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

Pavel Caha and Markéta Ziková

**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 particle and the verb; it is reflected in vowel length. Main evidence for the claim is drawn from a comparison to Norwegian, and from the way vowel length of adpositions is treated Czech internally. 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' (2004) account of prefixation in Slavic.

**Key words:** 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 refered 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.

(1) Norwegian

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| a. | ***Kast*** | *katta* | ***ut!*** | FREE | b. | ***ut-kast*** | BOUND |
| | throw | the cat | out | | | out-throw | |
| | 'Throw the cat out!' | | | | | 'a discard/a draft' | |

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 *na-* 'on' 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.

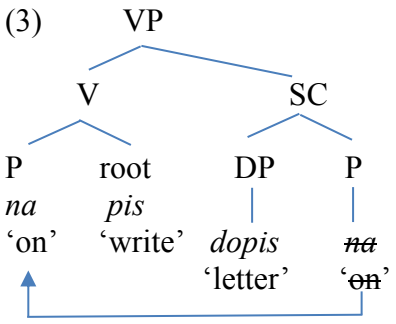
(2)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| a. | ***Vy-hod'*** | *tu kočku!* | | c. | ***vy** | tu kočku | **hod'** |
| | out-throw.imp | the letter | | | out | the cat | throw.imp |
| | 'Throw the cat out!' | | | | | | |
| b. | ***hod'** | tu kočku | **vy** | d. | ***hod'** | **vy** | tu kočku |
| | throw.imp | the cat | out | | throw.imp | out | the cat |

The widely accepted conclusion drawn from data such as (2) is that unlike in Germanic, the prefix

is always bound, and it always forms a single complex head with the root. 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 akin to English particles, but incorporate into the verb by head movement; Svenonius (2004), Ramchand (2004), Romanova (2006:chapter 2.4), Gehrke (2008:164), MacDonald (2008:99–100), Žaucer (2009:57), Gribanova (2015).[1] The popular 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 convenience, as a shorthand for whatever the exact structure of the predicative structure is. The rough constituency and the head movement of the prefix are the important bits.

(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 in this example. Short vowels are ortographically reflected as a plain vowel with no accent. In (4b), we see a zero nominalization based on the same verb (with no palatalization). The prefix is long here, and the ortography reflects this by placing an accute accent over the vowel.

(4)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| a. | ***Na-piš*** | *ten dopis!* | SHORT | b. | ***ná-pis*** | LONG |
| | on-write-imp | the letter | | | on-write | |
| | 'Write the letter up!' | | | | 'a sign' | |

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, what matters for the length in (4) is whether the first morpheme that follows the root is "verbal" (a palatal feature expressing the imperative in (4a)) or "nominal" (the zero nominalization affix in (4b)). These observations make the triggering condition very similar to the

[1] Svenonius (2004) 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 distinction between verbs and nouns. Why is there such a similarity? Why should vowel length in Czech be controlled by very much the same 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 the Czech prefix alternates between the two states in very much the same way as Norwegian particles do, and if Czech 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 reflects two distinct structural configurations. When the prefix is attached to the root (forms a constituent with the root), it is long. When it is prefixed to something bigger (to a phrase containing the root and other morphemes), it is short. When the prefix is attached to the root, we will say it is bound (like an affix). When it attaches to the whole word, it is free (like a clitic).

Our strongest 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, Svenonius 2003, Asbury et al. 2006, Biskup 2009, Gribanova 2009, a.o.). 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. An example is shown in (5b). Crucially, when the preposition is attached to the root, its vowel is long. (The pair in (5a,b) is like the English pair *under the ground* and *the underground.*)

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

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

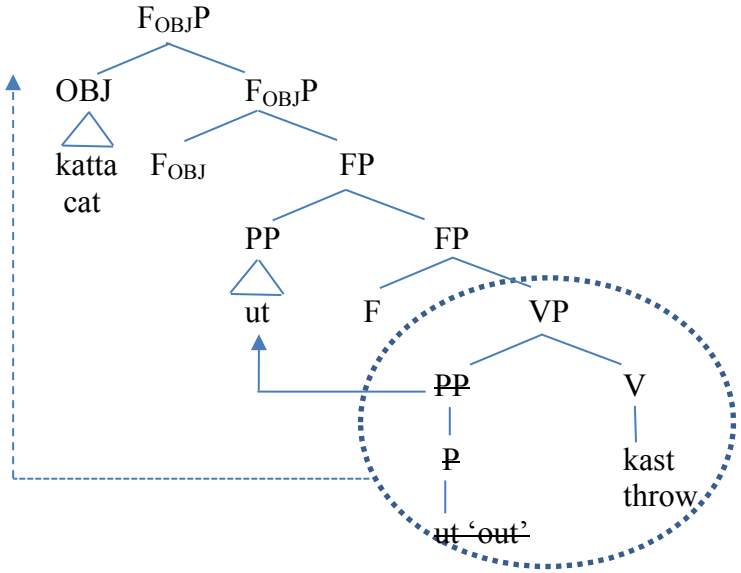
So, the data in (5) independently show that whether *na* 'on' attaches to the root (5b) or to a larger phrase (5a) correlates with its quantity. Taking this conclusion as correct, it follows that the structure in (3) cannot be right, because in (3), the prefix is always attached to the root. There is virtually no theoretical space in that diagram for the modelling of prefix alternations in terms of a variable attachment site of the prefix. Given the base structure in (3), head movement must always attach the prefix to the root, and cannot attach it to anything bigger.

To sum up, 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 cross-linguistically, the Czech alternation in length corresponds to a distinction in what is traditionally referred to as the free/bound status.

## 2. An account of particle alternations in Norwegian

One of our goals here will be to provide a unified analysis of the Czech length alternation with 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). The exact analysis of such sentences is subject to debate and controversy (see, e.g., den Dikken 1995, 2003, Ramchand and Svenonius 2002, Neeleman 2002, a.o.). 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 (6).

(6) Taraldsen (2000)




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 (cf. Nilsen 2003). Since in the base position, the particle is inside the VP, it follows that VP movement should always carry the particle along with the verb. The only way for the verb root and the particle to separate, is to extract the particle out of the VP to the Spec of a functional projection F. This movement is indicated by the full arrow. 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, 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 to be separated from it.

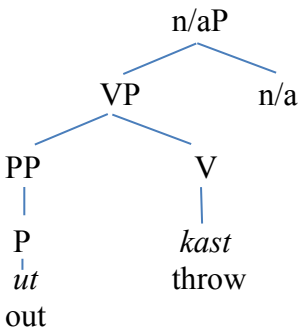
Note further that according to Taraldsen, all arguments of the verb must move to a position above the particle, yielding an intermediate structure like [ OBJ [$_{FP}$ PART [$_{VP}$ V ]]], where the object precedes both the particle and the verb. The V>O>Part order in (1a) is then achieved by moving the VP (containing just the verb) not only past the particle, but past the direct object as well. In (6), 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 PP *cat out*. (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. This generalization is important to us, since it holds for Slavic as well: since it is impossible to separate the particle from the verb (recall 2), it is also the case that the particle cannot precede the direct object unless the verb does. On Taraldsen's account, the generalization is derived 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, it may either move on its own, as in (6a), 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 *out throw the cat*, which is actually the Czech order) or on its right (after crossing it first), yielding the order *throw out the cat* (found in Norwegian as an alternative to (1a)). This way, the proposal derives the attested orders and excludes the unattested one.

