

1 Prefixes in Czech zero-derived nominalizations and verbs

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1.1 Introduction

This chapter investigates the relationship between prefixed verbs and related zero nominalizations in Czech. Specifically, we focus on the fact that the prefix in zero-derived nominalizations often have a different form compared to the one found in the related verb. Our goal is to understand why this is so, i.e., why the shape of the prefix changes when we derive a noun from the verb (or *vice versa*). Our analysis relies on the wide-spread idea that zero nominalizations share with verbs a number of functional projections, but their structure is impoverished. The most relevant property that zero nominalizations lack is aspect. Since prefixes are crucially involved in aspectual interpretation, the absence of aspect in nouns triggers a special shape of the prefix. The specific implementation draws on the Nanosyntax theory of spellout (Starke 2018, De Clercq 2019). We also rely on the idea that the prefix undergoes phrasal movement, as proposed in Svenonius (2004).

In this section, we introduce some basic facts concerning Czech verbal prefixes that are going to be relevant in our discussion. We briefly show what prefix alternations in Czech look like and we provide an outline for this chapter.

Typically, verbal prefixes are similar in meaning to English particles. A few examples are provided in (1).

- (1) lézt v- lézt s- lézt od- lézt vy- lézt
 crawl in crawl down crawl away crawl out crawl
 ‘crawl, crawl in, crawl down, crawl away, crawl out’

It is going to be relevant that the prefix has two basic grammatical functions. First, it describes a path along which the event proceeds. This function is most clear with manner of motion verbs like the one in (1). (In many cases, a particular *prefix-verb* combination may be idiomatic.) The second function of the prefix is that it changes the aspectual properties of the event expressed by the verb. (2) sums up.

- (2) The contribution of a prefix
- a. describe a path
 - b. change aspect

The main topic of this article is the fact that prefixes in Czech often differ in shape depending on whether we find them on verbs or zero-derived nouns. In (3), we show this for the prefix *na-* ‘on.’ When this prefix is found on the (zero-marked) imperative form, the prefix is short, see (3a). When it is found on a (zero-derived) noun, the prefix is long, see (3b).¹

- (3) a. Na- piš -Ø to. (*ná-piš-Ø)
 on write IMP.2.SG it
 ‘Write it.’
- b. ná- pis -Ø (*na-pis-Ø)
 on write NOM.SG
 ‘sign’

The same distinction between verbs and zero-derived nouns sometimes influences also vowel-zero alternations in the prefix. We show this in (4). What we can see in (4a) is that in the imperative, the prefix *pod(e)-* ‘under’ surfaces with a vowel at its right edge. However, this vowel is missing in the (zero-derived) nominalization in (4b).

- (4) a. Pode- piš -Ø to. (*pod-piš-Ø)
 under write IMP.2.SG this
 ‘Sign it.’
- b. pod- pis -Ø (*pode-pis-Ø)
 under write NOM.SG
 ‘signature’

Neither of these alternations can be fully reduced to phonology, since the relevant phonological conditions are identical across the two environments. In this paper, we shall therefore explore the precise morphological conditions under which these alternations arise.

Our main point is going to be that both alternations can be explained by combining two analytical ideas. The first idea concerns the relationship between prefixation and aspect. It says that the aspectual contribution of a prototypical prefix can be characterized by two partly independent notions (see Borik 2002, Gehrke 2008, Biskup 2019). The first notion is telicity – meaning that prefixes add a result state to the event expressed by the verb. For instance, when we say *He pushed the chair in*, the particle *in* conveys the fact that the ‘pushing’ event is not unbounded: it finishes when the chair is inside some contextually salient location. Traditionally,

¹Vowel length is marked by an acute accent sign, *á* is a long *a*. The alternation in vowel-length depicted in (3) has been investigated in Scheer (2001), Ziková (2012), Caha & Ziková (2016).

this type of verb meaning is tested by the availability of temporal modifiers like *in an hour/for an hour*.

The second type of aspectual contribution of the prefix is that it makes the verb perfective. This notion is related to ‘viewpoint aspect.’ Perfective verbs depict events as if viewed ‘from the outside,’ i.e., in their entirety, as units with a clear start and end on the temporal axis. Imperfective verbs depict events ‘from inside,’ i.e., as ongoing. In Czech, perfectivity gives rise to the future interpretation of apparent present-tense forms, it yields incompatibility with inceptive verbs such as *begin, start, end*, etc.

Importantly, some recent approaches argue that each of the aspectual functions of the prefix (telicity and perfectivity) is independent of the other, and that each of them occupies a different region in the sequence of verbal functional categories. Following a number of authors (e.g., Svenonius 2004, Ramchand 2008a, Gehrke 2008, Arsenijević 2010, Tatevosov 2011), we adopt here the idea that the resultative/telic function of the prefix is introduced low down in the verbal structure, while perfectivity is only relevant at a later point in the derivation. Schematically, we can depict this proposal as in (5).

- (5) [**PERFECTIVITY** [... [F2 [F1 [**RESULTATIVITY** V]]]]]

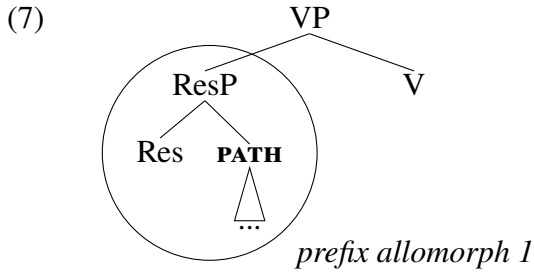
There are a number of ways how we can model the fact that the prefix usually contributes both meanings. Some authors (e.g., Arsenijević 2010, Biskup 2019) rely on a syntactic Agree relation between an aspectual operator situated in the higher position and the prefix (located in the lower position). Svenonius (2004) proposes that in order to contribute perfectivity, the prefix actually moves from the low position to the higher position (cf., Caha & Ziková 2016). Ramchand (2008a) suggests a semantic account, where a high Asp head gives rise to a perfective aspect just in case there is a result introducing prefix inside the (decomposed) VP. When the prefix is not there, the same Asp head yields an imperfective interpretation.

