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Vowel length as evidence for a distinction between free and bound prefixes in Czech

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Abstract: This paper argues that Czech verbal prefixes alternate between two states, roughly corresponding to the traditional notions 'free' and 'bound'. The distinction, however, is not reflected in the separability of the prefix and the verb; it is reflected in vowel length. Main evidence for the claim is drawn from the way vowel length of adpositions is treated Czech internally and from a comparison to Norwegian. Theoretically, we implement the alternation as a phrasal movement of the prefix from a VP internal position (where the prefix behaves as bound) to a VP external position, drawing on Taraldsen's (2000) proposal for Norwegian and Svenonius's (2004b) account of prefixation in Slavic.

Keywords: prefixes; particles; particle alternation; vowel length; Czech

1. Introduction

In Norwegian (and a number of other Germanic languages), prepositional particles alternate between two states; we will call them free and bound (for a lack of a better term). In Norwegian, the free state is characterized by two properties: (i) the particle can be separated from the verb, and (ii) the verb precedes the particle, see (1a). The second state will be referred to as bound, and it is characterized in Norwegian by the fact that the particle (i) cannot be separated from the verb, and (ii) the verb root follows the particle, see (1b). In (1), the free/bound distinction depends on whether the form is verbal (1a) or nominal (1b). Svenonius (1996) discusses such alternations across various forms and finds out that the degree of eventivity is the main organizing factor of such alternations across North-Germanic. Verbal forms tend to have their particles free, nominal/adjectival forms tend to have particles bound.

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(1) Norwegian

a. **Kast** katta **ut**! FREE
throw the.cat out
'Throw the cat out!'

b. **ut-kast** BOUND
out-throw
'a discard/a draft'

In contrast, Czech prepositional particles are only found in what superficially resembles the bound state. In all of their uses, they are both (i) inseparable and (ii) preverbal. This is shown in (2). In the grammatical example (2a), the particle *vy-* 'out' precedes the verb, and it is adjacent to it. Any permutation that violates either the property (i) or the property (ii) leads to ungrammaticality. (2b,c) are failed attempts to separate the prepositional particle from the verb, and (2d) shows that the particle cannot follow the verb even when adjacent to it.

(2) a. **Vy-hoď** tu kočku!
out-throw.imp the cat
'Throw the cat out!'

b. *__hoď__ tu kočku **vy**
throw.IMP the cat out

c. *__vy__ tu kočku **hoď**
out the cat throw.IMP

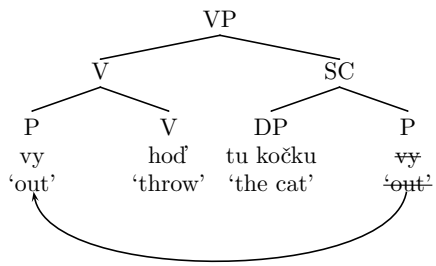
d. *__hoď__ **vy** tu kočku
throw.IMP out the cat

The widely accepted conclusion drawn from data such as (2) is that unlike in Germanic, the particle in Czech is always bound, and it always forms a single complex head with the root.[1] This is reflected in calling the prepositional element a verbal prefix, a terminology we adopt here as well. Theoretically, Babko-Malaya (1999, 76) has proposed that Slavic prefixes are base-generated adjoined to the lexical V head. Others have argued that prefixes originate as self-standing syntactic elements, but incorporate into the verb by head movement (Svenonius 2004b, 212; Ramchand 2004; Romanova 2006, chapter 2.4; Gehrke 2008, 164; MacDonald 2008, 99–100; Žaucer 2009, 57; Gribanova 2015, 527). A version of the popular head-movement analysis is shown in (3) below. SC stands for 'small clause', where the particle is predicated of the direct object. The label is used for

[1] Here and elsewhere, we use the term *root* in its 19th-century morphological sense, namely, as the base morpheme to which affixes are added. We will also rely on the idea that roots have a category, so we will be mostly talking about verbal roots even when these are embedded in nouns (because they are eventive).

convenience, as a shorthand for whatever the exact structure of the predication structure is. The rough constituency and the head movement of the prefix are the important bits.[2]

(3)



In this paper, we argue against adopting this widely shared view for Czech. Our starting point is the pair of examples in (4). (4a) shows the imperative of the verb 'to write up'. (The imperative is expressed by a floating palatal feature that docks on the root final *s* and turns it to *š*.) The prefix *na-* 'on' has a short vowel here. Short vowels are orthographically reflected as a plain vowel with no accent. In (4b), we see a zero nominalization of the same verb (so no palatalization). The prefix is long here, and the orthography reflects this by placing an acute accent over the vowel.

(4) a. **Na**-piš ten dopis! SHORT
on-write-IMP the letter
'Write the letter up!'

b. **ná**-pis LONG
on-write
'a sign'

(1) a. **Kast** katta **ut**! FREE
throw the.cat out
'Throw the cat out!'

b. **ut-kast** BOUND
out-throw
'a discard/a draft'

The existence of such an alternation is interesting in its own right. What is even more interesting are its triggering conditions. As has been pointed out by Scheer (2001) and Ziková (2012), the alternation cannot be explained in purely phonological terms (say, lengthen the prefix if a short vowel follows). Rather, they point out that vowel length is determined by the first morpheme that follows the root. If it is verbal (the palatal feature expressing the imperative in (4a)), the vowel is short. If the first morpheme after the root is nominal (the zero nominalization affix in (4b)), the vowel is long. This description makes the triggering conditions rather similar to the

[2] Svenonius (2004b, section 5) is the only proposal to date suggesting that Slavic prefixes undergo phrasal movement.

conditions governing the free/bound alternation in Norwegian, which also tracks the basic distinction between verbs and nouns. Why is there such a similarity between the alternations in (1) and (4)? Why should vowel length in Czech be controlled by very similar factors as the Norwegian free/bound alternation?

In this paper, we argue that the existence of a common logic behind the two alternations can be captured if Czech prefixes alternate between the two states in very much the same way as Norwegian particles do, and if Czech vowel length actually reflects the free/bound status of the prefix.

In slightly more technical terms, we are going to argue that in Czech, length and shortness of the prefix reflect two distinct structural configurations. When the prefix is attached to the root morpheme (forms a constituent with the root), it is long. In this configuration, we will call it bound (like an affix). When it is prefixed to something bigger (to a phrase containing the root and its affixes), it is short. In this configuration, we will call it free (like a clitic). We will also argue that the means by which the prefix alternates between the two positions is phrasal movement (related to the so-called perfectivity), drawing on the proposal made in Svenonius (2004b).

Our strongest independent argument for treating the length alternation in terms of the free/bound status of the prefix is the behavior of prepositions in Czech. The argument builds on the fact that verbal prefixes are often homophonous with prepositions (see Matushansky 2002; Asbury et al. 2006; Biskup 2009; Gribanova 2009, among others). For instance, the prefix *na-* 'on,' seen in (4), can also be used as a preposition. When it is used as a run-of-the-mill preposition, it attaches to the whole phrase, and it is short; see (5a) for an example. However, in Czech, prepositions can also attach just to the root and appear inside words (in forms resembling the English *underground*). An example is shown in (5b). Crucially, when the preposition is attached to the root, its vowel is long.

(5) a. **[na** [$_{NP}$ břeh-u]]
on bank-LOC
'on the bank'

b. **[ná-**[$_{N^0}$ břež]]-í
on bank-place
'river side' (lit. 'the on-bank')

The data in (5) independently show that whether *na* 'on' attaches to the root (5b) or to a larger phrase (5a) correlates with its quantity. Taking this observation as correct, and using it as a jumping board to the analysis of the same length alternation in (4), it follows that the traditional structure in (3) cannot be correct: in (3), head movement always attaches the prefix to the root and cannot attach it to anything bigger. Consequently, we

would expect the vowel in the prefix to be long in all forms (not just in the nominalization). The head-movement analysis leaves no theoretical space in the diagram (3) for the modelling of length alternations in terms of a variable attachment site of the prefix.

The goal of this paper is to develop a coherent analysis of prefixation in Czech, which does justice to our two novel observations. First, that internally to Czech, length alternations in morphemes such as *na* 'on' indicate whether the morpheme attaches to the root or to a larger phrase. And second, that analyzing the Czech alternation in terms of the free/bound distinction finds an independent support in Norwegian (and other Germanic languages).

2. The systematic nature of the short/long alternation

This section presents some of the basic facts that form the rationale for our subsequent analysis. In particular, we want to show that the length alternation is a systematic process that targets a whole class of prefixes in a uniform fashion. Furthermore, we show that this rule is not purely phonological, but has a morphosyntactic trigger. We credit Scheer (2001) for bringing these facts to theoretical attention and for describing the logic behind the pattern. We also build on Ziková's (2012) work, who refines and implements Scheer's ideas in the framework of Distributed Morphology.

2.1. The set of alternating prefixes

In Czech, there are six prefixes that alternate in vowel length, which is a proper subset of all the prefixes in the language. We first look at the alternating prefixes, and we turn to non-alternating prefixes in section 8. We list the alternating prefixes in (6).

(6) The alternating prefixes

Short V	Long VV	Meaning	Short V	Long VV	Meaning
na-	ná-	on	pro-	prů-	through
za-	zá-	back/behind	u-	ú-	away
při-	pří-	at/to	vy-	vý-	out

The so-called short prefixes have a single short vowel (V), the so-called long prefixes have a single long vowel (VV). As already mentioned, vowel

length is marked in the orthography by an accent over the vowel, i.e., *á* is a long *a*. There is one irregularity, the prefix *pro-* alternates with *prú-* (with long *u*), orthographically *prů-*. The change of the quality (from mid to high) is a regular side-effect of length alternations in the language. Vowel length is distinctive in Czech, as we will see shortly.

Note that even though we are talking of long and short prefixes, this is just a convenient label. The facts rather indicate that there is only a single prefix in the lexicon, and a regular phonological process that relates the two shapes. The reason is that a direct storage of two suppletive forms (one long and one short) would miss the fact that the distribution of vowel quantity is not random, but follows a clear pattern common to all six items. What is this pattern?

2.2. Alternation in prefix length is a morphologically governed process

As a first rough sketch, we may say that the short prefix surfaces in verbs, and the long prefix in zero-derived nouns. Sometimes, the prefix length is actually the only thing which signals the distinction between a nominal and a verbal interpretation of the particular form. (7) gives a couple of examples of this phenomenon for various prefixes. The imperatives in the first column have no ending, and neither do the nouns in the third column. The forms are thus homophonous save for the length of the prefix which distinguishes the verbal environment from the nominal environment.[3]

(7) Verbs have a short prefix, zero-derived nouns have a long prefix

Verb V	Gloss	Noun VV	Gloss
vy-stup	get out!	vý-stup	outcome
na-stup	get on!	ná-stup	boarding
za-stup	step in!	zá-stup	substitute
při-stup	come here!	pří-stup	access
u-stup	step back!	ú-stup	retreat

[3] The ending of the imperative is a marker that usually triggers palatalization of the preceding consonant (recall (4a)). However, the root *stup* ends in a labial and labials are immune to the process. As a result, a potential homophony – resolved by the prefix – arises between the imperative and the nominalization.

The facts in the table show that vowel length in the prefix is controlled morphologically, and not by pure phonology. This conclusion emerges from the fact that the forms without the prefix are segmentally identical across the nominal and the imperative columns. Still, one requires a short prefix (the verbal form), and the other a long prefix (the nominal form).

