***tyg[r] – tyg[ɾ]ice*** "tiger" ✓[ʃ] ***hro[x] – hro[ʃ]ice*** "hippo"	✓[ɾ] ***tyg[r] – tyg[ɾ]e*** "tiger" ✓[ʧ] ***ptá[k] – ptá[ʧ]e*** "bird"

With the data organization now complete, we are in a position to move from empirical description to theoretical assumptions. The next step is to examine how the observed patterns of palatalization can inform our understanding of the underlying mechanism that drives these processes.

The following section examines the assumption that palatalization often results from assimilation to a visible trigger, and argues that this assumption does not hold for Czech.

3. Czech palatalization is not assimilation

There are two major approaches to palatalization. The first is the traditional one, developed since the 1960s, which treats palatalization as an assimilatory process and therefore models it in terms of *feature spreading* or *feature sharing* between the participating segments. This view originates in Chomsky and Halle's *The Sound Pattern of English* (1968: 421–425) and was later elaborated in autosegmental, mainly Feature Geometry frameworks, most notably by Clements (1991) and Hume (1992).

The second, more recent approach, advocated primarily by phonologists working within Optimality Theory, moves away from the assumption that palatalization must be assimilatory. Within this view, palatalization is interpreted as the repair of phonologically illicit sequences, that is, sequences of units whose co-occurrence violates markedness constraints and therefore must be adjusted. Representative analyses include Jurgec (2016), Iosad & Morén-Duolljá (2010), Bateman (2007), Rubach (2003, 2000), among others. In this line of work, palatalization is no longer treated as an assimilatory process but more generally as a repair process. However, even though these analyses reject the classic assimilation scenario, their repair strategies ultimately produce outputs that are, in effect, assimilatory. The segments involved violate constraints that disfavour the adjacency of highly dissimilar elements, and the "repair" consists precisely in altering them so that they become compatible. Thus, despite departing from explicitly assimilation-based models, these approaches end up realizing an assimilatory outcome, nonetheless.

A key limitation of the assimilatory approach is that assimilation requires a *source of assimilation*. For palatalization to be assimilatory, there must be a segment that supplies the relevant feature(s). This is unproblematic when palatalization occurs next to segments that are independently expected to trigger it, such as front vowels or glides. The problem arises when palatalization appears without such triggers, or even next to segments that are featurally incompatible with palatalization, such as low back vowels or even labial glides. Such cases are attested across languages, and once they are acknowledged, the assimilatory scenario cannot be maintained; there is simply no segment that could function as the source of assimilation. Supporters of the assimilatory approach tend to treat these cases as marginal exceptions, but as the literature on palatalization grows, the number of such non-assimilatory contexts increases as well. Examples include Bennett & Braver (2020, 2015) on Xhosa (Bantu), Munteanu (2017) on Moldovan (Romance), Beranová (2009) on Czech (Slavic), and Malambe (2006) on siSwati and Tschiwenda (Bantu), or Ohala (2011) on Tswana (Bantu) among others.

Perhaps, instead of insisting on a uniform input of palatalization that fits pre-established expectations, we should acknowledge that palatalization may be manifested in more than one way – sometimes in the form that has been repeatedly observed and reinforced in the literature (and which goes nicely with the assimilatory story), and sometimes in ways that are less anticipated. This variation, however, should not lead us to classify the latter cases as deviant or unnatural. Rather, such cases should be treated as additional pieces of evidence that contribute to a more comprehensive and empirically grounded model of palatalization.

In our approach, we do not classify some cases of palatalization as more or less natural. We treat all cases alike, without assigning them different theoretical status based on how expected or typical they seem. Our analysis is based on a third, less widespread approach to palatalization, which also builds on the idea that palatalizers are defective phonological objects that need to be repaired. However, this repair is not based on the competing phonological constraints[8], as in Optimality Theory, where the outcome of palatalization aims to violate as few constraints as possible. Instead, it is based on the idea that certain logically possible phonological structures may be undesirable or strongly marked in the language, and the language seeks to repair them. In most cases, it is assumed that the palatalizer lacks some property that can be provided by the consonant it attaches to.

An important difference compared to previous assimilatory models is that the palatalizer, as a defective structure, is not copied, spread, or shared, because such operations would not repair it. They would simply spread something defective and cause even more trouble. On the contrary, in order to become licit, the palatalizer must move from its original position to a different one and merge with another object. This is a completely different process from assimilation, since assimilation does not displace phonological structure from one position to another. Unlike in Optimality Theory approaches, the motivation for this process lies in the violation of a single rule, which could be conceptualized as a parameter or a principle. It is not a matter of a complex set of constraints being violated. Rather, there is only one violation, but it is fatal in a given language. Further details will be provided in Sections 5 and 6.

In the following section, we first turn to Czech data that demonstrate why palatalization in Czech cannot be modelled as assimilation. There are cases where palatalization occurs even in the absence of a traditionally expected trigger, such as a front, high, or palatal segment.

4. Palatalizers remain hidden behind the surface

The view that palatalization processes are not assimilatory and might be unrelated to the quality of the vowel following the palatalized consonant has been present in the Slavic literature on the topic since the 1980s. Among others, this position is found in works by Dressler (1985), Szpyra (2003, 1992), Gussmann (2007, 1992), Iosad and Morén-Duolljá (2007), etc.

[8] There are, in fact, existing analyses of palatalization that combine the notion of the palatalizer as a floating segment with the idea that palatalization is driven by multiple interacting constraints, see Zdziebko (2015, 2018, 2022, 2023).

However, in some branches of Slavic linguistics, it is claimed that palatalization is tightly connected to the presence of front vowels or glides (Rubach 2011, 2003; Kochetov 2011; Ćavar 2004; Bhat 1978). If this were true in Czech, all derivational suffixes should begin with a front vowel or a glide to be able to trigger palatalization. However, when we examine the inventory of palatalizing suffixes in Czech, we find that palatalization is also triggered by suffixes that do not begin with these phonemes. The following table provides illustrative examples.

Table 6: *Czech palatalizing derivational suffixes without front or high vowels*

palatalizer type	**PAL0**	**PAL1**
suffix	***-ka*** feminine nouns	***-an*** demonyms
SIB [s z]	X ***černovla*[s]*ý* – *černovlá*[s]*ka*** "black-haired" – "black-haired woman"	X ***Texa*[s] – *Texa*[s]*an*** "Texas" – "Texan"
LAB [p b f v]	X ***zlatoko*[p] – *zlatoko*[p]*ka*** "gold digger" – "female gold digger"	X ***Evro*[p]*a* – *Evro*[p]*an*** "Europe" – "European"
COR2 [t d r_2]	X ***pacien*[t] – *pacien*[t]*ka*** "patient" – "female patient" X ***dokto*[r] – *dokto*[r]*ka*** "doctor" – "female doctor"	✓[c] ***Egyp*[t] – *Egyp*[c]*an*** "Egypt" – "Egyptian" ✓[r̝] ***Alžíí*[r] – *Alžíí*[r̝]*an*** "Algeria" – "Algerian"
VLR [k g x ɦ r_1]	✓[r] * ✓[ʃ] ***divo*[x] – *divo*[ʃ]*ka*** "savage" – "female savage"	✓[r̝] ***Kyp*[r] – *Kyp*[r̝]*an*** "Cyprus" – "Cypriot" ✓[ɦ] ***Ameri*[k]*a* – *Ameri*[ɦ]*an*** "America" – "American"

Table 6 shows two distinct palatalizing suffixes. The first begins with a consonant, while the second starts with a central vowel. Neither of these suffixes contains front vowels, yet both induce palatalization. In a phonological model where only front vowels and glides are believed to trigger palatalization, this raises the question of how palatalization can occur without their presence, more specifically how suffixes *-ka* and *-an* are able to trigger palatalization without containing a front vowel or a glide. The answer to this question is that they cannot trigger palatalization in such a phonological model. Even if we consider that it is only a subset of features, enabling front vowels and glides to cause palatalization, there is no phonological reason to attribute these features to both velars and central vowels, aside from the desperate attempt to assign these phonemes an ability to palatalize.