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 (7).

(7)




The little nP which is found on top of the VP in (7) is meant to express the fact that the verb is nominalized, but we understand the nP label essentially 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 what follows, we will adapt Taraldsen's proposal for Czech. This will allow us to achieve two things. First, we will base-generate the prefix inside the VP, forming a constituent with the verb root – which is also the gist of the analysis in (3). At the same time, we will have the analytical space needed to accommodate the two distinct positions of the prefix (one in the base position, and the other in Spec,FP). Regarding the specifics of this proposal, two aspects of Taraldsen's analysis will be relevant, and we devote a subsection to each of these.

### 2.1 The nature of F

The first issue concerns the exact nature of the particle's landing site, i.e., F. If the picture in (6) and (7) is correct, then the nature of this projection can be inferred on the basis of looking at which forms have the particle incorporated, and which forms have the particle free. In the Scandinavian languages, there seems to be a clear basic pattern (with some variation), such that nouns and adjectives always have the particle incorporated, while verbs have the particle free.

To see the pattern on an example, consider the data in (8). What we have here is a pair of passive sentences, where (8a) is the so-called verbal or eventive passive, and (8b) is the so-called adjectival passive. In the verbal passive (8a), the verb precedes the particle. In the adjectival passive (8b), the particle precedes the verb. Under the analysis we have outlined in (6) and (7), this translates onto the statement that F is missing in adjectival passives, but it is present in verbal passives. Taking this at face value, and considering the fact that verbal and adjectival passives differ in terms of the presence/absence of the agent, we could propose that F in Norwegian is a projection that introduces the external argument into the structure.

(8) Norwegian (Svenonius 1995)

a. *Brødet ble* ***skjært opp*** *av Jens.*
the.bread became sliced up by Jens
'The bread was sliced by Jens.'

b. *Brødet var ferdig* ***oppskjært*** *(*av Jens).*
the.bread was ready up.sliced by Jens
'The bread was already sliced.'

However, things are not that simple. While the basic division between adjectives/nouns on the one hand and the verbs on the other hand is on the right track, it is rather crude. As observed in Svenonius (1995/1996), there is a degree of variation among the Scandinavian languages. The variation revolves around the question whether eventive passives such as (8a) pattern with adjectives or verbs. So while the Norwegian eventive passive in (8a) has the particle free, in Swedish, the particle is glued to the left of the verb in eventive passives:

(9) Swedish (Svenonius 1995)

| | | | | | |
|---|---|---|---|---|---|
| *Skräpet* | *måste* | *bli* | *utkastat* | / | **kastat ut*. |
| scrap.the | had.to | become | out.thrown | | thrown out |

'The scrap had to be thrown out.'

To us, this fact translates onto the proposal that the landing site of the particle may actually slightly vary from language to langage (in Swedish, F is higher than in Norwegian). However, the fact that the division between the free/bound forms always roughly tracks the division between verbs and the rest, suggests that F will always be a functional head that has a characteristic prototypically assosiated to verbs, such as agentivity, aspect, and the like. However, the fact that there is variation in details suggests that the particle may land at slightly different places in different languages.

From this perspective, the contrast in (4) suggests that the Czech alternation falls within the confines of the variation space, where prototypically verbal forms have free (i.e., short) prefixes (4a), while the prototypically nominal forms have long (i.e., bound) prefixes (4b). However, what the exact nature of F is, will have to be seen by inspecting more data, and we turn to this in Sections 3 to 5.

## 2.2 The interaction between particle movement and verb movement

Another aspect of Taraldsen's proposal which is important is that the account of particle/verb placement has two independent ingredients: particle movement and verb movement. Their interaction yields the observed surface patterns in Norwegian (particle extracts, and only then can the verb move across it). However, depending on how verb movement works in a particular language, particle movement (the underlying cause of the distinction between an incorporated and a free particle) may have different effects across various languages.

For instance, Taraldsen observes that in embedded clauses, Dutch has optional particle movement, and no verb movement (Dutch embedded clauses are verb final). That means that when the particle moves to FP (10b), the only effect is that the particle becomes separated from the main verb *bellen* by *wil.* However, since the main verb does not move at all, it will never cross the raised particle. The free/bound state alternation (understood as particle movement to FP) thus only yields a separability distinction in Dutch, but not a difference in the order between the verb and the particle. (The examples in (10) as well as the analysis are taken over from Taraldsen's work. Note that the direct object is still to the left of the particle, i.e., higher up than the particle as expected per (6a).)

(10) Dutch embedded clauses have an optional particle movement and no V movement

| | | | | | | |
|---|---|---|---|---|---|---|
| a. | *dat* | *Jan* | *Marie* | *wil* | ***op****bellen* | |
| | that | Jan | Marie | will | up-call | |
| b. | *dat* | *Jan* | *Marie* | ***op*** | *wil* | *bellen* |
| | that | Jan | Marie | up | will | call |

## 2.3 A proposal for Czech

With the background in place, let us provide an analysis of how particle alternations arise in Czech. The goal is to capture the insight of the standard analysis in (3), as well as the two new observations we want to explain. What the traditional analysis in (3) gets right 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 (11). The particle is carried across the subject automatically and cannot be stranded.

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

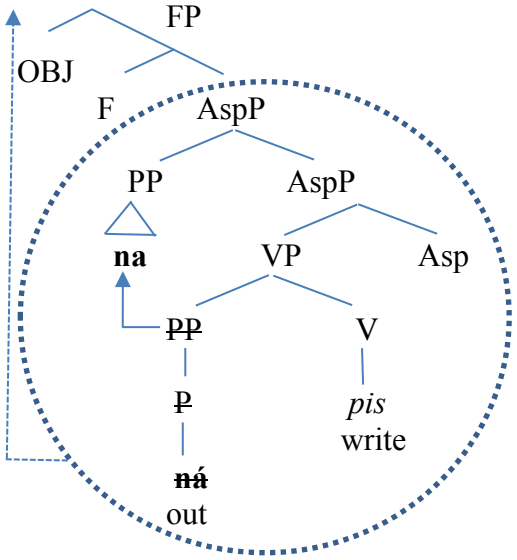
b. *Na-psal* *Petr* *dopis?*
on-hit Petr letter
'Did Peter write the letter?'