A similar set of minimal pairs can be provided for forms with overt suffixes. For example, the suffix *-u* is a lexical item with two (independent) meanings. When *-u* occurs on a verb, it corresponds to a first person singular marker (*nes-**u*** 'I carry' vs. *nes-e* 'he carries'). When it attaches to nouns, it corresponds to a genitive singular marker (*hrad-**u*** 'of the castle' vs. *hrad* 'castle, nom.'). If there is a root ambiguous between a verb reading and a noun reading, like *kop* 'a kick' or 'to kick', then also the form with *-u* is ambiguous; *kop-u* means either 'I kick' or 'of the kick'. This ambiguity is resolved when such forms have a prefix, as (8) shows. The form with the short prefix only has the verbal reading, and the form with the long prefix only has the nominal reading.

(8) Verbs and zero derived nouns with a suffix: still different

Verb V	Gloss	Noun VV	Gloss
vy-kop-u	I kick out	vý-kop-u	of the kick-off
pro-lez-u	I crawl through	prů-lez-u	of the manhole
na-lez-u	I crawl on	ná-lez-u	of the finding
za-syp-u	I strew on	zá-syp-u	of the dusting
u-plet-u	I knit up	ú-plet-u	of the knitted fabric

Concluding: the length of the prefix is a morphologically (not phonologically) controlled process, where all the relevant prefixes pattern alike. Therefore, we want a general account that has a single lexical form for all such prefixes, and this form undergoes a predictable and fully regular phonological process in a given environment. Importantly, we want this process to cover not only the verbal-prefix alternation, but also the alternations that the same morphemes undergoes in a nominal environment. That is because all prefixes that lead a second life as prepositions, alternate between long and short forms in a similar fashion, as can be seen in (9) below.

Since the alternation in (9) can be related to the free/bound distinction in a relatively straightforward manner, we will now focus on the issue of how to set up the syntax of verbal prefixes in a way that their shape can be related to the free/bound distinction as well.

(9) The alternation between a free and an incorporated preposition

Preposition V	Gloss	Noun VV	Gloss
na břeh-u	on the bank	ná-břež-í	a place on the bank
za mez-í	behind the boarder	zá-mez-í	a place behind the boarder
u pat-y	at the foot (of a mountain)	ú-pat-í	a place at the foot (of a mountain)
při zem-i	by the ground	pří-zem-í	a place by the ground (= the ground level)

3. An account of particle alternations in Norwegian

Led by the considerations presented above, one of our goals here will be to provide a morphosyntactic account for the Czech prefix alternation which assimilates it to the free/bound alternation found in Norwegian and other Germanic languages. With this goal in mind, we start by presenting our assumptions concerning the derivation of the sentence in (1a), repeated below for convenience. (Once we are ready setting up the syntactic account of the alternation, we will start providing Czech internal evidence for an analysis along the lines suggested here.)

(1) Norwegian

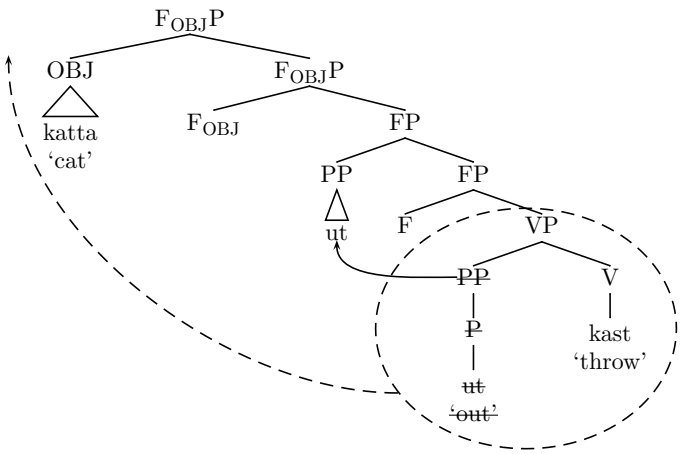
a. **Kast** katta **ut**! FREE
throw the.cat out
'Throw the cat out!'

b. **ut-kast** BOUND
out-throw
'a discard/a draft'

The exact analysis of such sentences is subject to debate and controversy (see, e.g., den Dikken 1995; 2003; Ramchand & Svenonius 2002; Neeleman 2002, among others). For reasons of space, we do not discuss the various alternatives in any depth. Instead, we directly adopt a proposal by Taraldsen (2000), which (as we argue) will allow us to capture both the similarities and the differences between Norwegian and Czech in a relatively straightforward manner. Taraldsen's analysis of (1a) is depicted in (10).

Taraldsen proposes that prepositional particles are phrasal elements generated low in Spec,VP. He further argues that verb movement in Norwegian is an instance of a phrasal VP movement. Since in the base position, the particle is inside the VP, any VP movement should always carry the particle along with the verb. The reason why the verb root and the particle separate, is that the particle extracts out of the VP to the Spec of a

(10) Taraldsen (2000)



functional projection F. This movement is indicated by the full line. After the particle extracts out of the VP, the remnant VP only contains the verb, which can now cross the particle. The VP is circled, and its movement past the particle is indicated by a dashed line. In effect, the particle movement to Spec,FP is what makes the particle have the properties of the so-called free state. If it stayed inside the VP, it would remain preverbal, and it would not be possible for the verb either to precede it, or be separated from it.

Note further that according to Taraldsen, the arguments of the verb must move to a position above the particle, yielding an intermediate structure like [OBJ [$_{FP}$ PART [$_{VP}$ V]]], where the object precedes both the particle and the verb. In (10), we do not depict the movement of the object from the base position, but place it directly in the displaced position. According to Taraldsen, the object moves from the complement of V position; but if the small clause analysis is on the right track, the object could also originate inside the small clause [*cat out*].[4]

Such an analysis is very much in line with a rich tradition, inspired by Kayne's (1994) work, of analyzing OV orders in terms of a series of extractions into pre-verbal positions (see, among others, Zwart 1994; Hinterhölzel 2000; Hroársdóttir 2000). According to Taraldsen, then, even VO languages pass through a stage of the derivation which looks very much

[4] Also prepositional phrases, predicates and all other phrasal material must extract to functional positions in the "middlefield". The references which follow in the main text serve as a pointer to the literature discussing these issues.

like the structure of an OV language, with arguments and other material obligatorily displaced out of the VP (see also Kayne 1998).

Starting from an OV-like structure, the Norwegian V > O > Part order in (1a) is then achieved by moving the VP (containing just the verb) not only past the particle, but past the direct object as well. This movement is indicated by the dashed line in (10). (The subject in these examples moves to a position that is even higher than the one of the object, and also higher than the landing site of the verb, yielding a basic SVO order in Norwegian.)

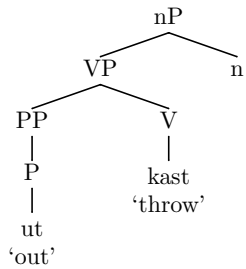
This system is set up to derive a generalization that holds across Germanic, such that the particle may never precede the direct object unless the verb does. Discussing this generalization will be useful, because the same generalization holds across Slavic (where it is traditionally explained by the complex head analysis in (3)). Taraldsen explains the generalization as follows. Recall first that the object always moves to a position which is higher than the particle, producing the intermediate order OBJ > PART > VERB in all Germanic languages. This is due to a stipulation that the functional projections attracting the particle and the object are rigidly ordered. In OV languages, this is the end of the story – since the verb stays to the right of the object, so will the particle. In VO languages, the verb moves across the object. When this happens, the verb may either move on its own, as in (10), or carry the particle along (by pied-piping FP). When it pied-pipes the particle along, it can in principle pied-pipe it on its left (yielding $[_{FP}$ *out throw*] *the cat*, which is the Czech order) or on its right (after crossing it first), yielding the order $[_{FP}$ *throw out*] *the cat* (found in Norwegian as an alternative to (1a)). This way, the proposal derives all and only the attested orders – without placing the verb and the particle in a complex head.

Let us now turn to the bound state of the particle. Even though Taraldsen (2000) does not discuss this explicitly, it seems natural to account for (1b) by claiming that forms with bound particles lack F. With F missing, the particle must remain in its base position because nothing makes it move. As a consequence of the particle's VP internal position, it precedes the verb, and it cannot be separated from it. The proposal is shown in (11).

The little nP which is found on top of the VP in (11) expresses the fact that the verb is nominalized, but we understand the nP label as a stand-in for whatever analysis turns out to be correct for nominalizations. If, for instance, zero nominalizations only have a DP on top of the VP, that would be compatible with the bound state of the particle and our proposal. What is crucial is that the projection F – which attracts particles – is missing. In

section 4, we will adapt Taraldsen's proposal for Czech, and we set out to explore its consequences in the remainder of the paper.

(11)



4. Extending the account to Czech

With the background in place, let us provide an analysis of how particle alternations arise in Czech. The goal is to capture the insights of the standard analysis in (3), as well as the two new observations we want to explain. The specific challenge is to encode simultaneously the following two facts. The first fact is that in forms such as (4a), the shortness of the vowel suggests that the prefix does not form a single head with the root (just like the short preposition in (5a) does not form a single head with the root of the noun).

(4) a. **Na**-piš ten dopis! SHORT
on-write-IMP the letter
'Write the letter up!'

b. **ná**-pis LONG
on-write
'a sign'

(5) a. [**na** [$_{NP}$ břeh-u]] SHORT
on bank-LOC
'on the bank'

b. [**ná**-[$_{N^0}$ břež]]-í LONG
on bank-place
'river side' (lit. 'the on-bank')

The second fact is that the prefix and the verb move together under all circumstances. For instance, yes-no questions in Czech are formed by moving the verb across the subject, see (12a,b). The particle is carried across the subject automatically with the verb and cannot be stranded.

(12) a. Petr na-psal dopis.
Petr on-wrote letter
'Peter wrote the letter.'

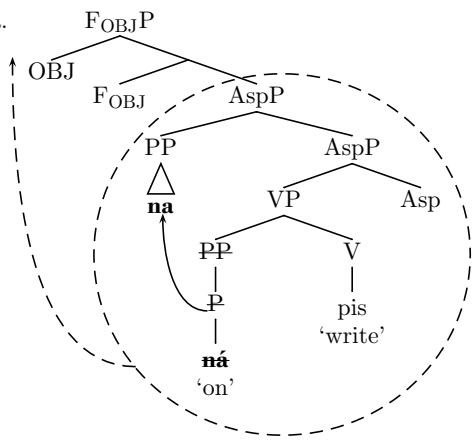
b. Na-psal Petr [~~na-psal~~] dopis?
on-wrote Petr letter
'Did Peter write the letter?'

If it is true that the prefix and the verb occupy different syntactic heads, the only way for sentences such as (12b) to be derived is by moving a phrase

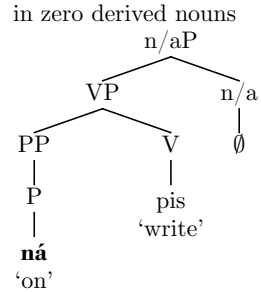
that contains the two heads but not the object. As we have already noted, such a constituent is readily available in (10), where the object occupies a position above the verb and the particle. Our goal will thus be to fine tune the account in (10) so that it provides for the language specific properties of Czech.