Following this, we conclude that the *palatalizing effect of derivational suffixes in Czech is independent of the phonemic composition of the suffix*. Although there is a strong correlation between the presence of front vowels in the suffix and the occurrence of palatalization, this correlation does not entail a causal relationship. And since only a subset of palatalization processes can be classified as assimilation processes with the required overt trigger, we exclude the possibility that palatalization in Czech is assimilatory in nature, and we will therefore not model it as an assimilatory process.

Consequently, we are no longer compelled to identify an overt trigger that directly causes the palatalization effect. This frees the analysis from the need to look for overt phonological triggers (such as front vowels or glides) in the suffix itself as the cause of the change. At the same time, however, this move comes with a commitment: we can no longer rely on the suffix itself to reveal any reliable clues about the internal structure of the palatalizer associated with it. Nor can we derive the shape of the palatalizer solely from the resulting palatalized consonant, since the shape of the palatalizer is obscured on the surface by merging with the target consonant. This means that we must acknowledge that the palatalizer is essentially invisible at the surface level, or at the very least, we cannot rely on surface evidence alone to predict its composition. This brings us back to Kaye (2005) and the relevance of his epistemological principle. The phonological properties of the palatalizer must be inferred from its behaviour in the system, since that behaviour offers the only reliable evidence we have.

Adopting this perspective admittedly creates additional work: if we separate the palatalizer from the suffix and acknowledge its *invisibility* on the surface, we are left with the more difficult task of uncovering its true identity based only on indirect phonological evidence. However, this added complexity is a small price to pay for resolving a more fundamental theoretical issue. By rejecting the assimilatory view of palatalization, we avoid relying on a model that is not supported by empirical data. As shown not only in Czech but also in many other languages (examples are provided in the previous section), the observed facts do not match the predictions of an assimilatory analysis. The additional analytic effort is justified by the realization of a theory that more accurately captures the attested patterns.

Since the surface forms of the suffixes do not play an active role in identifying the trigger of palatalization, we no longer need to include them in our typology. Their segmental makeup is not what drives the phonological process and therefore listing them does not contribute to the core generalizations. This brings us back to our dataset in Table 6.

Following this logic, we modify the headings of Table 6 to reflect only the types of palatalizers, since (as we emphasize) it is the palatalizers, not the suffixes, that are responsible for the palatalization effect. To simplify the overall picture, we also remove the individual examples from Table 6. By doing so, we eliminate all morphological and phonetic traces from the phonological processes under examination. The result of these changes is presented in Table 7.

Table 7: *Czech palatalization patterns in the domain of noun-deriving suffixes*

palatalizer type	no-PAL	PAL0	PAL1	PAL2
SIB [s z]	X	X	X	X
LAB [p b f v]	X	X	X	✓[pj bj fj vj]
COR [t d r_2]	X	X	✓[c ɟ $ɾ_2$]	✓[c ɟ ɲ $ɾ_2$]
VLR [k g x ɦ r_1]	X	✓[ʧ ʒ ʃ ʒ $ɾ_1$]	✓[ʧ ʒ ʃ ʒ $ɾ_1$]	✓[ʧ ʒ ʃ ʒ $ɾ_1$]

Table 7 shows that Czech has three different palatalizers in the morphologically defined domain of noun-deriving suffixes: PAL0, PAL1, and PAL2. A fourth possible type, no-PAL, illustrates that some suffixes are not associated with any palatalizer and therefore do not trigger palatalization. These palatalizers are independent phonological objects that operate separately from the suffixes they are part of, and their most salient property is that they remain completely hidden behind the surface phonetic form.

The following section introduces the analysis of Cavirani & Vanden Wyngaerd (2024), which builds directly on the idea that palatalization is not a process of feature sharing, spreading or copying, but rather a process in which hidden phonological material is transferred from one position to another. Material that is treated in phonology as capable of such movement is typically referred to as *floating*. In the floating account, the material is not merely shared or duplicated across segments, but instead undergoes a full displacement: it starts in one position and ends up in another. In the case at hand, the palatalizer is initially located within the suffix. However, it cannot be realized in that position. As a result, it shifts to a neighbouring segment, specifically the final consonant of the stem, where realization becomes possible. There, it attaches to the host and surfaces together with it, giving rise to the palatalization effect.

5. Palatalization repairs illicit phonological objects

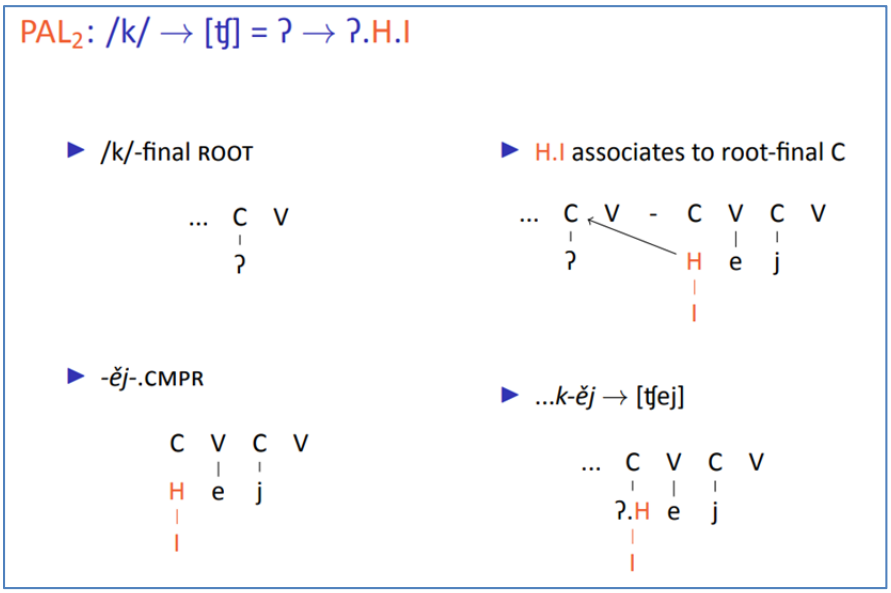
Whenever suffixes appeared not to contain the expected triggers, phonologists posited abstract phonological units associated with these suffixes that could supply the necessary features. This gave rise to proposals involving so-called *floating* segments.

When attempts were made to ground their existence more firmly, the focus often turned to historical explanations rather than synchronic evidence – as in Szpyra (2003) or Rubach's (2019) account of floating segments as reflexes of Proto-Slavic yers. The underlying logic was simple: if no suitable triggers are visible on the surface, they must be present covertly, and thus the floating segment was argued for. Conversely, in cases where visible triggers were present, no additional floating segments were assumed. Over time, however, the idea that palatalization may involve covert floating palatalizers began to spread.