In our account, we will use the structure in (5) in order to explain the variation in the shape of the prefix. In particular, when we combine this view with the widely shared assumption that zero-derived nouns have an impoverished structure, we arrive at the possibility that verbal and nominal structures may differ in the presence/absence of Asp. This is depicted in (6) (see also Tatevosov 2011):

- (6) a. verbal structure: [**PERF** [... [F2 [F1 [**RES** V]]]]]
 b. nominal structure: [F1 [**RES** V]]

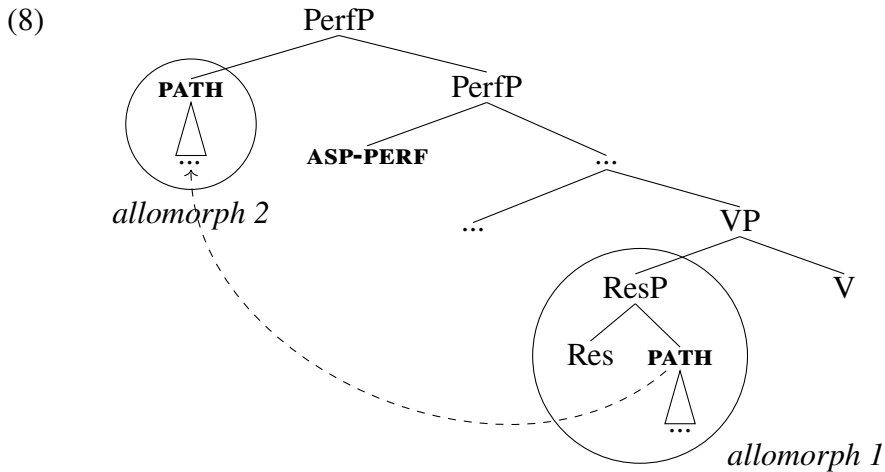
Once structures like this are in place, it becomes tempting to understand the different shapes of prefixes in verbs and their nominalizations as related precisely to the presence/absence of the higher aspectual projection. When the prefix only has the low resultative function, it has one shape. When it has both functions, it has a different shape. And this is the direction in which we shall be going.

Our specific implementation of this analytical intuition will be couched in terms of phrasal lexicalization and movement. What we shall propose is that the prefix originates as a sister to the verb, lexicalizing a phrasal constituent that minimally contains a Path component and the resultative projection. In this low position, the prefix contributes resultativity, see (7).



The idea we shall pursue is that in this low position (when the prefix contributes only resultativity), it has a shape that we designate as *prefix allomorph 1*.²

In order to also contribute perfectivity, the prefix moves higher up in the structure (following Svenonius 2004, Caha & Ziková 2016). We show this in (8). The structure in (8) will be assumed here for all forms that show aspect; these are first of all finite verbs, but also a subset of nominalisations (gerunds) and participles.



What we also propose is that as the prefix is moving, it strands its top-most Res projection in the base position. In other words, only a part of the prefix moves, yielding a sub-extraction of the Path component from within the resultative prefix, as depicted in (8). The reason why we propose this is to have a handle on the fact that the prefix has a different pronunciation depending on whether it is found in a zero nominalization (where it is purely resultative) or in a verbal form (where it also contributes perfectivity). What sub-extraction does for us is that the prefix has

²For simplicity, we draw the prefix to the left of the verb (rather than to the right), though we shall say more about this topic later.

different features in each of these functions, and the allomorphic variation of the prefix simply reflects this fact in a way that we make more specific as we proceed.

The chapter is organized as follows. In Sections 1.2-1.4, we provide the basic overview of prefix alternations in Czech. In these sections, we focus on alternations in length (1.2) and on vowel-zero alternations (1.3), as well as on the role that the root plays in these alternations (1.4). In Section 1.5, we investigate the spatial contribution of prefixes and focus on their relationship to prepositions. In 1.6, we highlight the role that prefixes have in establishing the result of the event and propose that they spell out the resultative Res head. Section 1.7 provides the structure of nominalizations, and Section 1.8 describes in detail the motivations for sub-extractions, while Sections 1.9 and 1.10 consider the fate of the projection left behind by this process. Section 1.11 concludes.

1.2 Vowel-length alternations

In this section, we focus on prefixes alternating in vowel length (see Scheer 2001, Ziková 2012, Caha & Ziková 2016). This type of alternation is found with a subset of vowel-final prefixes. We illustrate the relevant behavior in (9). In (9a), we have the imperative of the verb ‘take out’ and the prefix is short. In (9b), we have a zero-derived noun, and the prefix is long.

- | | | | | |
|-----|----|---|----|---|
| (9) | a. | vy- ber -Ø
out take IMP.2.SG
‘take out, select’ | b. | vý- běr -Ø
out take NOM
‘selection, collection’ |
|-----|----|---|----|---|

The examples form a phonologically near-minimal pair. Yet in one case, the prefix is short, and in the other case, it is long. Therefore, as the previous work has argued, the allomorph choice is not governed by phonology, but morphology. Specifically, it depends on whether the prefix appears in an imperative (9a) or in a result noun (9b).

The length difference is systematic across a whole range of vowel-final prefixes; an additional example is given in (10) for the prefix *za-*.

- | | | | | |
|------|----|--|----|---|
| (10) | a. | za- piš -Ø
down write IMP.2.SG
‘write down!’ | b. | zá- pis -Ø
on write NOM
‘notes, minutes of a meeting’ |
|------|----|--|----|---|

In addition to the imperative, the forms that require the short prefix include the infinitive, the present tense, the past participle and the *ing*-type nominalization. They are given in Table (11). These are productive forms and they can be formed from virtually any verb.

(11) The distribution of the prefix *vy-/vý-* in the paradigm

	INF	PAST PT	-ING NOMIN	PRES	IMP	NOUN
<i>vy-</i>	vy-br-at	vy-br-al	vy-br-ání	vy-ber-e	vy-ber-Ø	vý-běr-Ø
<i>za-</i>	za-br-at	za-br-al	za-br-ání	vy-ber-e	za-ber-Ø	zá-běr-Ø

In contrast, the zero nominalization (which has a long vowel in the prefix) is non-productive, and many verbs have a gap here. We can see the form in the last column. The fact that there may be gaps is important to note, but it does not blur the pattern: whenever a zero-derived noun exists for a prefix like *vy-*, the prefix is long in this environment.

The table has just one form with the long prefix (a zero-derived result noun), which is the form that we focus on in our description. However, we briefly note that there are other cases where the prefix is long, even though they are all non-productive and often idiomatic. For example, we sometimes find adjectives such as the one in (12a), or an agentive noun such as (12b). It is not clear to what extent these are based on the corresponding zero noun in (11), or whether they are derived independently of the noun.