The first specific property of Czech which we are going to argue for is that the prefix moves to an aspectual projection, labeled Asp (following Svenonius 2004b). This movement is shown inside the encircled constituent in (13a). The prefix is base-generated with a long vowel and surfaces with a short vowel in the displaced position for reasons that we turn to later in section 8. The important point is that the change of the vowel length is linked to the fact that the prefix has moved. If it had not moved, it would keep its long vowel. This way, the trigger for the alternation of the vocalic quantity is analogous to the trigger of free/bound alternation, which is one of our analytical goals.

(13) a.



b. Asp is absent in zero derived nouns



According to Svenonius, movement to Spec,Asp has the purpose of binding an aspectual operator in the Asp head. Still according to him, the result of the newly established binding relation is the so-called perfectivity. Perfectivity is a particular type of aspectual interpretation, and in Slavic languages, it is connected to a set of grammatical effects. According to the proposal in (13a), this set of grammatical properties correlates with the distinction between long and short forms of the prefix. The empirical evidence for this will be presented in section 7.

Note that the movement of the prefix to Spec,AspP does not lead to any re-ordering. This is not because the movement would not cross any overt heads. We later argue that there are overt heads that prefix

movement crosses (Asp and others), but they are ordered to the right of V. Therefore, even though there are structural effects of the movement, no linear effect is observed. We will show the evidence for the structural effect of the movement in sections 5 and 6.[5,6]

Further, as mentioned before, the object extracts to a position that is even higher than AspP, yielding the intermediate [OBJ [PREF [V]]] structure. We think of the object movement as the traditional A-movement to a position that is similar to the AgrO of the previous era (it has nothing to do with scrambling or information structure).[7]

The final ingredient of our proposal concerns the nature of verb movement. Specifically, we propose that VP-movement across the object necessarily pied-pipes the whole AspP. As a consequence, the verb will never cross the prefix no matter how many movements it undergoes. This is indicated by encircling the whole AspP constituent, which is the relevant unit of structure that moves in Czech together with the verb root contained inside the VP. (Note on the side that when nouns move, prepositions are also always pied-piped to their left, since Czech disallows P-stranding.)[8]

[5] The Asp head is ordered to the right of the VP to avoid graphical clutter. The actual analysis would move the VP from the complement position of Asp to its left.

[6] As an anonymous reviewer points out, there are additional morphemes which are prefixal on the verb. One of them is the sentential negation. Can the prefix cross the negation? It turns out that it cannot. When negation is present, the prefix is found to its right, i.e., we always have Neg > Pref > Verb. It must be the case, then, that Asp (where the prefix moves to) is lower than Neg, a conclusion that seems to go hand in hand with the actual scope of the morphemes. The so-called super-lexical prefixes (Svenonius 2004b) are also higher up in the structure than Asp, but lower than both the negation and the object. We come back to super-lexical prefixes briefly in section 8.4.

[7] As an anonymous reviewer urges us to do, we acknowledge here that not only objects, but in fact **all** phrasal material must be outside of the constituent that contains the prefix and the root. This is consistent with the approach to Germanic OV languages alluded to above (see Hinterhölzel 2000 for an explicit account along these lines), and it is also consistent with the idea that the derivation of a VO language involves an OV structure at an intermediate stage. The approach is further consistent with Žaucer's (2013) findings for Slovenian (which we are able to replicate in Czech), namely that prefixes consistently scope below all sorts of adverbs, including the so-called VP adverbs (at home, with a machine), restitutive 'again', and adverbs of completion (half way).

[8] Bošković (1997) and Migdalski (2006) independently propose that participle movement in Slavic is phrasal movement. Wiland (2013) proposes that verb movement across the subject in OVS structures is a phrasal TP movement.

In simple declarative sentences, this constituent lands in a position below the subject, as in (12a). In (12b), the very same constituent also moves across the subject.

(12) a. Petr na-psal dopis.
Petr on-wrote letter
'Peter wrote the letter.'

b. Na-psal Petr [~~na-psal~~] dopis?
on-wrote Petr letter
'Did Peter write the letter?'

In effect, we attribute to sentences exactly the same rough constituent structure that is assumed by approaches based on (3). Namely, the rough constituency under both accounts is always [*subject* [[*pref-verb*] *object*]]. The only difference in our proposal is that the complex consisting of *pref* and *verb* is not a head, but a phrase that never splits. We think that this way of setting up the syntax is able to capture any effect that the traditional account does (because any constituent in the traditional analysis corresponds to a constituent in our analysis). In addition, we can also capture the fact that the particle alternates between two attachment sites. This is impossible if the prefix always adjoins to the root as in (3).

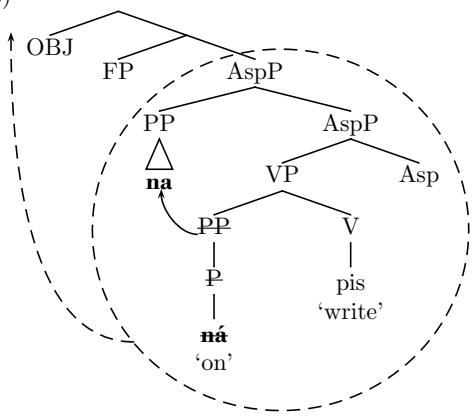
In sum, the proposal says that the prefix alternates between two attachment sites: it is either attached to the root (where it has a long vowel), or to a larger phrase (where it has a short vowel). The specific way in which the alternation proceeds is by movement: the prefix is first merged to the root, and only later (if the right conditions are fulfilled) leaves the base-generation site. Encoding the alternation this way allows us to unify it with a comparable alternation in the Germanic languages. A consequence of the proposal is that verb movement in Czech has to be modelled as a phrasal movement that always moves the verb and the prefix together, which is possible if the object and the subject always move even higher up in the structure than the prefix, as proposed in Taraldsen's work.

5. The theme marker and the infinitival template

In this section, we want to elaborate slightly on the structure (13), repeated below, and provide additional evidence for the movement of the prefix.

In order to make things as simple as possible, we have not included any functional structure or overt morphology between V and Asp. This is an oversimplification which we now address. Specifically, we will place an overt marker in Asp and show that there is interesting evidence for proposing that the prefix is actually located outside of the constituent composed of the remnant VP and the Asp head.

(13)



5.1. The theme marker

The main topic of this section is the so-called theme marker or stem marker. The theme marker is a suffix on the verb, one which comes closest to the root. This marker turns out to be a very important predictor of prefixal length, and so we introduce some facts concerning its properties, distribution and the assumed analysis. We start by giving a couple of verbs in (14) in order to show what the theme marker looks like.

(14)

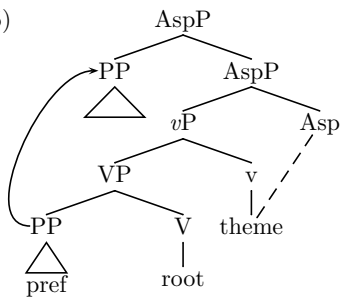
kick (imperf.)	kick once (perf.)	carry (directed, imp.)	carry (non-directed, imp.)
kop-**a**-t	kop-**nou**-t	nés-**Ø**-t	nos-**i**-t

There are four verbs here in the infinitive (marked by *-t*). This *-t* is preceded by a boldfaced morpheme (potentially null) which corresponds to the theme marker. The examples are chosen in a way that two and two columns have the same root ('kick') or a similar one (the two roots of 'carry' are related by the so-called ablaut). This allows us to identify the theme marker as an independent morpheme that influences the overall interpretation of a verb in a particular way, signaling the difference between a semelfactive and iterative reading of the verb, or the type of motion expressed.

Argument structure alternations (e.g., the causative-inchoative alternation) may also be signaled by the change of the theme. This is often the case when the theme markers derive verbs from nouns and adjectives. For instance, the adjective *červen-* 'red' can be turned into a verb by adding a theme marker; *červen-i-t* means 'to make red', while *červen-a-t* means 'to become red'.

Given these facts, we follow Svenonius (2004a) in providing a special place for the theme markers in the structure. Svenonius suggests that they reside below Asp in the little *v* head, an analysis followed also by Gribanova (2015). This makes sense of the fact that the markers derive verbs from roots that are not verbal (such as 'red'). Adopting this proposal, the encircled part of the structure (13) now looks as in (15), ignoring the dashed line for the moment. The new thing is the addition of the little *v*, and the proposal that the theme marker spells out this head.[9]

(15)



Let us now turn to the fact, illustrated in (14), that thematic markers also contribute to the aspectual properties of the verb form. We interpret this as evidence for the claim that the thematic vowel may in fact "span" several projections, using a terminology introduced by Williams (2003), and developed later in the Nanosyntax framework (Abels & Muriungi 2008; Taraldsen 2010, among others, drawing on the ideas published in Starke 2009). We indicate this by the dashed line in (15).[10]

For the following discussion, an important point is that if (15) is right, then prefix movement (even though string vacuous) crosses the theme marker on its way, and lands in a position **higher** than the thematic marker. This substantiates our pre-theoretical claim that prefix length reflects its attachment to two different objects: either to the root (in the base position) or to the stem (after it moves), where the stem corresponds to the combination of the root and the theme vowel.

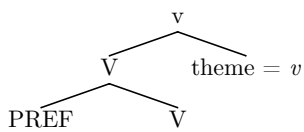
This is different from the approaches based on (3), where the prefix is head-adjoined to the root. In approaches based on such a structure,

[9] Again, let us repeat that we assume that the postverbal position of the theme marker is due to a movement of the VP to the left of Asp, followed by the extraction of the prefix, but we avoid depicting this in order not to create structures that are hard to parse. The predictions of the two types of structures are identical for the relevant facts to be discussed.

[10] In this discussion, we ignore the so-called secondary imperfectives.

the theme marker must be placed higher than the prefix (e.g., Svenonius 2004a; Gribanova 2015). The traditional proposal is depicted in (16).

(16)



It turns out that in Czech verbal structures, there is independent evidence against the low position of the prefix in (16) and in favor of a structure where the prefix is attached above the theme marker, as in (15). The evidence comes from the way prefixes interact with a lengthening process attested in infinitives.

5.2. The infinitival lengthening

Let us then give the relevant background concerning the process that we will call the "infinitival lengthening". The pattern we are about to discuss has been first noted in Scheer (2001) and studied in detail in Caha & Scheer (2007; 2008) and Ziková (2016), where we refer the reader for an exhaustive listing of the relevant forms. The observation is that the vocalic stem markers *-a, -i* and *-ě* sometimes lengthen in the infinitive, yielding *-á, -í* and *-í* respectively. The process is seen in the first two lines in table (17): the form in the past tense (*d-**a**-l* 'gave') is the underlying/lexical form, and this form is lengthened in the infinitive (*d-**á**-t* 'to give').[11]

(17) Infinitival lengthening of the theme with light roots

	a-stem	*i*-stem	*ě*-stem
light root, past	d-**a**-l 'give'	sn-**i**-l 'dream'	tř-**e**-l 'rub'
light root, infinitive	d-**á**-t	sn-**í**-t	tř-**í**-t
heavy root, past	děl-**a**-l 'make'	vol-**i**-l 'vote'	hoř-**e**-l 'burn'
heavy root, infinitive	děl-**a**-t	vol-**i**-t	hoř-**e**-t

However, lengthening of the stem marker fails to apply with some verbs, as in the other two lines of the table. Here, the stem marker in the infinitive has exactly the same form as the past tense theme marker. The question is what determines when the stem marker lengthens and when it does not.