A broader application of floating segments can be found, for example, in Cavirani & Vanden Wyngaerd (2024) for Czech, in Bennett & Braver (2015) for Xhosa, in Zdziebko (2015, 2017, 2023), and Gussmann (2007, 1992) for Polish, etc. Since the study by Cavirani & Vanden Wyngaerd (2024) comes closest to our proposal, we will briefly present it here.

Cavirani & Vanden Wyngaerd (2024) propose that each palatalizing suffix in Czech is associated with a floating palatalizer. This palatalizer, not linked to any syllabic position, is considered structurally defective. When it comes into contact with a stem-final consonant, the floating material seeks an anchor and attaches to the final segment of the stem. In doing so, it both triggers palatalization and resolves its structural deficiency by becoming licensed through this attachment. An example of this process is shown in the diagram below.

(6) Model of palatalization in the context of comparative suffix -ej- (Cavirani & Vanden Wyngaerd 2024)



In the diagram, the floating palatalizer is marked in orange. Its floating status is indicated by the absence of an association line to any syllabic position. Once the suffix is attached to a stem, the floating material comes into contact with a consonant that can license association by providing a stable syllabic anchor. In the course of association, the floating palatalizer merges with the consonant, and together they form a palatalized output.

Cavirani & Vanden Wyngaerd derive the element structure of the palatalizer from the outcome of palatalization. First, since the result is a palatal consonant and the element associated with palatality is |I|, the palatalizer contains |I|. Second, the outcome is an affricate (a consonant that, unlike the original segment, includes a fricative component), to account for this fricativization, the palatalizer also contains the element |H|[9]. The velar /k/ represents an ideal target for such a palatalizer, as it is underspecified for both of these elements and thus readily incorporates them. In contrast, segments already specified for either of these elements are more likely to resist palatalization, since they absorb the palatalizer without undergoing any change. An example is the coronal fricative /s/, which is specified for three elements |A|, |I| and |H| and therefore resists palatalization.

This observation points to a broader generalization: *phoneme size matters* (comparably to Pöchtrager 2019; Onuma & Nasukawa 2020). Segments that are only weakly specified, meaning those that contain fewer elements, are more susceptible to palatalization, as they readily incorporate additional material. Conversely, segments that are strongly specified and already contain multiple elements are more resistant, since there is less space for the palatalizer to contribute anything new. In such cases, the palatalizer is absorbed by the consonant without producing any visible change. Cavirani & Vanden Wyngaerd also show that the outcome of palatalization depends on the internal composition of the palatalizer. In their analysis, the palatalizer PAL_1 includes only one element |I|, whereas PAL_2 includes two

[9] And this is precisely where we see that Cavirani & Vanden Wyngaerd recognize the role of fricativity in the palatalization process discussed in Section 1. They interpret it as a property that needs to be added, which in their analysis leads to the conclusion that the fricative element |H| is part of the palatalizer.

elements |H| and| I|. The number of elements contained in the palatalizer plays a crucial role. A palatalizer with more elements can affect a broader range of consonants, while one with fewer elements influences a narrower range of phonemes that are structurally simpler.

This means that when palatalizers and phonemes come into contact, they are evaluated against each other. If the palatalizer is sufficiently large, in the sense that it contains enough elements (= has enough strength to influence/overwrite the adjacent consonant), it can trigger palatalization of the target consonant. However, this happens only if the target consonant is sufficiently small, meaning it contains too few elements (= is too weak to resist palatalization). In such cases, the consonant incorporates new material from the palatalizer, and changes into a different segment.

The palatalization process, as defined here, is built on asymmetrical oppositions between phonemes and palatalizers. Either the palatalizer is larger (that is, stronger), in which case it forces the consonant to change and become palatalized (see 7a), or the consonant is larger (or at least equally specified), in which case it absorbs the palatalizer and no surface change occurs (see 7b).

(7)

a. **PAL > consonant** ⇔ absorption of PAL **induces the palatalization** of the consonant

e.g. PAL_1 > /k/ ⇔ absorption of PAL_1 (|H| + |I|) induces the palatalization of /k/ (ʔ) to [tʃ] (|H| + |I| + |ʔ|)

b. **consonant ≥ PAL** ⇔ absorption of PAL **has no effect** on the consonant

e.g. /s/ ≥ PAL_1 ⇔ absorption of PAL_1 (|H| + |I|) has no effect on /s/ (|H| + |I|+|A|)

In a system like this, we can speak of two opposing forces: the strength of the palatalizer to induce change and the strength of the consonant to resist it.

Furthermore, the palatalizers are modelled in such a way that they are subsets/supersets of each other. So, when speaking about PAL_1 and PAL_2, either PAL_2 is the superset of PAL_1, or PAL_1 is the subset of PAL2. This is crucial in case, PAL_1 and PAL_2 overlap in the palatalizing effect they cause. In Czech (go back to the Table 7), we see that palatalization of VLR is uniform across PAL0, PAL1 and PAL2, and that palatalization of COR is uniform across PAL1 and PAL2. The outcome of palatalization is the same for all three contexts, the only thing in what these three palatalizers differ is the scope of palatalization. It is this scope that allows us to compare palatalizers to one another. The logic is straightforward: the larger the palatalizer, the broader its palatalization scope, and the larger the consonant, the greater its resistance to palatalization. This assumption holds for Cavirani & Vanden Wyngaerd, as illustrated in (8a), and for our Czech data as shown in (8b).

(8)

a. PAL_2 > PAL_1
/s/ > /k/

b. PAL2 > PAL1 > PAL0
SIB > LAB > COR > VLR

This type of comparison would not be possible if the representations of individual palatalizers were constructed independently. The advantage of Cavirani & Vanden Wyngaerd's approach lies precisely in how the entire system is internally connected.

This approach offers a more insightful attempt than previous approaches, as it derives the identity of the floating material directly from the behaviour of the palatalizing process. Unlike other analyses, which assume a shallow interpretation of the floating feature as something front, non-back, palatal or coronal (within the Element Theory |I| or |A|), this account reflects a deeper consideration of what the floating material actually is. Rather than taking the presence of palatalization as evidence of some generic palatalizing feature, it identifies the internal structure of the palatalizer based on the phonological properties of both the input and the output.

This is precisely the perspective we aim to replicate, and it is exactly why Table 7 is structured the way it is. The organization of the data reflects the strength of each palatalizer in relation to specific phoneme types, as well as the resistance of individual consonants to different palatalizers. By presenting the data in this way, we capture both dimensions of the interaction and make it possible to analyse the structure of the palatalization system in a principled manner.

A limitation of Cavirani & Vanden Wyngaerd's analysis is that they do not explore how exactly the defectiveness of the floating palatalizer is evaluated. Since their representational system relies on elements, there should be no principled problem in associating the palatalizer to any empty syllabic position, as a palatalizer represented by elements ought to be pronounceable on its own. What is missing, then, is a clearly stated reason why the palatalizer is defective in the specific sense that it cannot create its own association line to an empty syllabic position. If we understand their proposal correctly, the reason is simply that the palatalizer is, by definition, floating, and therefore incapable of doing so.

Nevertheless, the idea of a dynamic model that evaluates the interaction between a palatalizer and the target consonant is compelling. It aligns well with language systems in which palatalizers differ in their scope, that is, in the range of consonants they are capable of affecting.