- (12) a. **vý-** běr -ov -ý
out take ADJ AGR
'excellent, elective'
- b. **vý-** běr -č -í
out take er NOM.SG
'(tax) collector'

Regardless of how this is resolved, we see from the meaning of (12a) that the form is purely stative and resembles regular adjectives. The agentive nominalization in (12b) seems to be related to the 'simple-event' reading of the noun *vý-běr* 'collection.' The logic of the alternation thus opposes productive, verbal and fully eventive forms to various non-productive formations low in eventivity. The distribution of the alternating allomorphs is then summarized as in (13). (Note though that this regularity only holds for prefixes that actually alternate in length, which, recall, is a subset of vowel-final prefixes.)

(13) Vowel-length alternation in Czech prefixes:

- a. productive fully-eventive inflectional forms: CV-
- b. non-productive derivational forms low in eventivity: CVV-

Caha & Ziková (2016) provide two arguments for the conclusion that the specific component of 'eventivity' that is relevant for regulating the alternation in vowel length is aspect (perfectivity). Both of the arguments discussed by Caha & Ziková (2016) show that the forms with a long prefix do not behave as perfective forms, but as imperfective forms. A data of this type have been previously used in Tatevosov (2011) to argue that prefixation and perfectivity are not the same thing (cf., Borik 2002). Tatevosov's basic idea is that the prefix is located low down in the structure, while perfectivity is a relatively high functional projection, see (14).

- (14) [**ASP-PERF** [... [F2 [F1 [**PREFIX** verb]]]]]

Tatevosov points out that if we accept the picture in (14), we expect the existence of structurally impoverished forms that contain the prefix, yet lack perfectivity, as in (15).

- (15) [F2 [F1 [**PREFIX** verb]]]

As Caha & Ziková (2016) argue, the Czech forms with long prefixes fall under this characteristic. In order to see that, consider one of the traditional perfectivity tests, which is the incompatibility of perfective verbs with inceptives like ‘start.’ In (16a), we show that the infinitive of an imperfective unprefixated verb *měnit* ‘change’ can combine with the verb *začal* ‘started.’ In (16b), we show that when the verb *měnit* ‘change’ is prefixed (*vy-měnit*), it is incompatible with the inceptive verb. This is a standard pattern for Slavic, where prefixation makes verbs perfective.

- (16) a. Petr začal měnit pneumatiky.
Petr started change.INF tires
‘Petr started to change tires.’
b. *Petr začal vy-měnit pneumatiky.
Petr started out-change.INF tires

Interestingly, zero-derived nouns with long prefixes behave as imperfective with respect to this test, see (17a). On the other hand, the productive nominalization with the short prefix patterns as perfective, see (17b). Thus, the dividing line between imperfective vs. perfective forms coincides with the distinction between long vs. short prefixes.

- (17) a. Petr začal s vý-měn-ou pneumatik.
Petr started with out-change-INS tires
‘Petr started changing the tires.’
b. ??Petr začal s vy-měn-ě-n-ím pneumatik.
Petr started with out-change-TH-ING-INS tires

The data in (17) provide the first reason why we shall link the quantity of the prefixal vowel to the presence/absence of an Asp projection in the functional spine.

The second reason given in Caha & Ziková (2016) for proposing that prefixal length/shortness correlates with (im)perfectivity is that some verbs have (irregularly) prefixes with long vowels. While the set of such verbs is restricted, they exist, and all of them are imperfective, see (18) for an example.³

- (18) a. Petrovi na tom zá- lež -í.
Petr.DAT on that behind lie PRES
‘Petr cares about this.’

³See Gehrke (2008: p. 159) for analogous cases in Russian.

- b. Ten sýr se za- lež -í
 the cheese REFL behind lie PRES
 'The cheese will mature.'

The imperfective nature of the verb in (18a) can be seen from the fact that the present tense marker *-í* actually yields the present tense interpretation. This is impossible with perfective verbs, such as the one given in (18b). This verb has a short prefix, and the same verbal form (marked by *-í* following the root) has a future tense interpretation. This is typical of perfective verbs in Czech.

The imperfective/perfective difference between (18a,b) then also shows up in the compatibility with verbs such as 'start.' The verb with the long prefix is compatible with 'start,' see (19a), the verb with the short prefix is incompatible with it, see (19b).

- (19) a. Petrovi na tom začalo zá- lež -et.
 Petr.DAT on that started behind lie INF
 'Petr began to care about this.'
- b. *Ten sýr se začal za- lež -et
 the cheese REFL started behind lie INF
 'The cheese started to mature.'

This once again suggests that the presence of the long prefix does not turn verbs perfective; only the short prefix does so. The conclusion we shall draw from this is that the forms where prefixes are always long are structurally impoverished; they lack the aspectual projections characteristic for full-fledged perfective verbs. One of the goals of our paper will then be to explain how the presence/absence of the aspectual projection influences the shape of the prefix.

Before we leave this section, we once again return to the fact that only a subset of V-final prefixes alternates in length. In Table (20), we give minimal pairs involving the verbal root *stup* 'step.' We divide the V-final prefixes into three groups depending on whether they show the length alternation or not; and when they do, whether the vowels are related by the regular lengthening process characteristic for Czech, or whether the pairing is irregular (suppletive).

(20) Vowel-final prefixes

	IMPERATIVE	ZERO NOUN	
NON-ALTERNATING PREF			
change (vehicle)	<i>pře-stup</i>	<i>pře-stup</i>	transfer
move on	<i>po-stup</i>	<i>po-stup</i>	progression
ALTERNATING PREF			
get on	<i>na-stup</i>	<i>ná-stup</i>	onboarding
get out	<i>vy-stup</i>	<i>vý-stup</i>	offboarding
step away	<i>u-stup</i>	<i>ú-stup</i>	retreat
step in for someone	<i>za-stup</i>	<i>zá-stup</i>	substitute
come here	<i>při-stup</i>	<i>pří-stup</i>	access
crawl through	<i>pro-lez</i>	<i>prů-lez</i>	a manhole
SUPPLETIVE PREF			
make consonant	<i>s-lad'</i>	<i>sou-lad</i>	consonance

In the left-hand column, we see the imperative form corresponding to the bare root. In the imperative, the prefixes are short. The right-hand column gives the corresponding nominalization. We can see that most prefixes become long, and we call them alternating prefixes. However, some prefixes remain short (e.g., *po-* ‘on,’ *pře-* ‘over’), and we call them non-alternating. Whether a prefix alternates or not is a lexical property of such prefixes, and, as far as we can tell, it cannot be deduced from anything (Caha & Ziková 2016).