At the same time, 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 following noun). Therefore, the only way for sentencessuch as (11b) to be derived is by moving a phrase that contains the verb and the prefix, but not the object. As we have already noted, such a constituent is readily available in (6), where the object occupies a position above the verb and the prefix. Our goal will thus be to fine tune the parameters of the account in (6) so that it provides for the language specific properties of Czech.

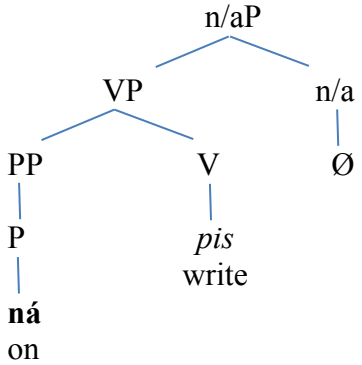
The first language specific property of Czech which we are going to argue for is that the prefix moves to an aspectual projection, labeled Asp (following Svenonius 2004). This is shown inside the encircled constituent in (12a). The prefix surfaces with a short vowel in the displaced position for reasons that we turn to later in section 6. For now, the change of the vocalic length reflects the simple description based on (5), such that when *na* attaches to a phrase, it is short. When it attaches to the root, it surfaces with a long vowel.

(12)

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 rougly (though not quite) similar to telicity, and in Slavic languages it is connected to a set of particular grammatical effects. According to the proposal in (12a), 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 Sections 4 and 5. For the start, we point out that aspect is something that is prototypically associated to verbs (rather than nouns or adjectives), and so attributing the triggering of the free form to Asp is one of the options that fulfill the basic requirement of having a contrast between verbs on the one hand, and adjectives/nouns on the other.

The second ingredient of the proposal concerns the nature of verb movement. In principle, if verb movement in Czech was VP movement like in Norwegian, then the verb would detach from the prefix and move across the object, yielding (2b). However, (2b) is ungrammatical. The reason for this (we propose) is that in Czech, verb movement is not VP-movement, but necessarily pied-pipes the whole AspP or maybe even a larger structure, though this structure never contains the object. 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 that this analysis is analogous to the analysis of preposition noun constructions. The preposition and the noun occupy two separate heads, but the noun never moves across that preposition (P-stranding is banned in Czech). When the noun moves, it pied-pipes the preposition along (just like the verb always pied-pipes the prefix).

Finally, as mentioned before, the object extracts to a position that is even higher than AspP, yielding the intermediate structure [ OBJ [ PREF [ V ] ] ]. We think of this movement as the traditional A-movement to a position that is similar to the AgrO of the previous era. After this, the [ PREF [ V ] ] constituent moves across the object as a phrase.[2] In simple declarative sentences, this constituent lands in a position below the subject, as in (11a). In (11b), the very same constituent also moves across the subject. In effect, we attribute to sentences exactly the same rough constituent structure that is assumed by approaches based on (3). Namely, the rough constituency 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

[2] Bošković (1997), Migdalski (2006) independently propose that participle movement in Slavic is phrasal movement (and objects thus have to extract outside of its projection, just like here). Wiland (2013) proposes that verb movement across the subject in OVS structures is a phrasal TP movement.

fact that the particle alternates between two attachment sites. This is impossible if the prefix always adjoins to the root as in (3).

Another thing we mention is that the movement of the prefix to Spec,AspP does not lead to any re-ordering (something we could see in Dutch, recall (10b)). This is not because the movement would not cross any overt heads. We later argue that there are in fact overt heads that prefix movement crosses, but they are ordered to the right of V (like the Asp head itself). Therefore, even though there are structural effects of the movement, no linear effect is observed.

As an anonymous reviewer points out, there is actually one morpheme which is prefixal on the verb, and that is 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.[3]

In sum, the proposal says that the prefix alternates between two attachment sites: it is either attached to the root, or to a larger phrase (to the stem in the traditional terminology). The specific way in which the alternation proceeds is by movement: the prefix first attaches to the root, and only later (if the right conditions are fulfilled) it leaves its base-generation site. Encoding the alternation this way allows us to account for the vowel length distinction and 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 also proposed in Taraldsen's work.

## 3. The systematic nature of the short/long alternation

This section is devoted to presenting the basic facts that are essential for our analysis. 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.

### 3.1 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 6. We list the alternating prefixes in table (13).

[3] The so-called super-lexical prefixes (Svenonius 2004) are also higher up in the structure than Asp, but lower than the object. We come back to super-lexical prefixes briefly in Section 6.4.

(13) *The alternating prefixes*

| short V | long VV | meaning |
|---|---|---|
| *na-* | *ná-* | on |
| *za-* | *zá-* | back/behind |
| *při-* | *pří-* | at-/to- |
| *pro-* | *prů-* | through |
| *u-* | *ú-* | away |
| *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 ortography by an accent over the vowel, i.e., *á* is a long *a*. There is one exception, the prefix *pro-* alternates with *prú-* (with long *u*), orthographically *prů-*. The change of the quality 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. In theory, we understand the facts as indicating 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?

### 3.2 Alternation in prefix length is a morphologically governed process

As a first approximation, we may say that the short prefix surfaces with verbs, and the long prefix with zero-derived nouns. Sometimes, the prefix length is actually the only thing which signals the distinction between a nominal and a verbal interpretation. Table (14) 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 safe for the length of the prefix which distinguishes the verbal environment from the nominal environment.[4]

(14) *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 |

[4] The ending of the imperative is a marker that usually triggers palatalization of the preceding consonant (see, e.g., (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 indicate 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 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 a root is 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 the table (15) shows. The form with the short prefix only has the verbal reading, and the form with the long prefix only has the nominal reading.

(15) *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.

As highlighted above, the observed regularity can be captured if vowel length in the prefix cares about its attachment site in the structure; when the prefix is a sister to the root, it is long. When its sister is a larger phrase, it is short. We now turn to the question of how these two distinct attachment sites correlate with the interpretation of the forms in question.

## 4. Prefix length and aspectual distinctions in verbs

Svenonius (2004) proposed 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' idea of movement triggered perfectivity with our proposal

concerning vowel length, we arrive at a prediction. The prediction is given in (16).

(16) *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 focussed specifically on the proper semantic treatment of perfectivity in Slavic (Borik 2002, Ramchand 2004, Romanova 2006, a.o.), and we refer the interested reader to this literaure. What is important to us from the literature are the tests used to distinguish the two notions. 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-s 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-s letter) means 'he will write a letter'. This shows that *na-píš* 'on-write' is perfective.

This test is good 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 2002:20, 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.

In (17), we show how the phase verb test works with infinitives, and we turn to nouns later on. When the infinitive has no prefix, as in (17a), the sentence is fine. This shows that *psát* 'write' is imperfective, which is the same result as per the present tense test. (17b) is ungrammatical, which means that *na-psat* 'on-write' is perfective, again the same result as per the present tense test.

(17) a. *Petr začal psát dopis.*
Petr started write.inf letter.
'Petr started writing a letter.'

b. **Petr začal na-psat dopis.*
Petr started on-write.inf letter.
intended 'Petr started writing up a letter.'