[11] *Třít* 'to rub' is classified as an *ě*-stem, because of the form found in the past tense. The raising of mid vowels under lengthening is a general process in Czech.

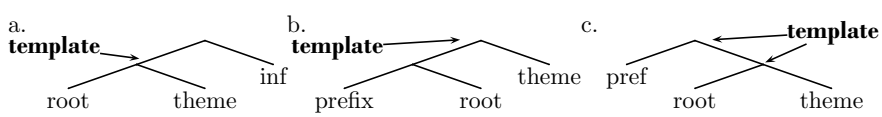
The answer is that this depends on the phonological properties of the root. If the root is "light" (has no vowel), the theme marker lengthens. If the root does have a vowel (which is overwhelmingly the case), the theme marker remains short.

In the literature quoted, this has been taken as evidence for the existence of a templatic requirement, which says that in the infinitive, the root and the theme marker taken together as a unit have to weigh (minimally) two moras. If the root has a vowel, then its simple concatenation with the theme marker yields a unit that already satisfies the templatic requirement; so no lengthening takes place. When the root has no vowel, the theme has to lengthen in order to fill the required space.

5.3. The interaction of infinitival lengthening and prefixation

The idea that we are going to build our argument on, is that templatic domains (in our case comprising the root and the theme) do not represent a purely linear grouping of morphemes that arises by the stroke of a pen on the paper. Rather, following the approach in Hyman et al. (2008), we will assume that morphological units relevant to templatic computation correspond to constituents in the morphosyntactic structure. In concrete terms, since the root and the theme **together** must weigh two moras, it means that they form a constituent in the morphosyntactic structure over which this requirement is stated. This idea is depicted in (18a), where the templatic requirement targets the constituent consisting of the root and the theme marker.

(18)



It then becomes relevant to ask what happens when the prefix is added into the structure. According to the traditional view based on (16), which is an extension of (3), the prefix and the root form a tight-knit constituent, because the prefix incorporates into the root from the complement-to-the-root position. The thematic vowel attaches only later on (at little *v*), so the prediction is that the structure of the verbal complex is as shown in (18b). In this structure, the only constituent that contains both the root and the theme is the top-most node. The prediction is, then, that when one adds a moraic prefix to the verb, this prefix will necessarily contribute to the overall weight of the form.

When we look at the *a*-stem paradigm in (19), this seems to be the case. So as the first column shows, when a moraic prefix is added to the root, infinitival lengthening no longer applies; the relevant form is in the shaded cell. The reason why lengthening fails to apply is because the templatic domain comprises all the three morphemes, and these by simple concatenation provide the needed phonological weight.

(19) Infinitival lengthening: the contribution of the prefix

	a-stem	*i*-stem	*ě*-stem
light root, past	d-**a**-l 'give'	sn-**i**-l 'dream'	tř-**e**-l 'rub'
light root, infinitive	d-**á**-t	sn-**í**-t	tř-**í**-t
moraic prefix, past	vy-d-**a**-l 'give out'	vy-sn-**i**-l 'dream out'	vy-tř-**e**-l 'rub out'
moraic prefix, inf.	vy-d-**a**-t	vy-sn-**í**-t	vy-tř-**í**-t

The alternative structure which we posit can accommodate this fact as well. According to the proposal (15), the rough constituent structure of the infinitive is as given in (18c). The top-most node of this structure includes all the relevant pieces that contribute to the weight of the *a*-stem: the theme, the root and the prefix. So the conclusion is that both proposals can incorporate the fact that in the *a*-stems, there is a constituent that includes all three pieces.

The difference between the proposals (18b) and (18c) shows when we look at the behavior of *i*-stems and *ě*-stems. What we see here is that in these classes, the prefix does not contribute to the overall weight of the form. As can be seen in the second and in the third column of (19), the theme marker lengthens even when a moraic prefix is present; we get *vy*-[*sn*-**í**]-*t* 'dream out', and *vy*-[*tř*-**í**]-*t* 'rub out'.

This fact means that in the latter two classes, the bi-moraic template scopes only over the unit composed of the root and the theme, excluding the prefix, as indicated by the brackets in the examples at the end of the preceding paragraph. Such a constituent is readily available in (18c); it corresponds to the lower node pointed at by the arrow. However, there is no such node available in the traditional structure (18b). In simple language, the analysis based on (3)/(16) has no morphological unit corresponding to the root and the theme in a prefixed verb. However, such a unit is clearly relevant for the process of infinitival lengthening.

Hence, based on the workings of the infinitival lengthening, we found independent evidence for the claim that the prefix in verbs is not prefixed to the root (as the traditional head-movement approach predicts), but

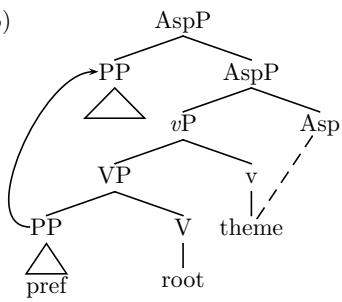
rather to the whole stem, because the stem without the prefix is the target of infinitival lengthening in the *i*- and *ě*-class.

In the following sections, we explore additional predictions of the new model in (15).

6. The correlation between the presence of the theme and the length of the prefix

The analysis introduced in (15), repeated below, has an interesting consequence, which is spelled out in (20) below the structure.

(15)



(20) The dependency between vowel length and the theme marker

All forms with a short prefix have the theme marker (more precisely, the structure corresponding to the theme marker), because the movement targets one of the projections spelled out by such a marker.

In a more theory-neutral wording, we claim that the shortness of the prefix is linked to its attachment to a verbal stem (which is composed of the root and the theme marker). If the theme marker is missing, there is no verbal stem to attach to. As a consequence, the prefix cannot have a short vowel in such cases.

Before we move on to exploring this prediction in detail, we must say something about the so-called zero themes (as in *nés-Ø-t* 'carry' seen in (14), repeated below).

(14)

kick (imperf.)	kick once (perf.)	carry (directed, imp.)	carry (non-directed, imp.)
kop-**a**-t	kop-**nou**-t	nés-**Ø**-t	nos-**i**-t

Specifically, we will adopt here the view that in the zero-theme class, the same underlying projections are present as in the forms which have an overt

theme marker. The only difference is how these projections are spelled out in the zero class: either by an actual null morpheme, or, adopting the spanning approach, the projections may be spelled out by the root. For prefix length, this entails that these forms should behave as if they had a regular theme.

As far as the phrase "have a theme marker" in (20) is concerned, we note that the presence/absence of the marker is inferred on a paradigmatic basis. If regular verb classes have a thematic marker in a particular form (say in the infinitive), then if some verbs do not have it (the zero-theme class), they will be assumed to posses a zero marker.

6.1. Two types of nominalizations

The prediction (20) finds much support in a number of minimal pairs. For instance, the presence or absence of the theme marker distinguishes two types of nominalizations in Czech shown in (21). Zero nominalizations (in the first column), have no theme, and their prefix is long (we have been talking about these already). However, a different type of nominalizations (we will call them verbal nouns), corresponding closely to English *ing*-nominalizations, have the theme marker (boldfaced in the table). As we can see in (21), their prefix is short. Hence, we observe the expected type of correlation: the shortness of the prefix correlates with the presence of the theme.[12]

(21) Verbal nouns have a short prefix

Zero nominalizations	Gloss	Infinitive V	**Verbal nouns**	Gloss
zá-kop	a ditch	za-kop-a-t	za-kop**-á-**ní	dig behind (burry)
vý-kup	a buy out	vy-kup-ova-t	vy-kup**-ová-**ní	buy out
vý-běh	a run	vy-běh-nou-t	vy-běh**-nu-**tí	run out
vý-stav(-a)	an exhibition	vy-stav-ě-t	vy-stav**-ě-**ní	build up
vý-měn(-a)	an exchange	vy-měn-i-t	vy-měn**-ě-**ní	exchange

[12] In the table, we treat *vý-měn-a* 'an exchange' and *vý-stav-a* 'an exhibition' as zero nouns, because the final *-a* is not a derivational but an inflectional case suffix that appears on feminine nouns, e.g., *žen-a* 'woman'. The shape of the nouns in GEN.PL. (where the inflectional ending is null) is *vý-měn, vý-stav,* and this supports their true zero noun status. Similarly, the masculine zero nouns only have no ending in the nominative and accusative singular, otherwise they have an overt case ending.

There are also aspectual differences between the forms which we turn to later. For now, it is important to note that the presence/absence of the theme nicely correlates with the length of the prefix, as predicted.

6.2. Adjectives and participles

Similar examples (with and without theme markers) can be provided also for adjectival forms. In Czech, there is an all-purpose adjectival marker *-n* (followed by agreement in the examples below). This marker can attach either directly to the root, and then there is no theme, or it can attach to the stem (root + theme). When *-n* attaches on top of the theme marker, we get a form that corresponds to the passive participle. These forms are in the middle column of (22). Correlating with the presence of the theme is the shortness of the prefix. There are alternations of the theme vowel, but we ignore them here. (The passive participles may have both eventive and a stative interpretation, and we come back to this later on. The vowel length in the prefix is the same regardless of the interpretation of the participle (eventive or stative)).

(22) Participles have a short prefix, adjectives have a long prefix

Infinitive	Gloss of V	Passive participle	Adj	Gloss of Adj
u-sek-a-t	to cut away	u-sek**-a-**ný	ú-seč-ný	curt
u-plat-i-t	to corrupt	u-plac**-e-**ný	ú-plat-ný	corrupt
vy-klop-i-t	to tilt out	vy-klop**-e-**ný	vý-klop-ný	flip out (screen)
při-tul-i-t	to snuggle with/to	při-tul**-e-**ný	pří-tul-ný	cuddly

When the adjectival marker *-n* attaches directly to the verbal root without the intervention of a theme marker, the prefix is long, as shown in the pre-last column. This is captured by the approach we propose: when the theme marker is missing, there is no landing site for prefix movement. Therefore, it stays in its base position and surfaces with a long vowel.

So far, there is thus a neat correlation between the presence of the theme and the length of the prefix. This state of affairs once again supports the idea that the shortness of the prefix is caused by the fact that it is attached to the stem. When there is no stem (the theme is missing), the vowel in the prefix is long.

The following section starts looking at the interpretative effects of the movement to Spec,Asp, namely perfectivity, as proposed originally by

Svenonius. This will help us understand a class of counterexamples to the so-far unexceptional correlation (20).

7. Prefix length and aspectual distinctions

Svenonius (2004b) proposes that the functional projection where the prefixes move to is Asp. The reason for this, recall, is the traditional observation that prefixation triggers perfectivity (a particular type of aspectual interpretation). Svenonius encodes this observation by saying that the prefix moves in order to bind an aspectual variable in Asp; once this variable is bound, perfectivity arises.

If we now combine Svenonius's idea of movement triggered perfectivity with our proposal concerning vowel length, we arrive at a prediction. The prediction is given in (23).

(23) The relationship between vowel length and perfectivity

a. Long vowel reflects a VP internal position of the prefix → no perfectivity.

b. Short vowel reflects movement to Spec,Asp → perfectivity.

There is a large body of recent literature focused specifically on the proper semantic treatment of perfectivity in Slavic (Borik 2002; Ramchand 2004; Romanova 2006, among others), and we refer the interested reader to this literature. What is important to us are the tests used to distinguish perfectives from imperfectives. One of them is that only imperfectives can have a present tense interpretation. The very same tense morphology on a perfective verb leads to a future interpretation. For instance, *píš-**e** dopis* (lit.: 'write-PRES letter') means 'he is writing a letter', so *píš-* 'write' is imperfective. A prefixed form of the same verb *na-píš-**e** dopis* (lit.: 'on-write-PRES letter') means 'he will write a letter'. This shows that *na-píš* 'on-write' is perfective.