Following Cavirani & Vanden Wyngaerd, our approach rests on four principles. First, we assume that all palatalizing contexts involve independent palatalizers. Second, the palatalizer is assumed to have an illicit status (this will be modelled in the subsection 4.3). Third, we derive the internal structure of palatalizers solely from their phonological behaviour with respect to the consonants they target. We take into account both types of evidence: cases in which the palatalizer overwrites the consonant, as well as those in which it does not. Subsequently, the outcome of palatalization depends on the mutual relation between the consonant and the palatalizer, which may be either as in (8a), or as in (8b).

The third point will be examined presently.

6. Palatalizers and phonemes form a coherent system as they compete for what surfaces

In this section, we examine the internal structure of the palatalization system as revealed by the patterns illustrated in Table 7 (repeated here as Table 8) and grounded in the theoretical

assumptions introduced earlier. The data show that the behaviour of individual palatalizers is not random but systematically reflects the phonological properties of the consonants they apply to. At the same time, the resistance of consonants to palatalization reveals key aspects of the palatalizers themselves. The resulting system thus shows a high degree of structural coherence: the properties of palatalizers and phonemes respond to each other in regular and systematic ways.

Table 8: *Czech palatalization patterns in the domain of noun-deriving suffixes*

palatalizer type	no-PAL	PAL0	PAL1	PAL2
SIB [s z]	X	X	X	X
LAB [p b f v]	X	X	X	✓[pj bj fj vj]
COR [t d r_2]	X	X	✓[c ɟ r_2]	✓[c ɟ ɲ r_2]
VLR [k g x ɦ r_1]	X	✓[ʧ ʒ ʃ ʒ r_1]	✓[ʧ ʒ ʃ ʒ r_1]	✓[ʧ ʒ ʃ ʒ r_1]

In Table 8, we observe that depending on the type of palatalizer, different groups of consonants are palatalized. In the case of no-PAL, we observe no palatalization effect. In the case of PAL0, PAL1 and PAL2, we observe three palatalization effects[10] which differ in their extent: the greater the extent of the change (i.e. the more classes of consonants are palatalized), the stronger palatalizer. PAL0 triggers palatalization only in VLR, making it the weakest palatalizer. Contrastively, PAL2 triggers palatalization in all phoneme classes except SIB, making it the strongest palatalizer. In between PAL0 and PAL2, PAL1 occurs. While it does not reach the strength of PAL2 due to its inability to palatalize LAB, it is stronger than PAL0 as it is able to palatalize VLR and COR. Following this, we propose a scale (see Scheme 1) that reflects the *strength* of individual palatalizers.

Scheme 1: *Strength of the palatalizers*

PAL2 > PAL1 > PAL0

This scale results from the new arrangement of data concerning palatalization patterns in Czech and will be crucial to our analysis of palatalization. However, this represents only part of what can be inferred from Table 8. The other aspect becomes clear when we examine the

[10] Table 8 shows that when we compare the Czech palatalizers, we naturally observe that each has a different palatalization scope, since each is capable of affecting a different subset of consonants. At the same time, we should also note that the effects they produce overlap across certain consonant classes. That is, all three palatalizers – PAL0, PAL1, and PAL2 – cause the same qualitative change in all VLR consonants, and PAL1 and PAL2 produce the same qualitative change in all COR consonants. They thus match in the kind of palatalizing effect they induce but differ in how far this effect can reach. This is precisely why, following Cavirani & Vanden Wyngaerd (2024), we assume that a structural relationship exists among the palatalizers. In the following section, we aim to make this relationship explicit when claiming that palatalizers form their own phonemic class, see Table 9.

issue by comparing palatalized and non-palatalized consonants, specifically considering their *resistance* to palatalization. In Table 8, we see that some consonants are completely resistant to palatalization, while others show varying degrees of resistance. The data reveals that VLR phonemes are the easiest to palatalize, as they are incapable of resisting any of the palatalization processes triggered by PAL0, PAL1, or PAL2. In contrast, SIB phonemes exhibit the highest resistance, as they are never palatalized by noun-deriving suffixes. LAB phonemes fall into the second most resistant class, being palatalized only by PAL2, and COR phonemes are the second least resistant, as they are palatalized by two palatalizers. Following this, we construct a descending scale of resistance to palatalization for Czech consonants, as shown in Scheme 2.

Scheme 2: *Scale of phonemes´ resistance*

SIB	>	LAB	>	COR	>	VLR
[s z]		[p b f v]		[t d r_2]		[k g ɦ x r_1]

The scale highlights differences in how Czech phonemes respond to palatalization and provides a foundation for analysing these patterns in the nominal domain. In what follows, we turn to the interaction between the two scales. By examining how the strength of individual palatalizers aligns with the resistance of different phoneme classes, we gain further insight into how the system operates as a whole.

We will examine how palatalizers and phonemes interact and contribute to this system, ultimately demonstrating that they function cohesively as part of it.

Building on this, we begin by examining the relation between the palatalizer and the consonant it affects, which is asymmetrical if we base our model of palatalization on the assumption that the palatalizer either overwrites the consonant, or the consonant absorbs the palatalizer, i.e. either (8a) or (8b), as in Cavirani & Vanden Wyngaerd (2024). When the palatalizer successfully palatalizes the consonant, it is considered stronger, which we phonologically evaluate in terms of feature richness: the palatalizer includes at least one more feature than the consonant it palatalizes. Conversely, when the palatalizer fails to palatalize the consonant, it is either equally strong or weaker than the consonant, which we again evaluate in terms of feature richness: the palatalizer includes at most as many features as the consonant that resists it. In both cases, the asymmetry between these two phonological units remains clear.

Our goal now is to combine Scheme 1 and Scheme 2 by comparing the asymmetrical relationships between the palatalizers and the given groups of phonemes.

Thus, if VLR are palatalized by PAL0, it follows that PAL0 is stronger than this group of phonemes. Conversely, if PAL0 fails to palatalize COR, it is either weaker than or, at most, equally strong as this group of phonemes. To summarize, the incorporation of PAL0 into Scheme 1 using inequality symbols (“>“ and “≥”) looks as follows.

Scheme 3: *Incorporation of PAL0 into the scale of phonemes´ resistance*

SIB > LAB > COR ≥ **PAL0** > VLR

By comparing the strength of the palatalizers PAL1 and PAL2 with the resistance of consonants to palatalization, we can establish the following asymmetries. PAL1 is clearly stronger than COR, as COR undergoes palatalization under its influence. However, since PAL1 cannot palatalize LAB, it must be either weaker than or, at most, equally strong as LAB. A similar analysis applies to PAL2. We know that PAL2 can palatalize labials but cannot palatalize sibilants, which helps determine its relative position on the scale. The resulting hierarchy is represented in Scheme 4.

Scheme 4: *Incorporation of three palatalizers into the scale of phonemes´ resistance*

SIB ≥ **PAL2** > LAB ≥ **PAL1** > COR ≥ **PAL0** > VLR

A more fine-grained specification of the phonological properties of individual phonemic groups than what is presented in Scheme 4 cannot be derived directly from our data. Once this hierarchy is established and given that not all asymmetries within it are sharply contrastive, the question arises of what features, and how many, are necessary to adequately capture palatalization processes in this domain while avoiding any additional contrasts not supported by the hierarchy.