We now turn to minimal pairs of verbs that differ in the length of the prefix. As a background, we start by noting the existence of a special 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 (18). Such examples usually correlate with a non-compositional nature of such combinations.

(18) *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 two of their properties. Since the prefix cannot move out of the VP, it should be a long prefix, and this should correlate with an imperfective interpretation of the verb. It turns out that there is a couple of verbs with long prefixes in Czech; we give an example below in (19):

(19) *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 (19) has exactly the two characteristics that our proposal predicts. The length of the prefix is obvious from the ortography; the imperfective nature of the verb is revealed through the present tense interpretation. It is unusual for verbal prefixes to be long, and it is also unusual for prefixes not to trigger perfectivity. The fact that these two exceptional properties correlate is predicted by the proposal.[5]

It is possible to find minimal pairs that differ only in the length of the prefix. We start from the unprefixed verb *ležet* 'lie', which is imperfective. When prefixed by the prefix *za-* with a short vowel, the verb turns perfective: *za-ležet (se)*, lit. over-lie (oneself), means 'become seasoned/aged' (applies to cheese etc.). When a long prefix *zá-* is added to the verb, we get *zá-ležet*, which means 'to depend'. This latter verb is imperfective.

Note 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: we know that when verbs are nominalized, their prefix becomes long. For instance, from *za-lož-i(-t)* 'to put aside' we get *zá-loh-Ø(-a)* 'a back up'. Then we can take this noun, and make a verb from it again; [[[*zá-loh*$_{VP}$]-*Ø*$_{nP}$]-*ova*$_{vP}$] 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.[6]

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 such as the following: [[[*zá-lež*$_{VP}$]-*Ø*$_{nP}$]-*e*$_{AspP}$] and [[[*ná-lež*$_{VP}$]-*Ø*$_{nP}$]-*e*$_{AspP}$]. 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

[5] 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 found eight verbs prefixed with long prefixes, and they are all imperfective.

[6] 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'.

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' observations, we have proposed that when prefixes move out of the VP (where they surface with a short vowel), they turn the verb perfective. As a consequence, we now expect (per (16)) that verbs prefixed by long prefixes are exceptionally imperfective. This turns out to be the case in two sets of examples.

First, in (19), 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.

## 5. Prefix length and aspectual distinctions in nouns and adjectives

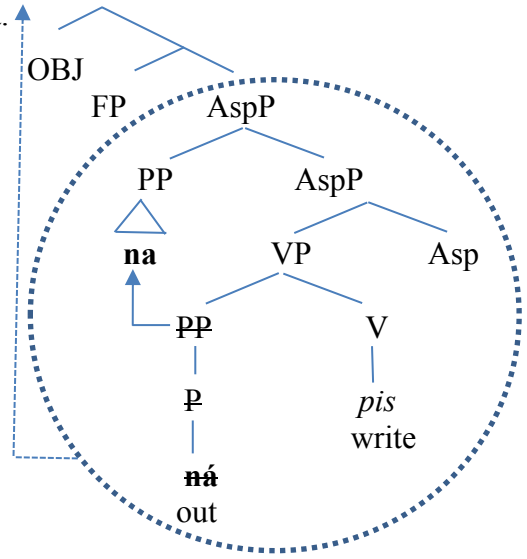
We now continue exploring the connection between vowel length and aspect. The new thing is that we move over to nouns, and we show that in this domain prefix length correlates with perfectivity as well. Before we do this, however, an excursus on the so-called theme markers is in order.

### 5.1 Structure in between V and Asp

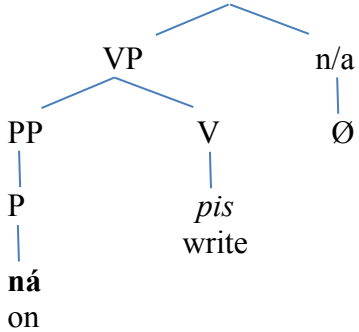
Let us first come back to the tree (12), repeated below, where we highlight the basic mechanics of the long/short alternation. In order to make things simple, we have not included any functional structure or morphology between V and Asp. This is an oversimplification which we now address.

(12)

a.




b. Asp is absent in zero derived nouns




Specifically, the verb in Czech (and Slavic in general) has several suffixal slots in the position

following the root. The one closest to the root is a marker that the traditional morphology calls a stem marker (or a theme marker). This marker is a very important predictor of prefixal length in nouns, and so we introduce some facts concerning its properties, distribution and the assumed analysis. We start by giving a couple of verbs in (20) in order to show what the theme marker looks like.

(20)

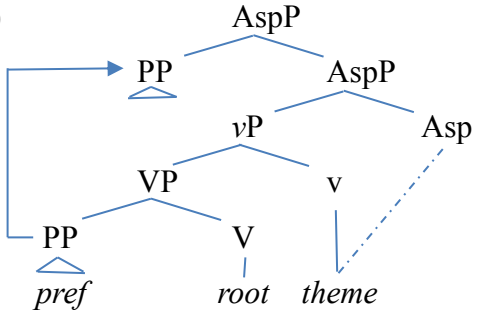
| kick (imperf.) | kick once (perf.) | carry (directed, imp.) | carry (non-directed, imp.) |
|---|---|---|---|
| *kop-**a**-t* | *kop-**nou**-t* | *nés-**ø**-t* | *nos-**i**-t* |

There are four verbs here in the infinitive (marked by *-t*). This *-t* is preceded by a boldfaced morpheme (potentialy 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, signalling the difference between 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 signalled 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 be(come) red'.

Given these facts, we follow Svenonius (2004b) 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 lower part of the structure now looks as in (21), ignoring the dashed line for the moment. The new thing is the inclusion of the little *v*, and the proposal that the theme marker spells out this head.

(21)




Let us now turn to the fact, illustrated in (20), that the thematic markers also contribute to the aspectual properties of the verb form. We interpret this as evidence for the claim that the thematic

vowel in fact "spans" several projections, using a terminology introduced by Williams (2003), and developed later in the Nanosyntax framework (Abels and Muriungi 2008, Taraldsen 2010, a.o., building on the ideas published in Starke 2009). We indicate this by the dashed line in (21).[7]

For the following discussion, an important point is that if (21) 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). We provide some independent evidence for this in Section 7.

An important consequence of this analysis is spelled out in (22).

(22) All forms with a short prefix must 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.

This consequence of (21) is correct (and serves in fact as the main motivation for the structure (21)). A version of this statement goes back to Scheer's original (2001) description, who observed that the nature of the first morpheme after the root (verbal or nominal) determines vowel length. Since the theme marker is the first morpheme after the root in verbal forms, (22) essentially restates Scheer's original description.[8]

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* seen in (20)). Specifically, we will adopt here the view that in the zero theme marker 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 zero morpheme, or, adopting the spanning approach, these 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 our statement in (22) is concerned, we note that the presence/absence of the relevant projections 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 posess a zero marker, and should behave as if they had one.