This test works well to sort verbs, but given that prefixes are mostly long in nouns, this test won't help us much in figuring out the aspectual properties of such forms. For these cases, we are going to rely on the incompatibility of perfective predicates with phase verbs (*start, end, continue*) as a reliable distinction (Borik 2002, 44; Romanova 2006, 6). The phase verbs in Czech are *začít* 'start', *přestat* 'stop', and *pokračovat* 'continue'. These verbs combine either with verbs in the infinitive, or event denoting nouns (as in 'He started with the reparation'). Their compatibility with nouns is crucial, since this gives us the possibility to test aspectual properties of event denoting nouns.

With the diagnostics in place, we now turn to minimal pairs of examples where one has a long prefix, and the other a short prefix. The prediction is that this should correlate with (im)perfectivity.

7.1. Aspectual distinctions in verbs

We start by looking at verbs. As a background, we start by noting the existence of a special (and relatively small) class of particle verbs in Norwegian, where the particle cannot be separated from the verb (cannot move out of the VP). An example is below in (24). Such examples usually correlate with a non-compositional nature of such combinations.

(24) Amerikansk general sier han til-hører Guds hær.
American general says he to-listens God's army
'American general claims to belong God's army.' (head-linese)

Should an analogous class of verbs exist in Czech, our proposal predicts what they should look like. Since the prefix cannot move out of the VP, it should have a long vowel, and this should correlate with an imperfective interpretation of the verb. It turns out that there is a small number of such verbs with long prefixes in Czech; we give an example below in (25):

(25) Americký generál tvrdí, že **ná**-leží k božské armádě.
American general claims that on-lies.3SG to God's army
'American general claims to belong God's army.' (head-linese)

The verb in (25) has exactly the two characteristics that our proposal predicts. The length of the prefix is obvious from the orthography; the imperfective nature of the verb is revealed through the present tense interpretation. (The verb also combines with 'begin/start.') It is quite unusual for verbal prefixes to be long, and it is unusual that they do not trigger perfectivity. The fact that these two properties correlate supports our proposal.[13]

Here we must admit that these verbs are surface problematic from the perspective of the generalization in (20), which claims that there is a correlation between prefix length and the presence/absence of the theme marker. These verbs do have a theme marker, yet their prefix is long. In

[13] Other verbs like that are *ná-sobit* 'multiply', *pří-slušet* 'be appropriate for', *zá-vidět* 'to envy', *ne-ná-vidět* 'to hate', *ná-sledovat* 'to follow', *zá-viset* 'to depend'. In total, we have eight verbs, and they are all imperfective.

our theory, this means that these prefixes must have failed to move out of the VP despite the availability of the potential landing site. And while we do not understand the reasons why some prefixes exceptionally refuse to move out of the VP, the fact that this failure correlates with the lack of perfectivity allows us to pin down the interpretive effect of the (failed) movement.

We also add here that the properties of these exceptional verbs cannot be explained by saying that they are denominal (denominal verbs are discussed from the perspective of length in Ziková 2012). The explanation via denominal verb formation goes as follows: when verbs are nominalized (which means that a little nP is put on top of the VP), their prefix becomes long. For instance, from *za-lož-i(-t)* 'to put aside' we get *zá-loh-Ø(-a)* 'a backup'. Then we can take this noun, and make a verb from it again; [[[*zá-loh*$_{\text{VP}}$]-*Ø*$_{\text{nP}}$]-*ova*$_{\text{AspP}}$] means 'to make backups'. We are assuming that the prefix in the denominal verb is stuck inside the noun from which the verb is derived, and cannot move out. As a consequence, the prefix stays long and the verb is imperfective.[14]

So the question is whether *ná-lež-e(-t)* 'belong', *zá-lež-e(-t)* 'to depend' and others of their kin can be explained by reference to morphological parses where the length of the prefix reflects a noun contained in the verb: [[[*zá-lež*$_{\text{VP}}$]-*Ø*$_{\text{nP}}$]-*e*$_{\text{AspP}}$] and [[[*ná-lež*$_{\text{VP}}$]-*Ø*$_{\text{nP}}$] -*e*$_{\text{AspP}}$]. The problem is first of all that there are no such nouns that would form the basis of the verb; *zá-leh* or *ná-leh* do not exist. The second problem is that the particular verbal suffix *-e* is not used to form denominal verbs; these regularly get either *-ova* or *-i*.

To sum up: building on Svenonius's observations, we have proposed that when prefixes move out of the VP (where they surface with a short vowel), the verb becomes perfective. As a consequence, we now expect (per (23)) that verbs with long prefixes are imperfective. This turns out to be the case in two sets of examples.

First, in (25), we have a long prefix that cannot be explained by a reference to a zero nominalization. We understand these cases as the Czech counterpart of Germanic inseparable particles: the prefix exceptionally fails to move out of the VP, and so it surfaces with a long vowel. This type of prefixation does not lead to perfectivity, which is the crucial thing predicted by our proposal. Second, we have also seen cases of denominal verbs with long prefixes; these too are imperfective as predicted (the prefix cannot move out of the noun due to locality).

[14] Such denominal verbs can receive their own perfectivizing prefix, sometimes even the same one. So *za-*[*zá-loh-ovat*] is the perfective version of the base verb and means 'to make a backup'.

7.2. Aspectual distinctions in nouns

Recall from (21), repeated in part below, that in Czech, there are two types of nominalizations (zero nominalizations and verbal nouns).

(21) Verbal nouns have a short prefix

Zero nominalizations	Gloss	Infinitive	**Verbal nouns**	Gloss
zá-kop	a ditch	za-kop-a-t	za-kop**-á-**ní	dig behind (burry)
vý-měn(-a)	an exchange	vy-měn-i-t	vy-měn**-ě-**ní	exchange

These nouns differ not only in their form, but also in their interpretation. Procházková (2006, 23) has concluded in general that verbal nouns (which include the theme marker) correspond consistently to a semantic class that Grimshaw (1990) calls complex event nominals, while zero nominalizations correspond either to result or to simple event nominals.

To see this, consider first the zero nominalization in the first line: *zá-kop* literally a 'behind-dig.' It means 'a ditch' and it is a result noun. It cannot take any arguments. On the other hand, the corresponding verbal noun ***za**-kop-**á**-ní* 'burying' is just perfect with a theme argument and an event interpretation. This correlates with the fact that the prefix is short here, and the thematic vowel is present. This is as expected if the shortness of the prefix entails movement to Spec,Asp, and the presence of Asp entails the presence of the theme vowel and an eventive interpretation in general.

However, even more interesting are cases (which are actually not so rare) when the zero noun can also have an eventive interpretation. One example of this is below in (26a).

(26) a. vý-měn-a pneumatik
ex-change-NOM.SG tires.GEN
'tire exchange'

b. vy-měn-ě-ní pneumatik
ex-change-TH-NOUN tires.GEN
'tire exchange'

(26a) is very close in meaning to (26b), despite the fact that it has no theme marker. The way we interpret the fact that theme-less forms may have eventive interpretation relies on the idea that the VP may be quite complex (as in Ramchand 2008), and the theme marker only spells out the higher projections (initiation and aspect); but Ramchand's process sub-event may be spelled out by the root, in which case the root retains some event and argument structure even in the absence of the theme.

That said, there is one environment where the two forms contrast sharply, namely in how they behave with phase verbs. This is shown in (27). What we see here is that the noun with the long prefix and without the thematic vowel is fine under a phase verb, see (27a). The example feels absolutely natural in a context where the exchange of tires started but not necessarily finished. This suggests that the nominalization is not perfective, despite the fact that it has a prefix.

(27) a. Začal s vý-měn-ou pneumatik.
started with ex-change-INS tires.GEN
'He started changing the tires.'

b. *Začal s vy-měn-ě-ním pneumatik.
started with ex-change-TH-NOUN.INS tires.GEN

c. *Začal vy-měn-i-t pneumatiky.
started ex-change-TH-INF tires.ACC
'He started changing the tires.'

This contrasts with (27b). The nominalization with the short prefix is ungrammatical, and behaves in this respect as its corresponding perfective verb, which we give in (27c). This contrast is quite general. Verbal nouns with short prefixes (derived from perfective verbs) fail to appear under phase verbs, and test as perfective. In contrast, simple event nouns with long pefixes test (surprisingly) as imperfective, and behave as if they were derived from verbs with long prefixes (which are imperfective). We interpret this finding in a "constructionist" way, assuming that verbs are built piece by piece from smaller ingredients. Zero nouns arise when the construction is stopped relatively early on, and the prefix still has not had the chance to move and trigger perfectivity.[15,16]

[15] An anonymous reviewer asks whether one can use 'in an hour' adverbials to modify the noun *výměna* 'exchange'. The answer is yes. This seems to suggest that *výměna* 'exchange' should be classified as perfective, since the possibility of such modification is sometimes taken to be one of the criteria for perfectivity. However, Borik (2002, 47) points out that imperfective predicates may in fact combine with 'in an hour' adverbs. Our conclusion here – as suggested both by Borik and the anonymous reviewer – is that the 'in an hour' adverb probes for a different property than perfectivity, namely telicity, which usually (though not always) correlates with perfectivity.

[16] In relation to our nominalization data, an anonymous reviewer brought to our attention a paper by **?**. In its general outlook, the main claim of Tatevosov's paper is very similar to ours. Specifically, Tatevosov proposes that the prefix originates inside the VP, but its presence *per se* does not lead to perfectivity. Perfectivity only arises higher up in the functional structure by the addition of a particular functional

To sum up, nouns exhibit a double contrast when it comes to the length/shortness of the prefix. When the prefix is short, nouns (i) have a theme marker, and (ii) they are perfective. When they have a long prefix, they (i) have no theme marker, and (ii) when eventive, they are imperfective. These findings support the approach highlighted in (15), where the prefix moves to the Spec of the projection spelled out by the theme marker thereby triggering a perfective interpretation.

7.3. Adjectives and participles

Recall now from (22), repeated partly below, that similar examples (with and without theme markers) can be provided also for adjectival forms, and this correlates with the prefix in the expected manner.

(22) Participles have a short prefix, adjectives have a long prefix

Infinitive	Gloss of V	Passive participle	Adj	Gloss of Adj
u-sek-a-t	to cut away	u-sek**-a-**ný	ú-seč-ný	curt
u-plat-i-t	to corrupt	u-plac**-e-**ný	ú-plat-ný	corrupt

Ideally, we would now subject forms like this to the 'start' test and show that once again, prefix shortness correlates with perfectivity. There are forms where the prediction is born out. So for instance, the passive participle given in the table above feels ungrammatical in a sentence with 'start', thinking here of sentences such as *'The branches were green while on the trees, but once they started to be *u-sek-a-ný* (cut off), their leaves turned brown.' The adjective *ú-seč-ný* 'curt', on the other hand, feels natural in sentences with 'start' ('His answers started to be curt' is fine in Czech).

head. In order to prove his claim, Tatevosov uses nominalizations of perfective verbs that test as imperfective under several tests; his point is that such nominalizations (similar to the Czech *vý-měn-a* 'exchange') prove that prefixation and perfectivity are separate, and moreover, that prefixation comes first and perfectivity later. This much is very much in line with our claims.