6.1. What features?

We draw all information about palatalization from its phonological behaviour. However, this behaviour is not stable with respect to phonetic substance. Across languages, it is highly variable and often contradictory. As a result, phonetic substance cannot be relied upon when constructing general phonological representations.

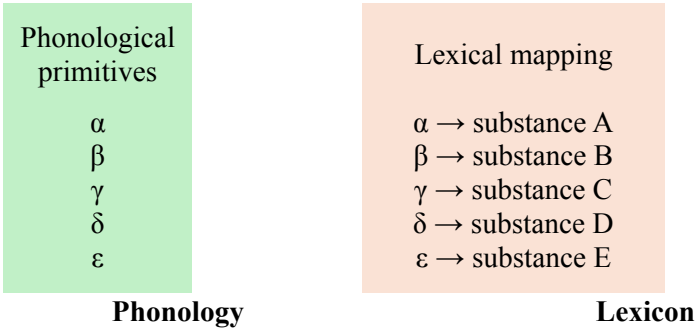
Substance-based models might offer an adequate account of a specific language, but they lose explanatory power when applied cross-linguistically. The variability lies in substance, not in the underlying principles of palatalization. What remains stable across languages is the structural logic of the process, not the phonetic details.

For this reason, we adopt a model in which phonology is not directly based on substance. The substance-free model (Chabot 2022, Iosad 2017, Reiss 2017, Scheer 2014, Cyran 2014) treats phonological features as abstract[11] entities whose identity is defined by their

[11] As one of the reviewers correctly observes, there is no univocal phonological interpretation for palatalizing units, except for their ability to trigger palatalizing effects. This observation captures exactly the methodological position adopted in this paper. The only aspect of palatalizers we can objectively identify is what they do – that is, their capacity to produce phonological effects in particular environments. The goal of this study is to model palatalization as it is instantiated in the grammar of a particular language, assuming, that once speakers acquire the language, they also acquire the set of phonological features (in the configuration required for native-like production). The ontological status of these features – what they are "in reality" – is a question for a different kind of research. Within the substance-free framework, we explicitly

phonological behaviour. These features are independent of phonetic content within the phonological module. The pairing of phonological features with phonetic substance takes place in the lexicon, where each language defines its own mappings.

(9)



6.2. How many features?

To determine how many features are required for an adequate representation of the palatalization processes outlined in Table 8, we must first establish the principle on which we argue for the presence of any given feature. As we have seen in the previous subsection, this cannot be done on the basis of the phonetic quality of the segments involved. Our analysis is grounded in the theory of Substance-Free Phonology, which follows the *epistemological principle* (Kaye 2005), later reformulated by Dresher (2015) as the *activity principle*. According to this view, only those contrasts that are active in the phonological computation are considered relevant. Any other distinctions, even if phonetically plausible, are set aside for the purposes of this analysis.

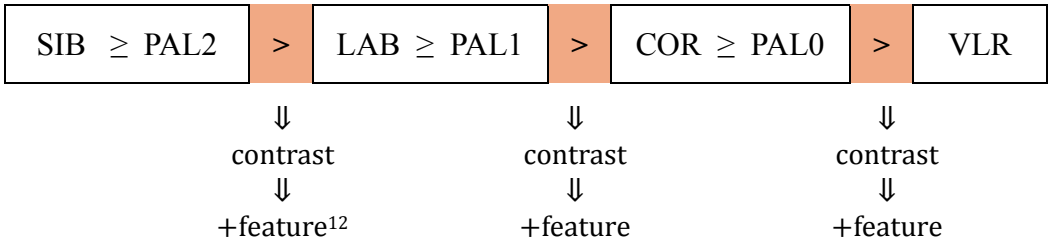
Based on the phonological behaviour of palatalization in Table 8, we treat as phonologically relevant the contrasts between individual phonemic classes, since they show distinct responses to palatalization. These classes include SIB, LAB, COR, and VLR (from Scheme 1). We also recognize contrasts between individual palatalizers: PAL2, PAL1, and PAL0 (from Scheme 2). Lastly, the interaction between segment groups and palatalizers themselves are considered contrastive: that is, the behaviour of VLR with respect to PAL0, PAL1, and PAL2; COR with respect to PAL1 and PAL2; and LAB with respect to PAL2.

At the same time, we acknowledge that the behaviour of palatalization processes does not provide sufficient evidence to establish contrasts between PAL0 and COR, PAL1 and LAB, or PAL2 and SIB. Since these pairings do not trigger any phonological behaviour that would justify an additional contrast, we treat them as indistinct within the system so far. This is fully in line with the epistemological (or activity-based) approach: if there is no observable activity in the domain under investigation, then no feature should be introduced to distinguish the

refrain from seeking access to the true nature of phonological features, acknowledging that such access may in principle be unattainable. Consequently, we can only deduce how many features are needed, and how they must be structured, to account for the phonological behaviour observed. For a more extensive discussion on the nature of phonological features, see Veer, Botma, Breit, & van Oostendorp (2023).

segments involved. In other words, we do not assume a feature unless the phonological system itself gives us a reason to postulate it.

Scheme 5: *Calculating the Feature Inventory Based on Three Phonological Contrasts (preliminary)*



To summarise, the comparison above requires us to establish three distinct contrasts, which leads us to posit three abstract phonological features: *α*, *β*, and *γ*. Assuming that velars are cross-linguistically underspecified, we represent their feature slot with the empty set symbol (∅). COR and PAL0 differ from VLR, so they acquire the feature *γ*. LAB and PAL1 also differ from VLR and thus receive *γ* as well, but since they also differ from COR and PAL0, they additionally receive *β*. Finally, SIB and PAL2 differ from all the previous classes – VLR, COR and PAL0, and LAB and PAL1 – and to reflect this, they are assigned *α* on top of *β* and *γ*.

Scheme 6: *Representing phoneme classes and palatalizers (preliminary version with three contrastive features acknowledged)*

SIB ≥ PAL2	>	LAB ≥ PAL1	>	COR ≥ PAL0	>	VLR
α+ β+γ+∅		***β+γ+∅***		***γ+∅***		***∅***

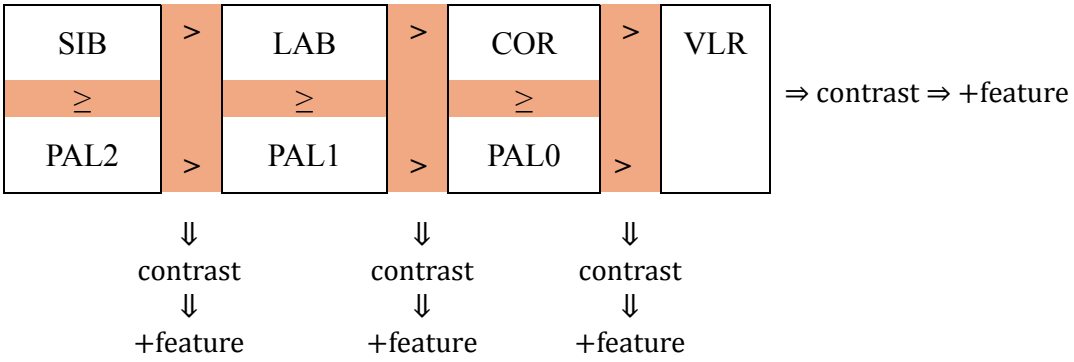
However, there is one further contrast that must be captured: the contrast between palatalizers and all other consonants. Unlike regular consonants, palatalizers represent illicit phonological structures that require repair. To reflect this distinction in our model, we must encode a difference between palatalizers (illicit objects that must undergo repair) and other consonants (licit objects).