The last line contains a special case of a ‘length’ alternation between a prefix with a long vowel (in the nominalization) and a C-final prefix in the verb. The example reveals the possibility that also C-final prefixes may have counterparts with long vowels. We will treat such examples as a special case of prefix suppletion, i.e., as a case where two different prefixes must be lexically stored. This is different from the other cells, where the prefixes are either identical (syncretic) or related to one another by regular length alternation.

1.3 Vowel-zero alternations

This section investigates the second class of prefixes, i.e., consonant-final prefixes. The point is to show that there is a class of roots where C-final prefixes exhibit the same type of allomorphy as V-final prefixes: we get one allomorph of the C-final prefix in the eventive/verbal paradigm and a different allomorph in the non-eventive/non-productive part of the paradigm.

Let us begin by introducing the two allomorphs of C-final prefixes. We do so in Table (21). These prefixes generally show a vowel-zero alternation at the right edge, and they thus alternate between a C-final shape (in the upper part of the table) and a V-final shape (in the lower part).

(21) Consonant-final prefixes

	IMPERATIVE	ZERO NOUN	
C-FINAL SHAPE			
step in	<i>v-stup</i>	<i>v-stup</i>	entrance
step away	<i>od-stup</i>	<i>od-stup</i>	distance
V-FINAL SHAPE			
step down	<i>se-stup</i>	<i>se-stup</i>	descend
step apart	<i>roze-stup</i>	<i>roze-stup</i>	(social) distance

What makes us classify V-final allomorphs such as *se-* ‘down’ as a C-final prefix is the fact that this prefix also has a C-final allomorph *s-* (which is used with other verbs). The label V-final prefix is reserved for prefixes that never have a C-final shape (these were discussed in the preceding section).

C-final prefixes most often have the same shape in the verbal paradigm and in the zero-derived noun. Therefore, they apparently belong in the class of ‘non-alternating’ prefixes, though more details regarding this conclusion will follow.

Let us now turn to some observations concerning the distribution of the V-final allomorph and the C-final allomorph. As we have already noted, each of the prefixes in Table (21) can have a V-final allomorph and a C-final allomorph (i.e., we find both $v \sim ve$ and $roz \sim roze$, depending on the context). The specific shape is usually a function of the root that follows. The specific properties of the root that govern the $V \sim \emptyset$ alternation at the right edge of the prefix are generally phonological in nature (cf., Gribanova & Blumenfeld 2013 for Russian). For example, Czech disallows word-initial geminates. Therefore, when the root begins with a consonant that is identical to the prefix (as in (22)), the prefix surfaces in the vowel-final shape. When the initial consonant is different, the prefix needs no vowel, see (23).

- (22) a. **se-** sypal
together poured
b. ***s-** sypal
together poured

- (23) a. ***ve-** sypal
in poured
b. **v-** sypal
in poured

The same point is illustrated in (24) and (25). Here we have a verb that begins with *v*. Before such a root, the prefix *v-* must have a vowel-final shape, see (24). However, the prefix *s-* has a C-final shape, see (25).

- (24) a. **ve-** valil
in rolled
b. ***v-** valil
in rolled

- (25) a. ***se-** valil
down rolled
b. **s-** valil
down rolled

For completeness, we note that the prohibition on the sequence of identical consonants only affects word-initial geminates. Prefixes that are of the shape VC-, or CVC- allow for the sequence of identical consonants, see (26a,b).

- (26) a. **roz-** **zuřil**
INCEPTIVE be.angry
'become angry'
b. **od-** **dálil**
away- further
'to move further away'

Another factor that determines the allomorphy of vowel-final prefixes is whether the root contains an initial consonant cluster. These cases are generally tricky, because two apparently identical consonant clusters may behave differently for the purpose of prefix vocalization, as illustrated in (27). In (27), both cases have the prefix attaching to a verb that begins with the cluster *br*, yet the shape of the prefix is different.

- (27) a. **se-** bral
together picked
b. **s-** brousil
away brushed

- (28) a. **roze-** střel
apart spread
b. **roz-** střelil
apart shot

An analogous case is shown in (28). Once again, the root-initial cluster *stř* triggers different behavior in the prefix.

An observation made in Ziková (2008) is that the difference in (27) and (28) is related to the morphological structure of the relevant forms, which is shown below:

- (29) a. **se-** br -a -l
together take TH PAST
'he picked up'
b. **s-** brous -i -l
away brush TH PAST
'he brushed off'

- (30) a. **roze-** stř -e -l
apart spread TH PAST
'he spread'
b. **roz-** střel -i -l
apart shot TH PAST
'he shot apart (in pieces)'

As we can see, the differential behavior depends on whether the root has a vowel or not. When the root has no vowel (as in the (a) examples), the prefix has the vowel-final shape. When the root has a vowel (as in the (b) examples), the other allomorph is found. The reason for this, as Ziková proposes, is that roots like 'take' or 'spread' (which only consist of consonants) do not contain

true consonant clusters. Instead, they have an empty nucleus position in between the consonants. Assuming further that also the prefix has an empty nucleus at its right edge, the vocalization of the prefix follows from the requirement that sequences of two empty nuclei are forbidden (Scheer 2004). This is depicted in (31a), where \emptyset stands for an empty-nucleus position.

- (31) a. **se-** bør -al (***s \emptyset -** bør -al)
 together take PAST together take PAST
 b. **s \emptyset -** brous -il
 away brush ed

On the other hand, the root ‘brush’ *brous* has a true cluster with no relevant empty nucleus in between *b* and *r*; therefore, the prefix-final empty nucleus may remain without a vowel. The vowel is not needed, since even without it, we do not end up with a sequence of two empty nuclei. This is shown in (31b).

It is important to note that all C-final prefixes (i.e., all of C-, VC- or CVC- prefixes) behave uniformly in these contexts; the example in (32) shows this.

- (32) a. **roze-** bør -al (***roz \emptyset -** bør -al)
 apart take PAST apart take PAST
 b. **roz \emptyset -** brous -il
 apart brush PAST
 c. **ode-** bør -al (***od \emptyset -** bør -al)
 away take PAST away take PAST
 d. **od \emptyset -** brous -il
 away brush PAST

All of this may seem complex, but the ultimate point is that in a number of cases, the conditions on prefix vocalization can be reduced to phonological constraints like ‘avoid word-initial geminates,’ or ‘avoid sequences of empty nuclei.’ (33) sums up.