But the surprising thing (for us) is that Tatevosov uses verbal nouns to prove his point, i.e., Russian examples analogous to (25b) are grammatical according to Tatevosov. We do not know why there is such a difference. What we did, however, is run the Czech verbal nouns through some of the other tests presented in Tatevosov's work, and it seems to us that the contrast is systematic: where Russian verbal nouns test as imperfective (even though the corresponding verb is perfective), Czech verbal nouns test as perfective.

However, there are orthogonal factors involved here which make the results of the test not so neat. Specifically, the point is that eventive perfective participles (which indeed refuse to combine with 'start') may be turned into statives, a process described for instance in Kratzer (2000). According to her, a stativizer may attach to an eventive predicate and turn it into a state resulting from undergoing that event. Once a predicate is turned into a state, it does combine with 'start', even though its prefix remains short. That is because states are always imperfective.

To see the stativization process on an example, consider the sentences below. In (28a), there is an active sentence based on a perfective verb ('to convince'). In (28b), the verb is passivized, but it keeps its eventive interpretation: it describes a change of state from 'not be convinced' to 'be convinced'. In (28c), a formally identical participle is used, but this time, the interpretation is stative; no change of state is implied. Because it is stative, it is also imperfective (all states are imperfective). As a consequence, the stative passive participle can be used as a complement of the verb 'to start' in (28d). What we see also in (28d) is that the agent cannot be present in the sentence. This indicates that the eventive reading of the participle still behaves as perfective, and it is the stative interpretation that brings about the shift to the imperfective behavior.

(28) a. (Pochyboval o tom, ale nakonec) ho jeho kamarád přesvědčil.
he doubted that but in the end him his friend convinced
'(He doubted that, but in the end) his friend convinced him.'

b. (Pochyboval o tom, ale nakonec) byl přesvědčen svým kamarádem.
he doubted that, but in the end was.3SG convinced his friend.INS
'(He doubted that, but in the end) he got convinced by his friend.'

c. Byl (celou dobu) přesvědčen, že to dobře dopadne.
was.3SG whole time convinced that it well end.up
'(The whole time,) he was convinced that it was going to end up well.'

d. Začal být přesvědčen (*svým kamarádem), že to dobře dopadne.
started.3SG be convinced his friend.INS that it well end.up
'He started to be convinced that it is going to end up well.'

Thus, when looking at adjectival formations (including participles), we do not find the expected neat contrast in perfectivity: in their stative reading, participles with short prefixes can be imperfective (because Kratzer's stativizer attaches on top of a structure, which we think contains enough space for prefix movement).

However, what can be observed is that deverbal adjectives without thematic markers are not eventive at all, while participles with thematic markers show a degree of eventivity not matched by the theme-less forms. To give an example which is typical of the two classes, let us turn to the verb *u-plat-i-t*, seen in the second line in table (22). The verb can be glossed literally as *pay on the side*, and it means 'to bribe someone'. The form without the theme vowel, *ú-plat-ný* means 'corrupt'. It does not take any arguments or other event modifiers, so it is impossible to say (29a,b).

(29) a. *někým ú-plat-ný
someone.INS corrupt
lit. 'corrupt by someone'

b. *ú-plat-ný sedmi milióny
corrupt seven.INS millions.INS
lit. 'corrupt by seven millions'

The form with the theme vowel is a regular passive participle, it means 'corrupted'. Unlike the form without the theme vowel, it does take arguments and other modifiers; (30a,b) are fine. These modifiers probe for the properties of the event that has led to the resulting state; for instance, (30b) says that seven millions were used in the event to bring the state about.

(30) a. někým u-plac-e-ný
someone.INS corrupted
'corrupted by someone'

b. u-plac-e-ný sedmi milióny
corrupted seven.INS millions.INS
'corrupted by seven millions'

Summing up: in verbs, the long/short prefix distinction correlates with perfectivity. Short prefixes induce perfectivity, long prefixes fail to do so. Moving away from verbs, we have seen that the same distinction obtains for nouns. Nominalizations with long prefixes test as imperfective, nominalizations with short prefixes test as perfective.

However, when a stative predicate is derived from a perfective one (e.g., stative participles), the correlation between prefix shortness and perfectivity is weakened. Still, what we see in these forms is that the forms with the short prefix do contain an event which led to the state, because this event remains accessible for modification.

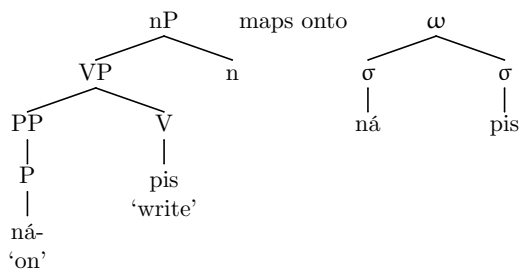
8. A shortening account of the alternation

This is where our discussion of the syntax and semantics of the alternation stops, and we now comment more on the phonological process involved in the alternation. Scheer's (2001) original idea as developed in Ziková (2012) was that the alternating prefixes were short in the lexicon and that length in the relevant forms was a result of lengthening. Lengthening was

implemented by a templatic requirement (a form of a lexical entry) which demanded that when embedded under a little *n* head, the syntactic node containing the prefix and the root must weigh three moras. When the root is monomoraic (has a single short vowel), the likewise monomoraic prefix lengthens in order to become bimoraic, so that together with the root, it fills the required weight. The account thus relies on the traditional constituency in the nominalization, and does not require anything specific to be said about the verbal forms. We therefore find it relevant to address this account here.

Our goal is to show that this account cannot me maintained. We argue against any conceivable lengthening explanation of the alternation and instead, we propose that the vowel is long in the lexicon, and shortens in the relevant forms. More specifically, we claim that the two distinct attachment sites of the prefix map onto two distinct prosodic structures. In nominalizations, the prefix and the root are mapped onto a single prosodic word, see (31). Inside the minimal word, the prefix surfaces in its lexical shape (with a long vowel, if the vowel is long in the lexicon).

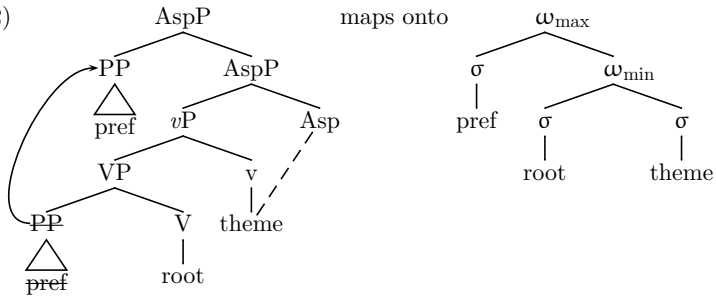
(31)



For cases where the prefix is short, we propose the following. First, we assume that the constituent containing the root and the thematic vowel corresponds to a prosodic word in Czech. When the prefix moves outside of this constituent (crossing the theme on its way), it gets outside of the prosodic word and becomes a clitic by adjoining to it, see (32).[17]

[17] We were told that in Serbian, a similar alternation exists as in Czech (we thank Aida Talić for a discussion). The difference is that the alternation between an affix and a clitic is revealed through stress placement. We may extend our analysis to these facts by saying that in nominalizations (31), the prefix and the root correspond to a single domain for stress placement, which leads to a stressed prefix. In verbs (32), the stress falls on the root and not on the prefix, since in the verbal environment, the prefix is outside of the domain where stress is assigned.

(32)



When the prefix becomes a clitic, it shortens. We propose that this happens because clitics have a canonical shape in Czech such that a clitic may not contain a long vowel; we state this in (33).[18]

(33) Clitics may not contain long vowels.

The way we have set up the account (in terms of inside/outside of the minimal prosodic word) allows us to unify the alternation of prefixes with the one that affects prepositions, recall (5) repeated below.

(5) a. **[na** [$_{NP}$ břeh-u]]
on bank-LOC
'on the bank'

b. **[ná-**[$_{N^0}$ břež]]-í
on bank-place
'river side' (lit. 'the on-bank')

For cases like these, we propose on analogy to the verbal domain that there is a particular constituent in the extended NP which corresponds to a prosodic word. In Czech, this is the KP (case marker is always the last morpheme in a noun). When the preposition is outside of this KP constituent, as in (5a), it is adjoined to the prosodic word corresponding to that KP; see the structure in (34a), which is as proposed in Svenonius (2008). Since the adposition has the status of a clitic in this structure, it is subject to the shortening process triggered by (33). The structure of (5b) is

[18] In a previous version of the paper, we phrased the restriction on the prosodic shape as specifically targeting only clitics of the syntactic category P. That was mainly because adpositional markers are the items we look at, while the behavior of other clitics is not immediately relevant (even though interesting in a larger perspective). We are now extending the claim to all clitics, because (33) is a more sensible claim to make from the perspective of phonology. However, there are potential counterexamples to the claim (33), since the clitics *nám* 'we.DAT' and *vám* 'you.PL.DAT' have long vowels. In order to maintain (33), we must treat these as a sequence of two clitics, *na-/va-* 'us/you' and *-am* 'DAT'. Should this decompositon turn out untenable, we would have to fall back on the narrower statement that only clitic adpositions may not contain long vowels (which is surface true).

as in (34b); the preposition is inside the KP, and hence, inside the minimal word. When that is so, it is not subject to (33), and the preposition surfaces in its lexical shape with a long vowel.

(34) a. [P [$_{KP}$ N K]] maps onto [$_{\omega}$ P [$_{\omega}$ N K]]
b. [$_{KP}$ [P N] K] maps onto [$_{\omega}$ P N K]

In sum, our proposal says that Czech verbal prefixes and prepositions alternate between a clitic and an affix status in terms of their structural position inside vs. outside of a constituent that is mapped onto a prosodic word. We now turn to justifying the particular aspects of this proposal.

8.1. Non-alternating prefixes

Let us first come back to our original data set from (7), repeated in (35) above the double line. Below the double line, the original table is augmented by examples where prefixes stay the same no matter whether they appear in the noun or in the verb.

(35) Alternating and non-alternating prefixes

Verb, V	Gloss	Noun, VV	Gloss
vy-stup	get out!	vý-stup	outcome
na-stup	get on!	ná-stup	boarding
za-stup	step in!	zá-stup	substitute
při-stup	come here!	pří-stup	access
u-stup	step back!	ú-stup	retreat
pro-stup	step through!	prů-stup	an opening
Verb		**Noun**	
po-stup	move on!	**po-stup**	progress
se-stup	step down!	**se-stup**	descend
od-stup	step away!	**od-stup**	distance
pře-stup	transfer!	**pře-stup**	transfer
v-stup	step in!	**v-stup**	entrance

This shows that there are prefixes that do not alternate in vowel length. What does this new piece of data tell us about the nature of the phonological process involved?

First notice that these facts are not problematic for the shortening account. What the shortening account says is that in the zero noun, the

prefix occurs in its lexical shape. So we can incorporate the non-alternating prefixes simply by saying that they are lexically short. In the verbal structure, prefixes have to shorten by (33). This has an effect on the prefixes which are lexically long. But since the non-alternating prefixes never had any long vowel, shortening applies vacuously and the prefix stays the same in the verbal environment. In sum, a shortening account of the alternating prefixes faces no challenges when non-alternating prefixes are considered.