6.3. How to represent the deficiency of the palatalizer with respect to other phonemes?

In our approach, we build on a similar idea to that proposed by Cavirani & Vanden Wyngaerd (2024), namely that the object responsible for triggering palatalization is illicit or deficient. From this perspective, it is natural to assume that palatalizers miss something that regular consonants possess. This contrast is straightforwardly modelled by positing another contrastive feature that is present in all consonants but absent in palatalizers.

[12] "+feature" is an abbreviation for "add feature". It does not mean the positive value of some feature.

Scheme 7: *Calculating the feature inventory based on four phonological contrasts*



Since this feature determines whether a segment can surface independently, it suggests that it plays a fundamental role in licensing pronounceability. It is also assumed to be present even in the least specified class of consonants in our system –VLR – which has remained fully underspecified up to this point. Based on these two observations, we position the new contrastive feature (ε) which differentiates phonemes from palatalizers; see Scheme 8.

Scheme 8: *Representing phoneme classes and palatalizers (four contrastive features acknowledged)*

SIB	>	LAB	>	COR	>	VLR
α*+ *β*+*γ*+*ε		***β*+*γ*+*ε***		***γ*+*ε***		***ε***
≥		≥		≥		
PAL2	>	PAL1	>	PAL0	>	
α*+ *β*+*γ*+*Ø		***β*+*γ*+*Ø***		***γ*+*Ø***		***Ø***

By introducing the feature ε, we first establish that phonological objects that bear it are capable of independently associating to the syllabic structure and can therefore be pronounced on their own. Second, by its absence, we establish that phonological objects lacking this feature lose this capacity, which necessitates the application of a repair process (i.e. palatalization). Third, phonological objects that contain the feature ε are exactly the ones that can serve as suitable targets for the palatalizer. This is precisely why palatalizers move towards these objects: they supply the missing material and thus repair the palatalizer's deficiency.

6.4. How to compare palatalizers with target consonants?

Up to this point, we have established how many contrastive features are needed to differentiate between palatalizers and target consonants. However, this by itself does not tell us how to model the interaction between the two. The central claim of this section is that palatalizers and target consonants form a coherent and highly interactive system. Crucially,

we should be able to compare their internal phonological representations in order to predict the outcome of their interaction.

As we outlined earlier, palatalization can either result in a visible phonological effect (8b) or be phonologically absorbed without any surface reflex (8a). To capture this, we need a mechanism that allows us to evaluate the relative strength of the palatalizer with respect to the target consonant. Following Cavirani & Vanden Wyngaerd (2024), we model both palatalizing strength and resistance to palatalization in terms of feature richness: the more features a palatalizer contains, the stronger it is; conversely, the more features a target consonant contains, the greater its resistance to palatalization.

This interaction is best captured if both types of the phonological objects, palatalizers and target consonants, are defined over the same set of contrastive features. Only under this assumption can their featural representations be directly compared without additional assumptions or arbitrary stipulations (e.g. this feature takes precedence, or that feature/element is headed etc.). When the palatalizer is featurally richer than the consonant, it overwrites the original consonant producing a palatalizing effect. When it is poorer or equally rich, it is absorbed with no surface effect. What we now turn to is the question of how this comparison can be formally implemented in the model.

When we work with grammatical features, we can either define them as independent units that are structurally unrelated – such features form unordered sets. Or we can define them as mutually connected units that are structurally dependent on each other – such features form ordered sets, more commonly referred to in linguistics as *hierarchies*.

Because we aim to build a truly coherent phonemic system, the interdependence of individual features is crucial for us. For this reason, we prefer a hierarchical organization of features over independent feature sets. By taking this step, we also partially follow Cavirani & Vanden Wyngaerd (2024), who adopt a hierarchical organization of features anchored in the framework of Feature Geometry. This framework uses partially ordered sets, grouping features into three main branches: Place, Manner, and Laryngeal. Features (in their case, elements) can interact within branches but not across them, resulting in a system that is only partially ordered. However, as shown in Section 1.1, features from different branches do in fact interact: palatalization involves both features lexically paired with the place node (COR, but not VLR or LAB) and features lexically paired with the manner node (plosive, but not fricative), and this interaction underlies the distinct resistance of SIB and COR segments, but does not reveal any difference among fricatives and plosives in VLR or LAB. This indicates that we need a system in which features are not separated into disjoint subsets but form a fully ordered structure that allows interaction across all features.

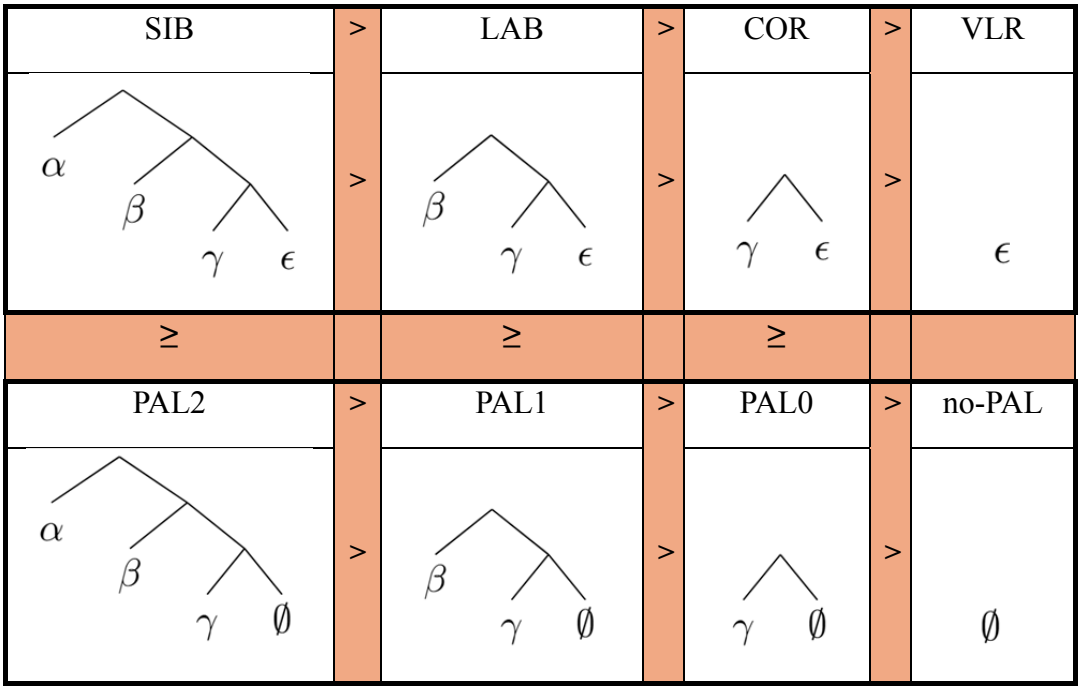
That is why we propose that all phonological features can be organized into a feature hierarchy, within which each feature establishes its relation to the others. Phonological units are thus represented as hierarchically structured feature representations. In order to compare phonemic classes with one another and without postulating any additional rules, these representations are modelled cumulatively.