### 5.2 Two types of nominalizations

The statement (22) 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. Zero

[7] In this discussion, we ignore the so-called secondary imperfectives. We come back to them later on in Section 5.3.
[8] There are some apparently problematic cases (noted already by Scheer) which we discuss in Section 6.3.

nominalizations, as we have already seen, have no theme, and their prefix is long. A different type of nominalizations (we call them verbal nouns), corresponding closely to English *ing*-nominalizations, has the theme marker. As we can see in table (23), their prefix is short. Hence, we observe the expected type of correlation: the shortness of the prefix correlates with the presence of the theme.[9]

(23) *Verbal nouns have a short prefix*

| zero nominalizations | gloss | infinitive V | **Verbal nouns** | gloss |
|---|---|---|---|---|
| *vý-kop* | a ditch | *vy-kop-a-t* | ***vy*-kop-*á*-ní** | dig out |
| *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** | ex-change |

The two types of nominalizations differ not only in their form, but also in their interpretation. Procházková (2006:23) has concluded that in general, verbal nouns ending in *-ní* 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; it means 'a ditch' and it is a result noun. On the other hand, the corresponding verbal noun ***vy*-kop-*á*-ní** meaning 'the digging out' would naturally combine with a theme argument and obtain 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 intepretation 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 (24a).

(24) 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'

This example is very close in meaning to (24b), 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

[9] 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.

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 in (24) contrast sharply, and that is how they behave with phase verbs. This is shown in (25). What we see here is that the noun with the long prefix and without the thematic vowel is fine under a phase verb, see (25a). The example feels absolutely natural in a context where the exchange of tires started but not necessarily finished. This suggests that the nominalization corresponds to an imperfective event, despite the fact that it has a prefix.

(25) a. *Začal s vý-měn-ou pneumatik.*
started with ex-change-ins tires-gen
'He started with 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.*
strated ex-change-th-inf tires.acc
'He started changing the tires.'

This contrasts with (25b). The nominalization with the short prefix sounds rather strange, and behaves in this respect as its corresponding perfective verb, which we give in (25c). To the extent that (25b) can be interpreted at all, it means ‚He started by changing the tires,' where the perfective event of changing the tires is performed til the end, and it is but one in the series of events that need to be executed.

The example (26) shows that this effect is not due to the fact that verbal nouns are excluded in this construction. As long as we use a verbal noun (26a) that is derived from an imperfective verb (26b), the construction is fine.

(26) a. *Začal s vy-měň-ová-ním pneumatik.*
started with ex-change-SI-noun.ins tires.gen
'He started with changing the tires.'

b. *Začal vy-měň-ova-t pneumatiky.*
strated ex-change-SI-inf tires.acc
'He started changing the tires.'

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 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.

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 test as perfective. When they have a long prefix, they (i) have no theme marker, and (ii) when eventive, they test as imperfective. These findings support the approach highlighted in (21).

### 5.3 Adjectives and participles

Similar examples (with and without theme markers) can be provided also for adjectives. What we find here is again the fact that if the adjective has a short prefix, it always has a theme marker.

However, there is a complication connected to the expected perfective/imperfective meaning distinction, and we deal with this first. The complication is that in Czech, it is possible to derive an imperfective predicate from a perfective one by adding morphemes. An example is shown in (27).

| | | | | | | |
|---|---|---|---|---|---|---|
| (27) | a. | *děl-a-t* | b. | *vy*-[*děl-a*]-*t* | c. | [*vy-děl-á*]-*va-t* |
| | | do-th-inf | | out-do-th-inf | | out-do-th-SI-inf |
| | | ‘to make’ | | ‘to earn’ | | ‘to be earning’ |

What we have here is an imperfective verb in (27a) which means ‘to make’. This verb is prefixed in (27b) yielding a verb meaning ‘to earn’. The prefix in (27b) – we assume – has moved away from the root and it is attached to the bracketed stem. That is why it is short and the verb is perfective.

Now out of this perfective verb, the so-called secondary imperfective (SI) can be formed, see (27c). The secondary imperfective is derived by an additional marker affixed to the perfective base (which is in brackets). The theme marker *-a* is lengthened, which regularly happens before *-va.* We think it is reasonable to say that the secondary imperfective morpheme attaches on top of the bracketed material, and that by attaching on top of the perfective base, it turns the verb imperfective (see, e.g., Gribanova and Harizanov (2015) for a recent approach along these lines). What is relevant for us is that even though the whole verb form in (27c) is imperfective, the prefix is short. This is because *-va* has attached on top of the whole structure (21), and it has so to speak „undone“ the perfectivizing effect of movement to Spec,Asp. The undoing consists in creating an ongoing reading of a telic predicate.

The general conclusion bears on our prediction (16), which says that short prefixes trigger perfectivity. The new thing is that the scope of that generalization is restricted to cases where the perfective meaning is not over-ridden by further affixes that attach on top of the whole structure (21).

The question is where – except for secondary imperfectives – such over-riding takes place. We think that there is one more instance of this phenomenon in Czech, namely the formation of stative (adjectival) passive paricipples (Kratzer 2000). These participles – as the name suggests – denote a state resulting from an event (as in *a* ***decorated*** *house*). In Kratzer’s theory, they are derived by attaching a stativizer on top of an eventive predicate; morphologically, the stativizer

corresponds to the participial morpheme. The crucial fact is that stative predicates are always imperfective, even if the state is a result of a 'perfective event'. As a consequence, we expect that we may get imperfective participles (denoting a state) with a short prefix (the event leading to that state is perfective).

Thus, when looking at adjectival formations (stative participles), we will not test them for perfectivity, since this is pointless for reasons we just reviewed (they are imperfective). Rather, what can be observed is that adjectives without thematic markers are not eventive at all, whereas participles with thematic markers show a degree of eventivity not matched by the theme-less forms.

To give a couple of examples, let us turn to table (28). In the table, we show that the stative adjectival suffix *-n* can either attach to the root (in the first column), or it can follow the thematic marker (in the third column). The forms where *-n* attaches after the thematic vowel correspond to passive participles. The *-ý* following *-n* is concord. The presence/absence of the theme marker correlates perfectly with the short/long prefix distinction.

(28) *Participles have a short prefix, adjectives have a long prefix*

| adj VV | infinitive V | **passive participle** | literal gloss |
|---|---|---|---|
| *ú-seč-ný* | *u-sek-a-t* | ***u*-sek-*a*-ný** | *cut away* |
| *ú-plat-ný* | *u-plat-i-t* | ***u*-plac-*e*-ný** | *pay on the side* |
| *vý-klop-ný* | *vy-klop-i-t* | ***vy*-klop-*e*-ný** | *tilt out* |
| *pří-tul-ný* | *při-tul-i-t* | ***při*-tul-*e*-ný** | *snuggle with/to* |

The presence vs. absence of the thematic vowel also correlates with the presence or absence of argument structure. All the theme-less forms seem to lack argument structure alltogether, as far as we are aware. For instance, the verb *u-plat-i-t*, seen in the first line of the table, glossed literally *pay on the side*, 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 corelation between prefix shortness and perfectivity is weakend. 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 is accessible for modification. Further, prefix shortness correlates with the presence of the theme marker, as predicted per (21).