- (33) V~ \emptyset alternations in Czech prefixes
 a. V-final shape appears to avoid word-initial geminates or sequences of two empty nuclei
 b. C-final shape appears elsewhere

1.4 Roots with empty nuclei and their prefixes

Interestingly, there is a set of cases where the generalizations in (33) fail (at least on the surface). In order to see that, let us focus on the class of roots like *br* ‘take’ – i.e., those that have a bogus cluster with an empty nucleus position in between the consonants. With these roots, the V~ \emptyset

alternation has interesting properties that seem to be worthy special attention. As an example, consider the imperative of the verb *roze-br-al* ‘take apart,’ shown in (34a). We can see that in the imperative, the root has a different shape than in the past tense in (32a), and so it actually does contain a vowel. (In other words, we have *br* in the past tense and *ber* in the imperative). Interestingly, the presence of the vowel in the imperative root has no effect on the prefix, which still shows up with a vowel at the right edge. This is *prima facie* unexpected, because on the surface, we are not avoiding a sequence of two empty nuclei.

- (34) a. roze- ber -Ø (*roz-ber-Ø)
 apart take IMP.2.SG
 ‘take apart, analyze’
 b. roz- bor -Ø (*roze-bor-Ø)
 apart take NOM.SG
 ‘analysis’

However, what is most curious from our perspective is the fact that there is a contrast here with the zero-derived nominalization in (34b). Specifically, the zero-derived nominalization also has a vowel in the root (like the imperative), yet the prefix does not (in fact cannot) contain a vowel, even though on the surface, the relevant phonological conditions appear to be identical to those in the imperative. In other words, there seems to be a morphological constraint at play here, which differentiates between what happens in the zero nominalization vs. in the imperative.

In order for us to see what is going on here, Table (35) gives the full paradigm associated to the root ‘take.’ Each row depicts a particular combination of this root and a prefix.

(35) Prefixes with *br* ‘take’

		PRES	IMP	INF	PAST PART	NOUN
<i>vy-</i>	‘out’	vy -ber-e	vy -ber-Ø	vy -br-at	vy -br-al	vý -bor-Ø
<i>za-</i>	‘behind’	za -ber-e	za -ber-Ø	za -br-at	za -br-al	zá -běr-Ø
<i>na-</i>	‘on’	na -ber-e	na -ber-Ø	na -br-at	na -br-al	ná -bor-Ø
<i>pře-</i>	‘over’	pře -ber-e	pře -ber-Ø	pře -br-at	pře -br-al	pře -bor-Ø
<i>s-</i>	‘down’	se -ber-e	se -ber-Ø	se -br-at	se -br-al	s -bor-Ø
<i>od-</i>	‘away’	ode -ber-e	ode -ber-Ø	ode -br-at	ode -br-al	od -bor-Ø
<i>roz-</i>	‘apart’	roze -ber-e	roze -ber-Ø	roze -br-at	roze -br-al	roz -bor-Ø

The table is divided into three major sections by the horizontal lines. In the uppermost part, we see the pattern exhibited by prefixes that alternate in vowel length. As already discussed in Section 1.2, we have a long vowel in the zero nominalization (shaded) and a short vowel elsewhere.

In the middle (horizontal) section, we see an example of a vowel-final prefix (*pře-*) that does not alternate in length: it has the same shape throughout the paradigm. This is what consonant-final prefixes usually do as well, recall (21). However, with the verb ‘take,’ this is not the case.

We can see this in the bottom section of the table. This area contains examples with C-final prefixes. The relevant fact is that the nominalization has a different allomorph of the prefix (C-final) than the other forms (V-final). This difference does not correlate with the surface phonology. Specifically, in the present tense and in the imperative, the root has the shape *ber*. On phonological grounds, such a shape does not seem very different from *bor*. Therefore, we would expect to find the same allomorph in both forms. However, this is not the case. We have a C-final allomorph in the nominalization, but a V-final allomorph in the present tense and in the imperative.

In sum, it seems to be the case that in the table (35), the $V \sim \emptyset$ alternation is influenced by morphosyntax, and it follows the same logic as the length alternation in the upper part of the table: we get one shape within the productive inflectional paradigm of the verb, and we get a different shape in the non-productive zero-derived noun.

The table also contains vertical lines. These indicate regions with different roots. The present tense and the imperative contain the root *ber*, the infinitive and the past tense contain the root *br*, and the nominalization has a different root still (*bor-/b[je]r*). We shall analyze these roots as (mildly) suppletive allomorphs of the root ‘take.’

The root *br-* ‘take’ is not the only root that shows this kind of pattern. In the remainder of this section, we present a near exhaustive list of roots that pattern like *br*. The main part of our data in this section comes from work by Petra Berecková (Berecková 2021), who has compiled an exhaustive list of the relevant root-prefix combinations and verified the vocalization patterns by corpus searches and work with native speakers.

In our presentation of the data, we shall proceed by individual roots. In table (36), we start by the root *ps* ‘write.’ We can see that also this verb has a root that alternates between a -CC- shape (in the middle two columns) and a -CVC- shape (in the remaining columns).

(36) Prefixes with *ps* ‘write’

	PRES	IMP	INF	PAST PART	NOUN
<i>vy-</i>	vy-píš-e	vy-piš-Ø	vy-ps-at	vy-ps-al	vý-pis-Ø
<i>na-</i>	na-píš-e	na-piš-Ø	na-ps-at	na-ps-al	ná-pis-Ø
<i>u-</i>	u-píš-e	u-piš-Ø	u-ps-at	u-ps-al	ú-pis-Ø
<i>při-</i>	při-píš-e	při-piš-Ø	při-ps-at	při-ps-al	pří-pis-Ø
<i>za-</i>	za-píš-e	za-piš-Ø	za-ps-at	za-ps-al	zá-pis-Ø
<i>pře-</i>	pře-píš-e	pře-piš-Ø	pře-ps-at	pře-ps-al	pře-pis-Ø
<i>s-</i>	se-píš-e	se-piš-Ø	se-ps-at	se-ps-al	s-pis-Ø
<i>od-</i>	ode-píš-e	ode-piš-Ø	ode-ps-at	ode-ps-al	od-pis-Ø
<i>pod-</i>	pode-píš-e	pode-piš-Ø	pode-ps-at	pode-ps-al	pod-pis-Ø
<i>nad-</i>	nade-píš-e	nade-piš-Ø	nade-ps-at	nade-ps-al	nad-pis-Ø
<i>před-</i>	přede-píš-e	přede-piš-Ø	přede-ps-at	přede-ps-al	před-pis-Ø
<i>roz-</i>	roze-píš-e	roze-piš-Ø	roze-ps-at	roze-ps-al	roz-pis-Ø