Assuming a hierarchy of features $\alpha > \beta > \gamma > \varepsilon$, we can capture the increasing resistance to palatalization across phoneme classes as in Scheme 9. VLR consonants, which are the least resistant to palatalization, contain only the lowest feature ε. COR consonants, which show

greater resistance, contain ε and γ. LAB consonants contain ε, γ, and β, and SIB consonants, which are the most resistant, contain all four features: ε, γ, β, and α, and there features are structurally organized.

Palatalizers, by contrast, lack the base feature ε, which models their structural deficiency and inability to surface independently. Their internal structure accumulates strength from PAL0 to PAL2: PAL0 contains only γ, PAL1 contains γ and β, and PAL2[13] contains γ, β, and α. This increase in featural content corresponds to an increasing ability to trigger palatalization.

Scheme 9: *Hierarchical representations of phoneme classes and palatalizers (four contrastive features acknowledged)*



The structural representation given in Scheme 9 can be equivalently expressed using the tabular format in Table 9. This format captures the same hierarchical relations in a more compact way.

[13] One of the reviewers points out that comparing palatalizers to phonemic classes leads, for instance, to the conclusion that PAL1 structurally resembles labials – effectively making it a type of labial palatalizer. We do not consider this problematic. As already noted, labial triggers of palatalization are attested, albeit rarely, both in Bantu languages (e.g. Xhosa, siSwati) and in the European context (e.g. Moldovan). The fact that one of the palatalizers structurally parallels labials is therefore not unexpected. Moreover, PAL1 is still not identical to labials: unlike them, it lacks the licensing feature ε and is thus structurally deficient. Even though our analysis is framed within a substance-free model, we may still ask whether the structural parallels between palatalizers and phonemic classes align with typologically attested palatalization patterns. And indeed, they do: PAL0 corresponds to COR, which links naturally to phonetic coronalization; PAL2 corresponds to SIB, which aligns with stridency-based palatalization. Once we accept that palatalization processes vary in naturalness, these parallels appear entirely unproblematic. What this ultimately shows is that phonological modelling based on phonetic substance alone leads to unnecessary complications in the analysis of palatalization. By removing substance from the phonological component, we obtain a structurally coherent and cross-linguistically plausible system.

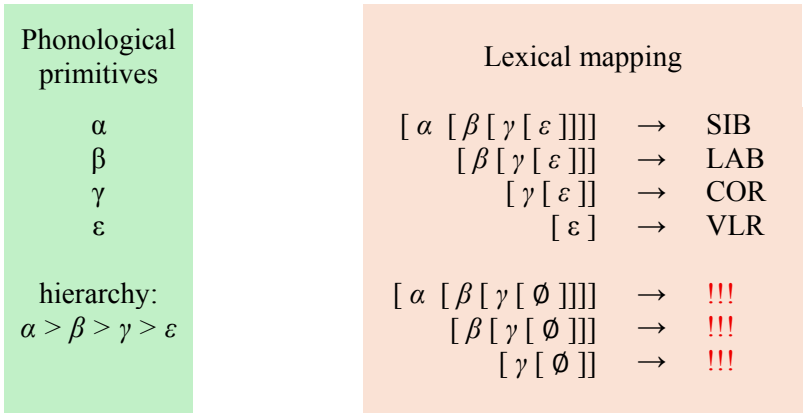
Table 9: *Hierarchical representations of phonemic groups and palatalizers (four contrastive features acknowledged)*

phonemic class		**abstract phonological features**			
SIB [s z]		***α***	***β***	***γ***	***ε***
LAB [p b f v]			***β***	***γ***	***ε***
COR [t d r_2]				***γ***	***ε***
VLR [k g x ɦ r_1]					***ε***
PAL	PAL2	***α***	***β***	***γ***	
	PAL1		***β***	***γ***	
	PAL0			***γ***	

The cumulatively layered featural representations proposed here allow for direct comparison between individual phonemes, as they are constructed on the basis of a single (shared) feature hierarchy. Each additional feature changes the interpretation of the entire structure. A phonological object containing only the feature *ε* is, in the lexicon, paired with a phonetic representation corresponding to a velar, laryngeal, or rhotic consonant (i.e. VLR). If one additional feature *γ* is present, the structure is interpreted as COR; if *β* is added, the result is LAB; and with the addition of *α*, the structure is interpreted as SIB. In this model, the phonological primitives are the abstract features *α*, *β*, *γ*, and *ε*, universally ordered in the hierarchy $\alpha > \beta > \gamma > \varepsilon$. Phonology combines these primitives into hierarchical structures, some of which have a phonetic counterpart in the lexicon, and some of which do not. Those that do can surface independently; those that do not (such as palatalizers) require a repair process to become pronounceable.

For the sake of precision, this cumulative perspective requires an update of the earlier schematic representation in (9), which is revised accordingly in (10) to reflect the cumulative organization of features assumed here.

(10)



With all the representations in place, this model allows us to make clear predictions about which consonants undergo palatalization in specific palatalizing contexts.

In the following section, we briefly turn to the computational mechanism that compares the representation of the palatalizer with that of the target consonant, and based on this comparison, determines whether palatalization will occur or not.

6.5. How to compute the interaction in the proposed system?

When a palatalization context arises with PAL0 present, the palatalizer, being unable to surface on its own, searches for a segment that can license its pronunciation. In our system, this requires the presence of the feature ε, which only target consonants possess. If the target is a VLR consonant, the palatalizer is absorbed and contributes additional featural material not previously present in the consonant. As a result, the target undergoes a structural change, yielding a surface palatalization effect. In contrast, when the target belongs to one of the other phonemic classes (SIB, LAB, COR), the palatalizer is also absorbed, but this has no effect on the featural structure: the palatalizer does not contribute any new material, and thus no palatalization occurs.

Scheme 10: *Computing palatalization with PAL0*

phonemic class		phonological features				palatalization X or ✓
SIB	[s z]	*α*	*β*	*γ*	*ε*	X [s z]
LAB	[p b f v]		*β*	*γ*	*ε*	X [p b f v]
COR	[t d r_2]			*γ*	*ε*	X [t d r_2]
VLR	[k g x ɦ r_1]			*γ*	*ε*	✓[ʧ ʒ ʃ ʒ r]
PAL	PAL0			*γ*		

In our model, this repair takes the form of merging an illicit phonological object with a licit one. If the illicit object contributes no new features, no surface change occurs; if it contributes new material, a change is triggered. This surface reflex is what we interpret as palatalization.
In the other palatalizing context, the palatalizer PAL1 is structurally richer than PAL0, as it contains two features (*β* and *γ*). Like before, it cannot surface independently and therefore searches for a target that contains the licensing feature ε. If such a target is found, PAL1 attaches to it.

In the case of VLR consonants, which only contain ε, the palatalizer contributes two extra features: *β* and *γ*. As a result, the structure of the target consonant is enriched and changes its quality – palatalization occurs. In the case of COR consonants, which contain *γ* and ε, the palatalizer contributes one extra feature: *β*. Again, the target acquires new material and changes its quality – palatalization occurs.

In the case of LAB consonants, which already contain both *β* and γ, the palatalizer is absorbed without contributing any new structure. The quality of the consonant remains unchanged and no palatalization occurs. The same holds for the SIB class, which contains

even more structure (α, β, γ, ε). Since the palatalizer adds nothing that the target consonant does not already have, no palatalization takes place.