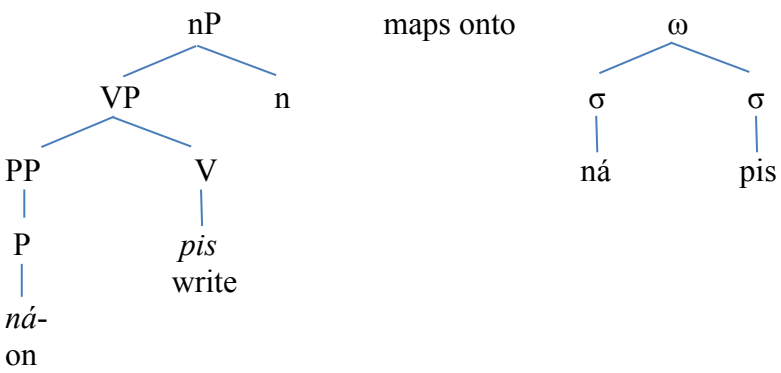
## 6. A shortening account of the alternation

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. How should we characterize it? There are two possible avenues of analysis to consider. The first one is that prefixes are lexically long, and shorten when they move to Spec,Asp. The other option is that they are lexically short, and lengthen when they stay *in situ*.

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 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.

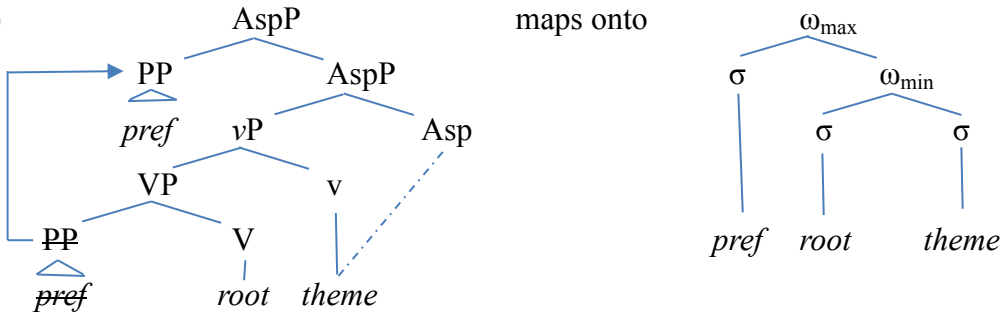
This section argues against any lengthening account of the alternation, and proposes a shortening analysis instead. More specifically, we claim that the two distinct attachment sites of the prefix correspond to two distinct prosodic structures. When the prefix stays inside the VP, the prefix and the root are mapped onto a single prosodic word in the phonological component, see (31). When it is 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 out of that constituent (crossing the theme on its way), it gets outside of the prosodic word and becomes a clitic, see (32).[10]

(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).[11]

(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.

| | | | | | | |
|---|---|---|---|---|---|---|
| (34) | a. | ***na*** | *břeh-u* | b. | ***ná***-*břež-í* |
| | | on | bank-loc | | on-bank-PLACE |
| | | 'on the bank' | | | 'a river side' (lit. the (PLACE) on a 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 (34a), it is adjoined to the prosodic word corresponding to that KP; see the

[10] We were told that in Serbian, a similar alternation exists as in Czech. The difference is that the alternation between an affix and a clitic is revealed through stress placement. 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 verbal environment, the prefix is outside of the domain where stress is assigned.

[11] In a previous version of the paper, we have phrased the restriction on prosodic shape as specifically targeting only clitics of the syntactic category P. That was mainly because adpositional markers are the domain 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* 'us, 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).

structure in (35a), 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 (34b) is as in (35b); 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.

(35) 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.

### 6.1 Non-alternating prefixes

Let us first come back to our original data set from table (13), repeated in (36) 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.

(36) *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 (36).

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 (36). 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 (36).

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 becomes a clitic.

Note as well that the same reasoning carries over to prepositions. So just like we have alternating prepositons (corresponding to alternating prefixes), we have non-alternating prepositions (corresponding to non-alternating prefixes). An example of a 'non-alternating' preposition is given in (37). 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 (37b).

(37) 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, the table (38) 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 (see Caha and Scheer 2008 for an explanation); some of the relevant forms are in the first column. In nominalizations, 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.

(38) *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* |

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 nominaliza-tion. These occupy the three rows at the bottom. The non-alternating prefixes are insert-

ed 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. The only change that happens is that the long prefixes have to shorten by (33) when they move to Spec,AspP. This is the case out, as the first column shows.

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.[12]

### 6.2 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 (39), we list all the verbal prefixes in Czech. Brackets around segments indicate that the segment alternates with zero.

(39) 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*

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

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 (safe 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.[13] 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.

[12] 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.

[13] 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'.

The shortening analysis encounters no surprises. It proposes that the true lexical shape of the particle 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.[14]

### 6.3 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 the table (40); we call them '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.

(40) *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 |

Scheer (2001), who first observed the generalization relating theme markers and the quantity of the prefix, also noted the exceptional nature 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 this long vowel 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 (40); the tri-moraic templatic requirement is satisfied simply by combinig 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 (38), prefixal length is not blocked by a length in the root. And

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

in (38), 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 the table (40), 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 by (i) 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 show 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.

(41) *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 out |

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 (41).[15]

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). 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 (palatalizations). In order to see the pattern, consider in addition zero nouns corresponding to the perfective verbs. These are on the right preceding the gloss.

(42) *Nominalizations from roots with ablaut*

| ablaut nouns | secondary | perfective | zero | *literal gloss* |
|---|---|---|---|---|
| nouns | imperfective | verb | nouns | |
| *vy-náš-ka* | *vy-náš-e-t* | *vy-nos-i-t* | *vý-nos* | carry out |
| *vy-váž-ka* | *vy-váž-e-t* | *vy-voz-i-t* | *vý-voz* | drive out |
| *vy-cház-ka* | *vy-cház-e-t* | *vy-chod-i-t* | *vý-chod* | 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?

[15] There are some issues relating to the quality of the vowel: *o* alternates with *á*. This is not expected by a pure lengthening acount. We are not sure how to solve this. Theoretically, one could say that there is root suppletion going on, with the root spelling out a full phrase containing both V and F. 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).

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

(43) *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 |

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 orhographic 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 platalizations, 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.[16]

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.

### 6.4 Multiple prefixes

The last issue we want to discuss briefly are multiple prefixes. In (44), we can see two examples of multiply prefixed verbs, each representing a particular type, as we will see later.

[16] 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 table (42).