On the other hand, any lengthening account encounters a problem. If prefixes lengthen in nouns, then nothing else said, one would expect the prefixes to be long in the boldfaced forms in (35).

The issue in general terms is that going from the noun to the verb and shortening any long vowel in the prefix, we can unambiguously say what the verbal prefix will look like. However, a derivational path from the verb to the noun cannot apply one and the same rule to all prefixes, because some lengthen and some do not.

Aware of this problem, Ziková (2012) puts forth the proposal that some prefixes do not lengthen for principled reasons. The claim is that the prefixes which lengthen are a phonological class, and other prefixes do not lengthen because they do not belong in that class. We think that this move has some problems, and we turn to these now.

Let us first say how the class is defined. The first property that the lengthening prefixes share is that they are vowel final. This can be easily verified by looking at the upper part of (35). This, for instance, rules out the prefix *od-* 'away' as a candidate for lengthening. However, looking at the lower part, we see that, for instance, *po-* 'on' is also vowel final and it does not lengthen. So, in addition, Ziková (2012) says that the prefixes which lengthen end in either a high or a low vowel, but never in a mid vowel.

Looking now at the upper and lower part, this almost makes the right cut. Still, the prefix *pro-* 'through' is a problem, because it is V-final and ends in a mid vowel. It should thus behave the same as *po-* and fail to alternate. However, *pro-* does regularly and productively alternate with *prů-*, an example of which can be seen in (35).

The result of the discussion is that ultimately, the lengthening analysis ends up stipulating that some prefixes are allowed to lengthen and others not. On the other hand, the shortening analysis avoids the need to introduce arbitrary word classes such as 'alternating prefix' and 'non-alternating prefix'. What we have is just the arbitrary lexical form (either long or short) and a regular process that shortens all long vowels when the morpheme appears as a clitic.

Note as well that the same reasoning carries over to prepositions. So just like we have alternating prepositions (corresponding to alternating prefixes), we have non-alternating prepositions (corresponding to non-alternating prefixes). An example of a 'non-alternating' preposition is given in (36). Once again, the shortening analysis faces no challenge; short Ps remain short whether a clitic or an affix. On the other hand, a lengthening account would expect the vowel to lengthen in (36b).

(36) a. po vod-ě
all.over water-LOC
'all over the water'

b. po-vod-í
all.over-water-PLACE
'catchment area'

In addition to these general considerations targeted against any conceivable lengthening account, the existing implementations (i.e., Scheer 2001; Ziková 2012) happen to encounter additional problems because of the specifics of their proposal. Recall that Scheer's original proposal considers prefix length to be a side-effect of a templatic requirement that wants the prefix and the root taken together to weigh three moras. The additional issue the account faces is that even though some prefixes cannot lengthen, the root should do so in order to fill the required weight. But in reality, it does not; the root is always fixed.

To show the issue on an example, consider the table in (37).

(37) No trimoraic forms for some verbs

Verb inf/past	Noun	Weight	Gloss	Tri-moraic form
růst/rost-l	růst	2	grow/growth	————
s-růst/s-rost-l	s-růst	2	grow together	*se-růst
vz-růst/vz-rost-l	vz-růst	2	grow up	*vze-růst
do-růst/do-rost-l	do-rost	2	grow up (mature)	*do-růst
po-růst/po-rost-l	po-rost	2	overgrow	*po-růst
pod-růst/pod-rost-l	pod-rost	2	undergrow	*pod-růst
ob-růst/ob-rost-l	ob-rost	2	overgrow	*ob-růst
na-růst/na-rost-l	ná-růst	4	grow in number	*ná-rost/*na-růst
vy-růst/vy-rost-l	vý-růst-ek	4	grow out	*vý-rost/*vy-růst
při-růst/při-rost-l	pří-růst-ek	4	accrete/increment	*pří-rost/*při-růst

(37) presents perhaps the most baffling collection of facts that the tri-moraic analysis faces. In Czech, the verb 'to grow' is *růs-Ø-t*. The length in the root is not stable; most forms have a short vowel, but the infinitive has a long vowel; some of the relevant forms are in the first column. In nominal-

izations, the root is sometimes short and sometimes long, as the second column shows. But strangely enough, the length in the prefix and the root conspire in a way that the actual forms never have three moras. This is obviously a problem for the templatic analysis. The expected forms are given in the last column, making use of the allomorph of the root that complements the weight of the prefix for the net total of three moras. However, all these forms are ungrammatical.

How does the prefix-centered shortening alternative fare with these data? It does so well. The prefixes which are stored in the lexicon with a long vowel (*ná-, vý-, pří-*) have a long vowel in the nominalization. These occupy the three rows at the bottom. The non-alternating prefixes are inserted in the structure with their vowel short (which is how the lexicon stores them), and this is how we see them in the nominalization. These examples occupy the four rows above the bottom-most triplet.

Apparently, then, the length of the root (while interesting in its own right) is orthogonal to the length of the prefix, and we intentionally avoid relating the two together. As far as we understand the facts, the prefix length is fully predictable on its own, using the rule (33) and the lexical specifications of the prefixes (i.e., whether they have a long vowel or a short vowel). The lengthening analysis (of which the tri-moraic template is an instance) cannot achieve this result.[19]

8.2. No verbal prefixes with long vowels

According to our analysis, there is a general rule that in effect shortens underlying long vowels in verbal prefixes, should these contain one. This predicts that there are no verbal (clitic) prefixes (or prepositions) with long vowels. In (38), we list all the verbal prefixes in Czech. Brackets around segments indicate that the segment alternates with zero.

(38) Clitic forms of Czech verbal prefixes (i.e., the form found on verbs)
na, nad(e), o, ob(e), od(e), pod(e), pro, pře, před(e), při, roz(e), s(e), u, v(e), vy, vz(e), z(e), za

(38) confirms our prediction. No verbal prefix has a long vowel, and this is captured by our theory through (33).

[19] Similar observations extend to the "underground" type of construction with prepositions. Specifically, the prepositions regularly lengthen even if the noun is long, producing quadri-moraic forms like *pří-sál-í*, lit. 'the by-concert.hall', i.e., 'a foyer'. However, we add that Scheer's and Ziková's analyses were not intended to capture these facts.

Any version of the lengthening analysis says that (a subset of) prefixes lengthen in nominalizations. It predicts nothing concerning the issue whether prefixes in verbal contexts have short vowels or long vowels. The fact that no prefix appearing before a verb in Czech has a long vowel (save for the exceptional cases discussed in section 4) comes as a surprise. And it is an odd surprise; we expect that some prefixes should have long vowels, and some short. That is because in Czech, length is in large part an arbitrary property of lexical items, which is synchronically unpredictable.[20] The fact that no prefix has a long vowel calls for an explanation, and the lengthening analysis has none inbuilt in it. So in order to explain the fact that no verbal prefix has a long vowel, the lengthening analysis has to invoke additional rules/constraints (possibly along the lines of 33) to capture this. However, the point is that once something like (33) is adopted, it does all the job that is needed, and an additional lengthening process becomes superfluous.

The shortening analysis encounters no surprises. It proposes that the true lexical shape of the prefix is seen in the nominals. Here, some particles are long, and some are short, as expected if length is in part a lexical accident. Only the clitic shape of the particle is regulated by the canonical shape constraint (33), and that is why a regularity is observed.[21]

8.3. Ablaut as a marker of F

Let us now turn to the main motivation for why Scheer (2001) proposed a lengthening template-based analysis. We start by introducing a new type of nouns in the first column of (39).

(39) Nominalizations from roots with ablaut

Ablaut nouns	Corresponding verb	Literal gloss
vy-náš-ka	vy-náš-e-t	carry out
vy-váž-ka	vy-váž-e-t	carry out by a vehicle
vy-cház-ka	vy-cház-e-t	walk out
za-vír-ka	za-vír-a-t	close up
u-pín-ka	u-pín-a-t	pin to
vy-bír-ka	vy-bír-a-t	take out

[20] For instance, in nouns we find minimal pairs such as *lak* 'varnish' vs. *lák* 'pickle', *plat* 'salary' vs. *plát* 'plate'. In verbs, there is *s*[*i*]*pat* 'strew' vs. *s*[*í*]*pat* 'breathe hard'.

[21] We add that the same restriction is observed by clitic prepositions as well (see Caha 2014 for a complete list).

We call these nouns "ablaut nouns" for reasons that will become obvious later. What is problematic about them is that they have a short prefix, yet they do not have the theme marker (as a comparison with the corresponding verb reveals). The ablaut nouns are always derived by the suffix *-k*, there are no zero nouns of this sort.

Scheer (2001), the first to observe the generalization relating theme markers and the quantity of the prefix, also noted the exceptionality of these forms, and provided a phonological account for them. His idea was that the prefix does not show the expected length because in all the problematic nouns (and others like them), there already is a long vowel in the root, and it blocks the regular lengthening process. The existence of such nouns is the main and virtually only reason for proposing a lengthening account: in order to be able to block the process when the root is long.

To enforce such blocking, Scheer stated the lengthening account in terms of the tri-moraic template. If the goal of the lengthening is that the constituent composed of the prefix and the root has to have exactly three moras, then there is no need for the prefix to lengthen in (39); the tri-moraic templatic requirement is satisfied simply by combining the relevant morphemes.

However, we have already seen examples suggesting that this cannot be quite right; in forms such as *ná-růst* 'an increase', seen in (37), prefixal length is not blocked by a length in the root. And in (37), there are also non-alternating prefixes which combine with roots that are too light, and the result has only two moras where a tri-moraic form would be available.

So the question is what to do with the nouns in (39), if the tri-moraic account is not to be held responsible. Our hypothesis is that despite the lack of an apparent theme marker, the ablaut nouns actually do have the relevant functional projections of little *v* and Asp. However, these projections are phonologically expressed (i) by the ablaut in the root and (ii) as a palatalization of the root-final consonant. If this turns out to be correct, the prefix actually behaves as expected: since there is Asp, it moves to its Spec and becomes short. No blocking of length is needed here.

In order to prove this, let us start from the observation that all the verbs which give rise to the problematic forms are the so-called secondary imprefectives. Functionally speaking, this is a verbal category whose goal is to express an ongoing or an iterative reading of a perfective verb. The table below lists the corresponding perfective verbs on which the secondary imperfectives are based. So for instance, *vy-nos-i-t* in the first line means 'to carry out', *vy-náš-e-t* means 'to be carrying out', *za-vř-í-t* means 'to close down', *za-vír-a-t* means 'to be closing down', and similarly for all the other verb pairs.

(40) Nominalizations from roots with ablaut

Ablaut nouns	Secondary imperfective	Perfective verb	Literal gloss
vy-náš-ka	vy-náš-e-t	vy-nos-i-t	carry out
vy-váž-ka	vy-váž-e-t	vy-voz-i-t	drive out
vy-cház-ka	vy-cház-e-t	vy-chod-i-t	walk out
za-vír-ka	za-vír-a-t	za-vř-í-t	close down
u-pín-ka	u-pín-a-t	u-pn-ou-t	pin to
vy-bír-ka	vy-bír-a-t	vy-br-a-t	take outt

Looking at the verbs, we may note that the process of forming the secondary imperfective involves three kinds of changes. First of all, the theme is often different (with the exception of *vy-bír-a-t* in the last row). Second of all, we often find consonant mutations of the root-final consonant, and finally, there are vowel mutations in the root (ablaut). Let us first look at the vowel change more closely.