Scheme 11: *Computing palatalization with PAL1*

phonemic class		phonological features				palatalization X or ✓
SIB	[s z]	α	β	γ	ε	X [s z]
LAB	[p b f v]		β	γ	ε	X [p b f v]
COR	[t d r$_2$]		β	γ	ε	✓[c ɟ ɾ̠]
VLR	[k g x ɦ r$_1$]		β	γ	ε	✓[t͡ʃ ʒ ʃ ʒ ɾ̠]
PAL	PAL1		β	γ		

In the third palatalizing context, the palatalizer PAL2 is structurally the richest of the three, containing three features: α, β, and γ. Like the previous palatalizers, PAL2 cannot surface independently and must attach to a segment containing the licensing feature ε. Once this condition is met, PAL2 merges with the target consonant.

In the case of VLR consonants, which contain only ε, PAL2 contributes three new features: γ, β, and α. This results in a fully enriched structure, and the quality of the consonant changes significantly – palatalization occurs. In the case of COR consonants, which already contain γ and ε, PAL2 still contributes two additional features: β and α. Since new structure is added, palatalization again takes place. In the case of LAB consonants, which contain β, γ, and ε, PAL2 only adds α. This feature is not present in the original target consonant, so the structure changes and palatalization effect arises. However, in the case of SIB consonants, which already contain α, β, γ, and ε, PAL2 contributes no new featural material. As a result, the structure of the target remains unchanged, and no palatalization occurs.

Scheme 12: *Computing palatalization with PAL2*

phonemic class		phonological features				palatalization X or ✓
SIB	[s z]	α	β	γ	ε	X [s z]
LAB	[p b f v]	α	β	γ	ε	✓[pj bj fj vj]
COR	[t d r$_2$]	α	β	γ	ε	✓[c ɟ ɾ̠]
VLR	[k g x ɦ r$_1$]	α	β	γ	ε	✓[t͡ʃ ʒ ʃ ʒ ɾ̠]
PAL	PAL2	α	β	γ		

In this article, we have developed representations and computations that reflect only the contrasts arising from the internal structure of palatalizers and target consonants. Once a third variable is introduced – namely, the nature of the palatalization output (i.e. not just whether palatalization occurs, but what form it takes and thus what new contrasts it

introduces) – additional features will come into play, and the overall model will necessarily become more complex.

However, these issues will be addressed in future work, as this article does not provide sufficient space to cover all aspects of the system in its full complexity. In addition, two other morphological contexts in which palatalization arises in Czech – the verbal and the declensional domains, introduced at the beginning of this article – remain to be modelled within the same methodology. Once these domains have been analysed, the results will allow us to begin constructing a new representation of the Czech phonological system: one based solely on phonological behaviour. This, we argue, brings us closer to a genuine model of phonology – and to a more accurate picture of how phonology actually works.

7. Conclusion

This paper examined the phonological behaviour of palatalization in Czech, focusing on the morphologically defined domain of noun-deriving suffixes. The central claim is that palatalization in Czech is a non-assimilatory process that functions as a repair mechanism for illicit phonological objects: palatalizers. The proposed model posits that palatalizers are independent but phonologically and lexically deficient units, whose properties should be derived solely from their phonological behaviour.

Section 2 presented a systematic organization of Czech palatalization data within the nominal domain. The analysis showed that Czech consonants form distinct phonological classes depending on how they interact with palatalizers. One of the key findings was that palatalization affects coronal plosives and fricatives differently, dividing the coronal series into two classes: COR (coronal plosives /t d/, more susceptible) and SIB (coronal fricatives /s z/, more resistant). Further, the data revealed two systematically different phonological objects corresponding to the consonant /r/, labelled /r_1/ and /r_2/, whose distinct behaviour is consistently conditioned by syllabic position. The variant /r_1/, found in a branching onset, undergoes palatalization in PAL0, PAL1, and PAL2 contexts, while /r_2/, which appears in a simple onset, is only affected by PAL1 and PAL2. This results in a modified subsegmental profile for /r_1/ that explains its differential sensitivity to PAL0. Eventually, the data showed that /r_1/ patterns with the VEL & LAR which resulted in their consolidation into the unified VLR phonemic group.

Section 3 provided the theoretical and empiritcal motivation for rejecting the assimilatory analysis. We argued that assimilation accounts for only a subset of the processes commonly grouped under the label of palatalization. Since palatalization in Czech (as well as in many cases cross-linguistically) occurs without any "appropriate" overt trigger, the assimilatory approach fails to capture the full range of the data. Rejecting this analysis also removes the need to locate a trigger in the surface form of the suffix and thus avoids imposing unnecessary constraints on its underlying representation.

Section 4 has acknowledged the invisibility of the palatalizer at the surface, committing the analysis to reconstruct its internal structure solely from its phonological behaviour within the system.

Section 5 introduced the core theoretical assumption that the palatalizer is an illicit phonological object that cannot surface in its original position and therefore triggers palatalization as a repair process.

Section 6 examined the internal structure of the Czech palatalization system by analysing the interaction between three types of palatalizers (PAL0, PAL1, PAL2) and four classes of consonants (VLR, COR, LAB, SIB). The section first introduced two scales: a scale of palatalizers´ strength and a scale of target consonants´ resistance. These were derived directly from the empirical data and then combined into a unified hierarchy that reflects the asymmetrical relationships among them. The palatalizers were treated as structurally deficient phonological objects that cannot surface on their own and therefore require repair through merger with a licit phonological segment. This repair mechanism was formalised as the transfer of structural material from the palatalizer to the target consonant, which could lead either only to the absorption of the palatalizer by the target consonant or to the absorption of the palatalizer followed by the palatalization of the target consonant.

In order to model this interaction, the section adopted a representational system based on distinctive features introduced according to the epistemological (activity-based) principle. Only distinctions that are phonologically active – i.e. visible through systematic effects in phonological behaviour – are encoded. The analysis resulted in a cumulative featural hierarchy with four distinctive features (α, β, γ, ε), ordered relative to one another. Phonemic classes were represented as structures of these features, ranging from minimally specified (VLR: ε) to maximally specified (SIB: $\alpha+\beta+\gamma+\varepsilon$). Palatalizers were represented as structures lacking one of the fundamental features (ε): PAL0 (γ), PAL1 ($\beta+\gamma$), and PAL2 ($\alpha+\beta+\gamma$).

This system allowed for a direct comparison of structure between the palatalizer and the target consonant. When the palatalizer contributed at least one feature that was not already present in the target consonant, palatalization occurred. When no new feature was added, no palatalizing process was observed. This interaction was defined without appealing to phonetic substance and instead relied on fully abstract phonological features ordered in the featural hierarchy: $\alpha > \beta > \gamma > \varepsilon$. Without hierarchical organization, the mapping between fully abstract phonological features and their phonetic counterparts would become impossible.

So far, our analysis focused exclusively on the presence or absence of palatalization and did not take into account variation in output forms. Additionally, it left aside the verbal and declensional morphological domains in Czech. These aspects are left for future research. Other directions for future research include, first, enriching the current model with contrasts arising from variation in the output of palatalization, as this study focused primarily on the conditions under which palatalization occurs. Second, the same methodology should be applied to other morphological domains in Czech (specifically, verbal and declensional suffixes) thereby enabling a full reconstruction of the Czech phonological system grounded entirely in phonological behaviour.

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