(44) a. *vy-na-léz-t* b. *vy-po-moc-t*
out-on-crawl-inf out-on-be.able.to-inf
'to invent' '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 VP, while the outer prefix is base-generated higher up in the extended VP (Svenonius 2004, Romanova 2006, Tatevosov 2008). 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 (44a) exhibits this pattern, yielding the zero nominalization in (45a). 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 these cases are very rare.[17]

(45) a. *vy-**ná**-lez* b. ***vý-po**-moc*
out-on-crawl out-on-be.able.to
'an invention' '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 (45b) is an instance of this scenario.[18] There are comparatively more examples of this type (we found ten).

In principle, a third type of pattern could exist, namely one where the inner prefix is short(ened), and the outer prefix is long (e.g., a sequence like ***vý**-na-*...). This logically possible type is unattested, and this is predicted by our theory. In order to accommodate the length, 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. However, for that to be the case, the outer prefix would have to be lower in the structure than the inner one, which is incompatible with the ordering.[19]

### 6.4 A summary of the arguments for a shortening analysis

This section has argued that a shortening anlysis 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 (34) that

[17] The pattern of a short prefix followed by a long prefix is well documented with denominal verbs, though, cf. ftn. 5.
[18] 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.
[19] An additional interesting case are pairs such as ***po-u**-káz-at* 'to point out' and ***po-u**-kaz* 'a 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 (/pou̯/). 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 (both are affixes). The prefix *u-* in the noun cannot lengthen because there are no long diphtongs in Czech.

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.

## 7. Independent evidence for the high attachment site of the prefix

In this section, we turn to some independent evidence from Czech against the structure in (3) and in favor of the structure where the prefix is attached *above* the theme marker. The evidence comes from the way prefixes interact with a lengthening process attested in infinitives.

Consider first the relevant background concerning the process we will call 'infinitival lengthening.' The pattern we are about to discuss has been first noted in Scheer (2001) and studied in detail in Caha and Scheer (2007/2008) and Ziková (2016), where we refer the reader for an exhaustive list of forms. The basic fact is that in the infinitive, the vocalic stem markers *-a, -i* and *-ě* sometimes lengthen yielding *-á, -í* and *-í* respectively. The process can be observed in the first two lines of the table in (46). The past tense forms in the second line have a short stem vowel, which lengthens in the infinitive.[20]

(46) *Infinitival lengthening of the theme with light roots*

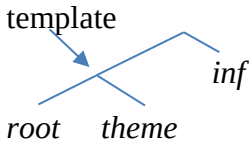
| | *a*-stem | *i*-stem | *ě*-stem |
|---|---|---|---|
| light root, infinitive | *d-**á**-t* 'give' | *sn-**í**-t* 'dream' | *tř-**í**-t* 'rub' |
| light root, past | *d-**a**-l* | *sn-**i**-l* | *tř-**e**-l* |
| heavy root, infinitive | *děl-**a**-t* 'make' | *vol-**i**-t* 'vote' | *hoř-**e**-t* 'burn'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

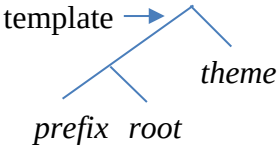
[20] *Třít* 'to rub' is classified as an *ě*-stem, because of the form found in the past tense. The raising of mid vowels under lengthening is a general process in Czech.

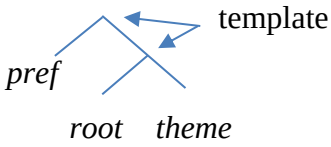
However, infinitival lengthening does not always apply, as shown in the third and fourth line of the table. The question is what determines when the stem marker lengthens and when it does not. The answer is that this depends on the phonological properties of the root. If the root is 'light' (has no vowel), the theme marker lengthens. If the root has a vowel, the theme marker remains short.

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

The idea on which we are going to build our argument 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, Inkelas and Sibanda (2008), we will assume that morphological units relevant to phonological computation correspond to constituents in the morpho-syntactic 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 (47a).

(47) a. 

b. 

c. 


It then becomes relevant to ask what happens when the prefix is added into the structure. According to the traditional view based on (3), the prefix and the root form a tight-knit constituent, because the prefix incorporates into the root. The thematic vowel attaches only later on (at little *v*), so the prediction is that the structure of the verbal complex is shown as in (47b) (see, e.g., Svenonius 2004, Gribanova 2015). 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 the table (48), 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.

(48) *Infinitival lengthening: the contribution of the prefix*

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

The alternative structure which we posit can accommodate this fact as well. According to the proposal (12), the rough constituent structure of the infinitive is as given in (47c). 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 constitunt that includes all three pieces.

The difference between the proposals (47b) and (47c) shows when we look at the behavior of *i*-stems and *e*-stems. What we see here is that in these classes, the prefix does not contribute to the overall weight of the form. So in the second and third column, the theme marker lengthens even when a moraic prefix is present (*vy-[sn-**í**]-t* ‘dream out’, *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 (47c); it corresponds to the lower node pointed at by the arrow. However, there is no such node available in the traditional structure (47b). In simple language, the analysis based on (3)/(47b) 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, we once again reach the conclusion that in the infinitive (where the prefix is short), the prefix is not prefixed to the root, but to the whole stem, because the stem without the prefix is the target of infinitival lengthening in the *i*- and *e*-class.

## 8. 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 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 11). 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 and Szabolcsi 2000, Taraldsen 2000, Nilsen 2003). This perspective may 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).

## 8. References


Abels, Klaus & Muriungi, Peter Kinyua (2008): The focus marker in Kiitharaka: Syntax and semantics. *Lingua* 118, 687–731.

Abels, Klaus & Ad Neeleman (2012): Linear Asymmetries and the LCA. *Syntax* 15, 25–74.

Asbury, Anna, Berit Gehrke & Veronika Hegedüs (2007): One size fits all: Prefixes, particles, adpositions and cases as members of the category P. In Cem Keskin (ed.): *UiL OTS Yearbook 2006*. Utrecht, 1–17.

Babko-Malaya, Olga (1999): *Zero Morphology: a Study of Aspect, Argument Structure and Case.* Ph.D. thesis, Rutgers University.

Biskup, Petr (2009): Prefixes as Prepositions and Multiple Cases. In: Gerhild Zybatow et al. (eds.): *Studies in Formal Slavic Phonology, Morphology, Syntax, Semantics and Information Structure. Proceedings of FDSL 7, Leipzig 2007.* Frankfurt am Main: Peter Lang, 3–17.

Bošković, Željko (1997): The Syntax of Nonfinite Complementation: An Economy Approach. Cambridge, MA: The MIT Press.

Caha, Pavel (2014): The Jungle of the Czech Local Cases: Where Semantics and Morphology Meet. In Lilia Schürcks, Anastasia Giannakidou & Urtzi Etxeberria (eds.): *The Nominal Structure in Slavic and Beyond*. Berlin: Mouton De Gruyter, 209–236.