Before we investigate the prefixes, let us comment briefly on the various shapes of the root. We analyze this paradigm as containing three different root shapes. Regions with different roots are demarcated by the vertical lines. In the nominalization, we see an *s*-final root *pis*. In the imperative, the root has the same vowel (*i*), but it ends in *š*. This cannot be treated as a regular palatalization, since *s*-final roots in this class do not show palatalization (e.g., the imperatives *od-nes-Ø* ‘carry away,’ *na-pas-Ø* ‘graze’). Therefore, we shall analyze *piš* and *pis* as different (mildly suppletive) roots.

The imperative root is grouped together with the present tense root, because of the fact that they are both *š*-final (which is irregular). There is a vowel-length difference between them, but this can be seen as an effect of a regular imperative shortening (long vowels always shorten in the imperative, e.g., *hlás-í-š* ‘you are reporting’ ~ *hlas* ‘report!’). The root in the past tense and the infinitive has no vowel, and so these two forms are also confined in their own section of the table.

In sum, the verb ‘write’ has three different roots, confined in the same paradigm regions as the various allomorphs of *ber-e* ‘take.’

Let us now turn to the various prefixes (each row contains one prefix). In the top part of the table, we have the by-now familiar pattern of V-final prefixes. These have a long prefix in the zero nominalization and a short prefix elsewhere.

In the horizontal section in the middle of the table, we see the non-alternating prefix *pře-* ‘over.’ There is nothing exciting happening here, we just note this to remind ourselves that some V-final prefixes do not alternate.

In the bottom section of the table (36), we can see that C-final prefixes have two shapes: one for the verbal paradigm and another one for the nominalization. This is indicated by shading. This split is not driven by surface phonology, because the present tense root as well as the imperative root contain a vowel (just like the nominalization). However, it is only in the nominalization where the root's vowel is 'taken into account' by the prefix, which switches to the C-final allomorph. This behavior is uniform across all the prefixes. In sum, we see that the bifurcation between the zero nominalization and the rest of the paradigm is systematic. We also see that morphology must also be involved in determining the shape of the prefix, since phonology alone cannot help us. Interestingly, the way the morphology controls the V~Ø alternation runs parallel to what we witness with the alternating vowel-final prefixes.

Let us now move on to another alternating root, namely *ml* 'grind.' We can see the relevant forms in (37). In the top row, we see the vowel-final prefix *vy-/vý-*. As expected, we find a short vowel in the inflectional verbal paradigm, and a long vowel in the zero nominalization.

(37) Prefixes with *ml* 'grind'

	PRES		IMP	INF	PAST PART.	NOUN
<i>vy-</i>	vy-mel-e	vy-mel-Ø		vy-ml-et	vy-ml-el	vý-mol-Ø
<i>pod-</i>	pode-mel-e	pode-mel-Ø		pode-ml-et	pode-ml-el	pod-mol-Ø
<i>roz-</i>	roze-mel-e	roze-mel-Ø		roze-ml-et	roze-ml-el	—
<i>s-</i>	se-mel-e	se-mel-Ø		se-ml-et	se-ml-el	—

In the lower part of the table, we show three lines with consonant final prefixes. Only the topmost line out of these three – featuring the prefix *pod-* 'under' – has a full paradigm (i.e., including the zero nominalization). In this line, we can see once again that we have the vowel-final allomorph in the verbal paradigm (regardless of whether the root has a vowel or not), and the C-final allomorph in the nominalization.

The two lowermost rows are only partly relevant, even though what they show is rather typical. In particular, what we see here is that the zero nominalization column is empty, because the relevant zero nominalization does not exist (it is a non-productive category). The reason why we include these two lines is to demonstrate the fact that even in the absence of the nominalization, we still find the 'unexpected' vowel-final allomorph of the prefix before CVC roots (*mel* in (37)). This is unexpected, because 'regular' CVC roots show the C-final allomorph of the prefix. We illustrate this in (38), where we use the root *maz* 'smear.' It begins with an *m* just like 'grind,' yet it has a non-alternating vowel. This predictably yields the C-final allomorph of the relevant prefixes.

(38) Prefixes with *maz* ‘smear’

	INF	PAST PART.	PRES	IMP	NOUN
<i>od-</i>	od-maz-at	od-maz-al	od-maž-e	od-maž	od-maz
<i>s-</i>	s-maz-at	s-maz-al	s-maž-e	s-maž	—

And so even though we do not know for some of the rows in (37) what the prefix in the nominalization is, we still need to explain why we find the vowel-final forms like *roze-* ‘apart’ before roots that have the CVC shape on the surface. In concrete terms, we need to explain the difference between the present tense *roz-maž-e* ‘smear apart, spread’ in (38) and *roze-mel-e* ‘grind’ in (37). Somehow, the difference must be linked to an independent difference between the two roots, namely that the former root has a stable vowel (present in all forms), whereas the latter root has an alternating vowel, which may also be absent.

It is quite typical that various roots show ‘incomplete paradigms,’ lacking the nominalization. The table below shows the same set of facts for the root *hn* ‘chase.’ Note that the shape of this root in the present tense and in the imperative (*žen*) can be understood (at least historically) as an effect of inserting a vowel in between the consonants of the root *hn*, with the addition that the vowel palatalizes the initial consonant (*h~ž* alternation is common in Czech). However, we shall analyze this as two suppletive roots.

(39) Prefixes with *hn* ‘chase’

	PRES	IMP	INF	PAST PART.	NOUN
<i>na-</i>	na-žen-e	na-žeň-Ø	na-hn-at	na-hn-al	ná-hon-Ø
<i>na-</i>	po-žen-e	po-žeň-Ø	po-hn-at	po-hn-al	po-hon-Ø
<i>s-</i>	se-žen-e	se-žeň-Ø	se-hn-at	se-hn-al	s-hon-Ø
<i>roz-</i>	roze-žen-e	roze-žeň-Ø	roze-hn-at	roze-hn-al	—
<i>od-</i>	ode-žen-e	ode-žeň-Ø	ode-hn-at	ode-hn-al	—

In the bottom part, we see the same distribution of prefixes as with all the preceding roots. The unexpected forms are the present tense forms like *roze-žen-e* ‘chase apart.’ All of this is, however, old news; the main purpose of the table is to illustrate the systematic nature of this pattern.