In Czech, the verbal ablaut appears in three grades: zero grade (the vowel is missing), short grade (the vowel is short), and long grade (the vowel is long). What is important here is the fact that the distribution of the ablaut grades is not accidental, but follows a clear pattern: long ablaut grades always appear in secondary imperfectives. The perfective verbs appear in the other two grades.

One possible explanation for the distribution of the strong ablaut grade can be provided by Gribanova's (2015) account of analogous facts in Russian. First of all, she argues that secondary imperfectives in general are derived by a special head, the secondary imperfective Asp, which she places on top of the little *v* head, occupied by the theme marker. For us, the secondary imperfective Asp would sit slightly higher up, namely above the low aspect head where the prefix moves to (a decision based on the consideration of the scope relations). Gribanova further proposes that for the verbs that undergo vowel mutations, the secondary imperfective is expressed by a floating mora affix, which docks onto the root and triggers an action on the root's vowel, such that the vowel becomes one mora heavier. As far as we can see, this approach can be extended to cover our data in (40). The conclusion then is that ablaut is in fact a way of spelling out the secondary imperfective head (whether by a floating mora or by some other means).[22]

[22] There are some issues relating to the quality of the vowel: *o* alternates with *á*. This is not expected by a pure lengthening account. We are not sure how to solve this. Theoretically, one could say that there is root suppletion going on, with the root

So Scheer's observation that it is the length in the root *per se* what inhibits prefix length turns out to be a red herring; what is important is that the length is the spell-out of the secondary Asp, which attaches on top of a structure that is already big enough to yield prefix shortness. That also explains why we can get forms like *ná-růst* 'an increase': here the long vowel in the root does not mark imperfective aspect, since the verb *na-růst* 'to increase' is perfective.

An independent piece of evidence that the apparently problematic ablaut nouns have the relevant verbal functional structure for prefix shortness is provided by consonant mutations (palatalization). In order to see the pattern, consider in addition zero nouns corresponding to the perfective verbs. These are on the right preceding the gloss.

(41) Nominalizations from roots with ablaut

Ablaut nouns	Secondary imperfective	Perfective verb	Zero nouns	Literal gloss
vy-náš-ka	vy-náš-e-t	vy-no**s**-i-t	vý-no**s**	carry out
vy-váž-ka	vy-váž-e-t	vy-vo**z**-i-t	vý-vo**z**	drive out
vy-chá**z**-ka	vy-chá**z**-e-t	vy-cho**d**-i-t	vý-cho**d**	walk out

What we now see are two sets of verb-noun pairs. Apart from the ablaut grade, the verbs and the corresponding nouns share also the quality of the final consonant. In particular, the secondary imperfective pair has a palatalized root-final consonant. This can be seen in comparison with simple perfective verbs. What is the trigger of these palatalizations?

The first thing to note is that the *-k* suffix in the ablaut noun is an unlikely trigger for the palatalization. This can be shown by placing the same suffix on the short grade zero noun. The form is in the third column of the table below, and it shows no consonant mutation.

(42) Palatalizations in nominalizations

Secondary imperfective	**Ablaut noun**	Affixed zero noun	Gloss
vy-ná[ʃ]-e-t	**vy-ná[ʃ]-k-y**	vý-no[s]-k-y	out-carry
vy-vá[ʒ]-e-t	**vy-vá[ʒ]-k-y**	vý-vo[z]-k-y	out-drive
vy-chá[z]-e-t	**vy-chá[z]-k-y**	vý-cho[d]-k-y	out-walk

spelling out a full phrase containing both V and Asp. This would solve the vowel quality issue, but miss the fact that the vowel in the root is always long (the floating mora account captures this).

Thus, it appears that the palatalization in the ablaut nouns are simply a reflex of a common derivational origin with the secondary imperfective verb given in the first column.

Turning now to the secondary imperfective verb forms, we can note that these do have a palatalization trigger, namely the theme marker -*ě* (an orthographic rendering of *e* that triggers palatalization), which is known to have such effects independently. This seems relevant for an account of the palatalizations in ablaut nouns. Specifically, if we suppose that the palatalization in the verb indeed arises as a consequence of a contact between the root final consonant and the theme marker -*ě*, then to account for palatalization in the ablaut nouns, we are led to conclude that the theme marker actually *is* present in the underlying structure, and it gets deleted on the surface (for reasons we do not fully understand). But its underlying presence is forced by the observation that there is no other palatalization trigger available.

Considering now the ablaut grade in the root together with the palatalizations, it seems to us reasonable to think that these forms provide enough phonological evidence for the presence of verbal functional structure that is commonly expressed by theme markers; the only thing which is special about them is how they mark this structure phonologically.[23]

If these considerations are correct, then the shortness of the prefix is fully regular, and needs no special rule. As a consequence, the shortening account works well also for these cases, which, recall, served as the main motivation for Scheer's lengthening account.

8.4. Multiple prefixes

The last issue we want to discuss briefly are multiple prefixes. In (43), we can see two examples of multiply prefixed verbs, each representing a particular type, as we will see later.

(43) a. vy-na-léz-t
out-on-crawl-INF
'to invent'

b. vy-po-moc-t
out-on-be.able.to-INF
'to help out'

There is a large literature on multiple prefixes with two major analyses proposed. One option is that only the inner prefix originates inside the

[23] This conclusion is also supported by a difference in the morphology. Specifically, the ablaut nouns never correspond to zero nominalizations, and always take the -*k* suffix, a contrast that nicely stands out in comparison to the non-ablaut nouns seen in (42).

VP, while the outer prefix is base-generated higher up in the extended VP (above Asp) (Svenonius 2004b; Romanova 2006; Tatevosov 2006). If that is the case, we predict that in a zero nominalization (should one exist), the inner prefix will surface in its lexical shape, while the outer prefix will appear invariably with a short vowel. The verb in (43a) exhibits this pattern, yielding the zero nominalization in (44a). We found in total four items like this (*u-**zá**-věr* 'a closure', *při-**vý**-děl-ek* 'a bonus', *pro-**ná**-jem* 'a rental'), so while attested, these cases are very rare.[24]

(44) a. vy-**ná**-lez
out-on-crawl
'an invention'

b. **vý-po**-moc
out-on-be.able.to
'a (temporary) help'

The second possible analysis (proposed in Žaucer 2009) is that also the outer prefix originates inside the VP (at least in some cases). If correct, this leads to the prediction that both prefixes may stay inside the VP in the zero nominalization, and, as a consequence, they both appear in their lexical shape (with a long vowel in the case of the alternating prefixes). The example in (44b) is an instance of this scenario.[25] There are comparatively more examples of this type (we found about ten items).

In principle, a third type of pattern could exist, namely one where the inner prefix is shortened, and the outer prefix is long (e.g., a sequence like ***vý**-na-...* 'out on'). This logically possible type is unattested, and this is predicted by our theory. In order to accommodate such an example, the structure would have to be such that the inner prefix is outside of the minimal word (because it is shortened), but the outer prefix is inside the minimal word. For that to be the case, the outer prefix would have to be lower in the structure than the inner one. However, this is incompatible with the ordering, which tells us that the outer prefix must be higher than the inner one. Since no structure can be assigned to the third type, we correctly predict its non-existence.[26]

[24] The pattern of a short prefix followed by a long prefix is well documented with denominal verbs, though, cf. footnote 14.

[25] Admittedly, we only see the outer prefix with a long vowel, since the inner prefix is of the non-alternating type. There are no cases like this with two alternating prefixes.

[26] An additional interesting case are pairs such as the verb ***po-u**-káz-at* 'to point out' and the zero noun ***po-u**-kaz* 'a pointer/voucher'. Here the difference is not in length, but in the fact that in the infinitive, there is a glottal stop in between the first and second prefix (/poʔu/), but in the noun, the two adjacent vowels coalesce into a diphtong (/po͡u/). This too suggests that there is a stronger prosodic boundary between the prefixes in the verbal case (both are clitics) than in the nominal case

8.5. A summary of the arguments for a shortening analysis

This section has argued that a shortening analysis of the alternation is to be preferred over any lengthening alternative. First, we looked at non-alternating prefixes, and found that the shortening analysis needs no new stipulation to deal with them. All that is required is just a single rule (33) that applies blindly to all clitic prefixes, whether on the surface they are of the 'alternating' type or of the 'non-alternating' type. The appearance of two types is just a reflex of the fact that shortening applies vacuously to prefixes that are lexically short, affecting only those that are lexically long.

Second, the shortening analysis predicts that no prefix has a long vowel in the "free" state, which is indeed the case. For the lengthening alternative, this is an accident.

Third, we have discussed a surface counter-example to the correlation between the presence of theme markers and prefix quantity. Specifically, we looked at examples where the theme marker is missing, yet the prefix is short. Previously, this has been taken as evidence for a templatic lengthening of the prefix. However, upon scrutiny, it turns out that these problematic forms show evidence for the same projection(s) that are elsewhere spelled out as the thematic marker; here realized through ablaut and consonant mutations. With the underlying projections syntactically present, we in fact expect them to trigger prefix movement, and yield prefix shortening. If that is so, the problematic examples fail to provide unequivocal evidence in favor of the templatic account, and the shortening analysis remains unchanged.

9. Conclusion

In Czech, a subset of verbal prefixes alternates regularly between a long and a short form. We have presented here reasons to think that this alternation corresponds to two distinct attachment sites of the prefix. When it attaches to the root, it is long; when it attaches to a larger unit (the stem in traditional terminology), it is short. This account is supported by the behavior of prepositions, which also alternate between short (when they attach to a phrase) and long (when they are bound inside a word). Understanding the alternation in these terms also allows us to capture a parallel that exists between the Czech alternation and the Germanic free/bound

(both are affixes). The *u-* in the noun cannot lengthen because there are no long diphtongs in Czech.

alternation. Put simply, we propose that the two alternations correspond in fact to a single process, where the prepositional element (particle, prefix) moves from a VP internal position to a VP external position.

Such a unification is incompatible with the traditional understanding of the structure of the Czech/Slavic verb cluster, as depicted in (3). According to this traditional analysis, the prefix always adjoins to the verb root by head-movement, and it is supposed to occupy one and the same slot in all kinds of constructions. It seems difficult to extend this approach to account for the new facts, since it is not the case that a head (corresponding to the prefix) can move within another head (the complex head corresponding to the verb) so that it can attach to constituents of various sizes.

What the traditional analysis gets right, however, is the fact that all the components of the verb (the prefix, the root, the theme and the inflection) form a constituent to the exclusion of the object (recall 12). Our analysis is able to incorporate this insight by moving the object high up in the structure, high enough for all the pieces of the verb to form a constituent below the object's final landing site. (The subject moves even higher up.)

Starting from this structure, all the verbal pieces form a constituent to the exclusion of the arguments, and they may move across just the object (in SVO), or across both the object and the subject (in VSO interrogatives). Because of this, our account is able to capture any traditional insight (it has the same rough constituency), and at the same time provide the analytical space needed for the prefix alternations to fall in place.

The big picture conclusion that our specific account leads to is that traditional words are not units that necessarily correspond to a single head (Julien 2002). In our account, the verb rather corresponds to a collection of heads that form a constituent to the exclusion of the arguments, and its placement in the structure is the product of phrasal movement (Koopman & Szabolcsi 2000; Taraldsen 2000; Nilsen 2003). Adopting this perspective may further lead to new explanations for phenomena that cannot receive a natural account under the standard view depicted in (3), like the so-called infinitival lengthening.

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