Caha, Pavel & Tobias Scheer (2007): The syntax and phonology of Czech templatic morphology. A handout of a talk at FASL, available at http://sites.unice.fr/scheer/tobweb/papers.htm.

Caha, Pavel & Tobias Scheer (2008): The syntax and phonology of Czech templatic morphology. In: Andrei Antonenko, John F. Bailyn & Christina Bethin (eds.): *Proceedings of the Annual Workshop on Formal Approaches to Slavic Linguistics 16*. Ann Arbor: Michigan Slavic Publications, 68–83.

Den Dikken, Marcel (1995): *Particles: On the Syntax of Verb-particle, Triadic, and Causative constructions.* New York: Oxford University Press.

Den Dikken, Marcel (2003): *When particles won't part*. Ms., CUNY.

Gehrke, Berit (2008): *Ps in motion: On the semantics and syntax of P elements and motion events.* Ph.D. thesis, University of Utrecht.

Grimshaw, Jane (1990): *Argument Structure*. Cambridge, Mass.: MIT Press.

Gribanova, Vera (2009): Phonological evidence for a distinction between Russian prepositions and prefixes. In Gerhild Zybatow et al. (eds.): *Studies in Formal Slavic Phonology, Morphology, Syntax, Semantics and Information Structure. Proceedings of FDSL 7, Leipzig 2007*. Frankfurt am Main: Peter Lang, 383–396.

Gribanova, Vera (2015): Exponence and morphosyntactically triggered phonological processes in the Russian verbal complex. *Journal of Linguistics* 51(3).

Gribanova, Vera & Lev Blumenfeld (2013): Russian prepositions and prefixes: Unifying prosody and syntax. In *Proceedings of the 49th Meeting of the Chicago Linguistic Society.*

Gribanova, Vera & Boris Harizanov (2015). Locality and directionality in inward-sensitive allomorphy: Russian and Bulgarian. In: Vera Gribanova and Stephanie Shih (eds.): *The morphosyntax-phonology connection: locality and directionality*. Oxford: Oxford University Press.

Hyman, Larry, Sharon Inkelas & Galen Sibanda (2008): Morphosyntactic correspondence in Bantu reduplication. In: Kristin Hanson and Sharon Inkelas (eds.): *The nature of the word: Essays in honor of Paul Kiparsky*. Cambridge, MA: MIT Press, 273–309.

Julien, Marit (2002). *Syntactic heads and word formation*. Oxford: Oxford University Press.

Koopman, Hilda & Anna Szabolcsi (2000): *Verbal comlexes.* Cambridge, MA: MIT Press.

Kratzer, Angelika (2000): Building statives. *Annual Meeting of the Berkeley Linguistics Society* 26(1).

MacDonald, Jonathan E. (2008): *The syntactic nature of inner aspect: A minimalist perspective.* Amsterdam: John Benjamins.

Matushansky, Ora (2002): On formal identity of Russian prefixes and prepositions. *MIT Working Papers in Linguistics 42*. 217–253.

Migdalski, Krzystof (2006): *The Syntax of Compound Tenses in Slavic*. Utrecht: LOT.

Neeleman, Ad (2002): Particle placement. In: Nicole Dehé et al. (eds.): *Verb-particle explorations*. Berlin/New York: Mouton de Gruyter, 141–164.

Nilsen, Øystein (2003): *Eliminating positions*. PhD thesis, Utrecht university.

Pollock, Jean-Yves (1989): Verb movement, universal grammar, and the structure of IP. *Linguistic Inquiry* 20(3), 365–424.

Procházková, Věra (2006): *Argument structure of Czech event nominals.* MA thesis, University of Tromso.

Ramchand, Gillian (2004): Time and the event: The semantics of Russian prefixes. In Peter Svenonius (ed.): *Nordlyd 32.2*, *Special issue on Slavic prefixes*. Tromsø, 323–361.

Ramchand, Gillian (2008): *Verb Meaning and the Lexicon: A First Phase Syntax*. Cambridge: Cambridge University Press.

Ramchand, Gillian & Peter, Svenonius (2002): The lexical syntax and lexical semantics of the verb-particle construction. In Line Mikkelsen & Christopher Potts (eds.): *Proceedings of WCCFL 21*. Somerville: Cascadilla Press, 387–400.

Romanova, Eugeniya (2006): *Constructing perfectivity in Russian.* Ph.D. thesis, University of Tromsø.

Scheer, Tobias (2001): The Rhythmic Law in Czech: Vowel-final Prefixes. In Gerhild Zybatow et al. (eds.): *Current Issues in Formal Slavic Linguistics*. Frankfurt am Main: Lang, 37–48.

Svenonius, Peter (1996): *The verb-particle alternation in the Scandinavian languages*. Ms. University of Tromsø.

Svenonius, Peter (2004): Slavic prefixes inside and outside VP. In Peter Svenonius (ed.): *Nordlyd 32(2)*, *Special issue on Slavic prefixes*. Tromsø, 205–253.

Svenonius, Peter (2004b): Slavic prefixes and morphology: an introduction to the *Nordlyd* volume. In Peter Svenonius (ed.): *Nordlyd 32(2)*, *Special issue on Slavic prefixes*. Tromsø, 177–204.

Svenonius, Peter (2008): Projections of P. In: Anna Asbury, Jakub Dotlacil, Berit Gehrke, and Rick Nouwen (eds.): *Syntax and Semantics of Spatial P*. Amsterdam: John Benjamins, 63-84.

Starke, Michal (2009): Nanosyntax - A short primer to a new approach to language. *Nordlyd* 36(1), 1-6.

Taraldsen, Tarald (2000): V-movement and VP-movement in derivations leading to VO-order. In: Peter Svenonius (ed.): *The Derivation of VO and OV*. John Benjamins, Amsterdam, 97–122.

Taraldsen, Tarald (2010): The nanosyntax of Nguni noun class prefixes and concords. *Lingua* 120(6), 1522–1548.

Wiland, Bartosz (2013): Paths in remnant movement: A single solution to three problems in the Polish OVS syntax. In: C. Kan, C. Moore-Cantwell, and R. Staubs (eds.): *Proceedings of NELS 40*. GLSA, University of Massachusetts, Amherst, 253–264.

Williams, Edwin (2003): *Representation theory*. Cambridge, MA: MIT Press.

Ziková, Markéta (2012): Lexical Prefixes and Templatic Domains: Prefix Lengthening in Czech. In Markéta Ziková & Mojmír Dočekal (eds.): *Slavic Languages in Formal Grammar: Proceedings of FDSL 8.5, Brno 2010*. Frankfurt am Main: Peter Lang, 325–338.

Ziková, Markéta (2016): When Prosody Follows Syntax: Verbal Stems in Czech. *Linguistica Brunensia* 64(1), 163–185.

Žaucer, Rok (2009): A VP-internal/Resultative Analysis of 4 “VP-External” Uses of Slavic Verbal Prefixes. Ph.D. thesis, University of Ottawa.