To sum up: even though the *V~Ø* alternation at the right edge of C-final prefixes appears phonologically driven (as discussed in Section 1.3), there is a small niche of the grammar where the alternation ‘overapplies,’ providing a V-final version of the prefix before a CVC root. This is generally the case with roots that have an alternating vowel, i.e., with roots that also have a -CC- shape in other parts of their paradigm. Even more interestingly, the overapplication is restricted to verbal forms, and does not extend to nominal forms. As a result, the *V~Ø* alternation with these roots exhibits the same distributional pattern as with prefixes that alternate in length.

We will now provide a unified account of these alternations, where the same process that is responsible for length alternation is also the triggering cause for the $V \sim \emptyset$ alternation with roots alternating between -CVC- and -CC- shapes.

Our account has three main ingredients. The first ingredient of our analysis is a specific proposal concerning the structure of prefixes. Specifically, we shall claim that as a function of their syntactic environment, prefixes have a slightly different structure in zero nominalizations and in verbal forms. These structural differences between nominal and verbal prefixes will occupy us in Sections 1.5 and 1.6.

The second ingredient is the idea that zero nominalizations have less syntactic structure than verbal forms (see e.g., Borer 2014, Fábregas 2014). We shall devote our attention to this in Section 1.7

The final ingredient is the nanosyntactic theory of spellout (Starke 2018), including a particular implementation of feature-driven movement explored in De Clercq (2019). This will be covered in Sections 1.8-1.10.

1.5 Prefixes and prepositions

In this section, we lay out our assumptions concerning the structure of prefixes. As highlighted in the introduction, Czech prefixes have multiple grammatical meanings. In order to model the fine morphological details of the prefix alternations, we will now make an inventory of these features and determine their structure inside the prefix.

In order to do that, let us first look more closely at the fact that prefixes describe a path of movement along which an event unfolds. As an example, consider the pair of sentences in (40).

- (40) a. Petr **od-** letěl do Stockholmu.
 Petr away flew to Stockholm
 ‘Petr departed for Stockholm (by plane).’
 b. Petr **při-** letěl do Stockholmu.
 Petr in flew to Stockholm
 ‘Petr arrived to Stockholm (by plane).’

Both sentences contain the sequence ‘flew to Stockholm.’ The sentences differ only in the choice of the prefix. The sentence (40a) contains the prefix meaning ‘away,’ while (40b) has *při-* ‘at, towards.’ Using the approach proposed in Zwarts (2005), we are assuming that the trace of the event ‘flying to Stockholm’ must be in the set of Paths denoted by the prefix. This means that in (40a), the event of flying has a trace which starts at some contextually given location and goes away from this location. This correctly gives the meaning ‘depart by flying.’ In (40b), in contrast, the flying event unfolds along a Path that reaches a particular contextually given location. This gives the meaning ‘arrive by flying.’

Let us now therefore look at the spatial contribution of various prefixes. In the literature, it is standard to assume that paths described by spatial markers can be broken down into two main components, namely Path and Place (Jackendoff 1983). The basic Paths that have been recognized in the literature are Goal Paths (*to*), Source Paths (*from*) and Routes (*via*). Each such Path can be associated to multiple locations, also called Places, e.g., *inside* or *below*. Depending on the type of Path, the relevant Place serves either as the starting point of the movement (*from inside/from below*), as its end point (*to inside/to below*) or as a route (*via inside/via below*). Such decomposition of path denotations applies equally well to both prepositions and prefixes.

For illustration, we list a couple of Czech prefixes and prepositions in (41). In the table, we look at three basic locations (AT, IN, ON) and we list the prefixes and prepositions that express the paths that can be defined with respect to these locations.

(41) Czech directional markers

	PATH	PLACE	PREFIX	PREPOSITION
a.	TO		<i>při-</i>	<i>k</i>
b.	FROM	AT	<i>od-</i>	<i>od</i>
c.	VIA		<i>pro-</i>	<i>kolem</i>
d.	TO		<i>v-</i>	<i>do</i>
e.	FROM	IN	<i>vy-</i>	<i>z</i>
f.	VIA		<i>pro-</i>	<i>skrz</i>
e.	TO		<i>na-</i>	<i>na</i>
g.	FROM	ON	<i>s-</i>	<i>z</i>
h.	VIA		<i>pře-</i>	<i>přes</i>

In the table, highlighting indicates that some prefixes (though far from all) are homophonous to a corresponding preposition (cf., Matushansky 2002, Griбанова 2009). For example, the prefix *od-* ‘away’ is homophonous to the preposition *od* ‘away from,’ see (42) for an example.

- (42) **Ode**-hnali mě **od** bazénu.
 away-chased.3PL me away.from pool
 ‘They chased me away from the pool.’

At the same time, there are also prefixes that do not correspond to any preposition. An example of such a prefix is *vy-* ‘out/up’ which is matched by the preposition *z* ‘out of, from.’ (The morpheme *vy-* ‘out’ cannot be used as an adposition at all.)

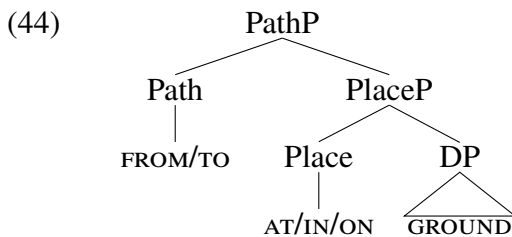
- (43) **Vy**-hnali mě **z**/***vy** bazénu.
 out-chased.3PL me out.of pool
 ‘They chased me out of the pool.’

The facts depicted in (42) and (43) are typical instances of a phenomenon called syncretism, where two different grammatical meanings are sometimes (but not always) realized by a single form. The situation is similar to English pronouns, where *you* is ambiguous between 2nd person singular and 2nd person plural. This is usually not taken to mean that the singular and plural are not distinguished in English or that the two categories are identical to each other; rather, it is the peculiarity of one form (*you*) that can be used in both environments. We shall treat the occasional homophony between prefixes and prepositions in the same way.

The reason why this is important is that syncretism generally reflects a situation where the two syncretic elements share one part of their meaning, but also differ in some respects. For example, *you* in English always refers to the addressee, and the two uses differ in whether also other referents are included. So this means that prefixes and prepositions should have something in common, but they should also differ.

This general idea confirms our approach that attributes to verbal prefixes the meanings related to Place and Path. Since spatial prepositions (by definition) express the syntactic categories of Place and Path, it seems that attributing to the prefix the same features (i.e., Path and Place) goes a long way towards understanding the basis of the homonymy in (41) and elsewhere. However, since the prefixes and prepositions are not always identical, we do not want to go as far as saying that they have exactly the same features. In other words, we need to also specify how prepositions and prefixes differ.

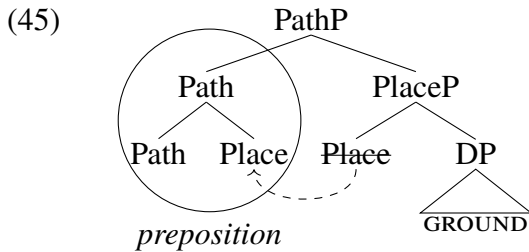
In order to do so, let us now say more about the syntactic structure of the Path and Place features as proposed in the existing literature. Specifically, it has been argued that each of these features corresponds to a separate head in the syntactic structure (see Koopman 2000, van Riemsdijk & Huybregts 2002, Zwarts 2005, Svenonius 2010, Pantcheva 2010). We show this in (44).



In (44), the Place head combines with a DP first. The DP serves as the so-called Ground argument (Talmy 1978). The Place head determines a set of points in space relative to this DP. For example, *in the box* is going to yield a set of points which are internal to the box. The Path head applies to this denotation and delivers a set of Paths whose final or initial point coincides with one of such points, yielding a goal or a source Path respectively.

It is relevant to note that in Czech, many adpositions and prefixes express Path and Place simultaneously, i.e., cumulatively inside a single morpheme. We could see this in (41), where the prepositions for goal, source and via paths unpredictably differ. The same holds for the prefixes: it is impossible to decompose them into separate Place and Path markers.

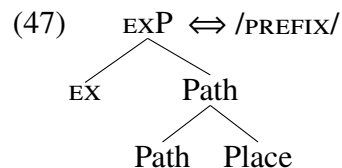
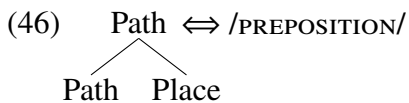
In our analysis, we shall take this to mean that the adpositions are portmanteau morphemes expressing both Path and Place. One way this can be achieved is by proposing that Place and Path form a constituent in Czech, and they are pronounced by phrasal spellout (McCawley 1968, Weerman & Evers-Vermeul 2002, Neeleman & Szendrői 2007, Starke 2009). In traditional theory, the relevant constituent can be derived via head-movement. We show this in (45), though we shall later adopt an alternative mechanism where Path and Place are directly merged together in a separate workspace.



Once Path and Place form a constituent, as in (45), the mechanism of phrasal spellout allows that the two features can be pronounced by a single cumulative marker. This analysis is depicted in (45) by the circle around the relevant constituent, and we shall assume this type of analysis in what follows. We will explain the details of the insertion procedure as we go.

The question that we set out to explore now is how we can analyze the difference between prepositions and prefixes.

The specific proposal we shall adopt here is that both directional prepositions and prefixes describe a Path: this is their common core. However, the prefix contains (under our analysis) an extra layer of meaning. We depict this below, where (46) gives the structure of the adposition (reflecting the structure in (45)), while (47) is the structure of the prefix.



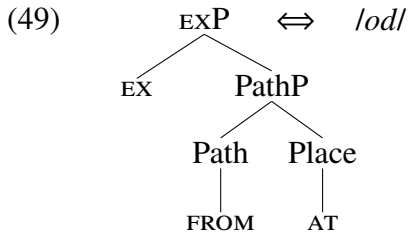
According to this analysis, Czech prefixes differ from prepositions in that they have an extra element of meaning, coded as EX in (47). We shall elaborate on the content of the EX projection shortly; for now, the point is that once these abstract structures are adopted, we can correctly capture the relationship between the morphological shapes of prefixes and prepositions, in particular the fact that they are sometimes the same, but other times they differ.

The basic idea that allows us to capture this is that lexical entries are not tailor made for a specific structure (each structure a set of features), but they can (in principle) spell out multiple structures (feature sets). Concerning the specific implementation of this idea, we shall adopt here the approach based on the Superset Principle, given in (48).

(48) The Superset Principle, Starke (2009):

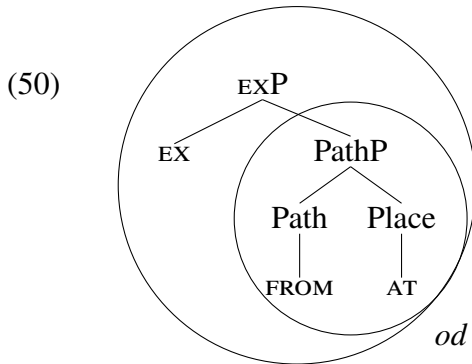
A lexically stored tree L matches a syntactic node S iff L contains the syntactic tree dominated by S as a subtree.

The wording of the principle presupposes that lexical insertion may target non-terminal nodes. Under this view, phonological information is associated to a potentially complex syntactic tree, called the lexically stored tree. An example entry is in (49), which is the lexical entry for *od* ‘away.’ Recall from (42) that this marker can be used both as a preposition and a prefix.



The specific prefix *od* embeds a source Path (FROM) originating at a location that is AT something; we note this by placing the abstract meanings FROM AT under the relevant nodes.

The Superset Principle (55) says that this lexical entry can be used to pronounce any constituent contained in the lexically stored tree. This means that it can pronounce not only the full prefix structure, but also the structure of the preposition, which it contains. This is depicted in (50).

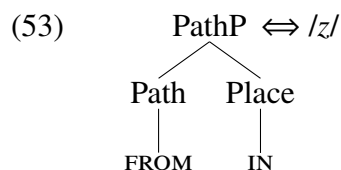
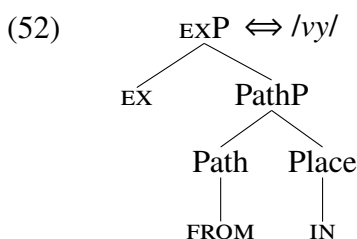


The reason why both the preposition structure and the prefix structure can be spelled out by the same morpheme is that they are both contained inside the lexical entry for the prefix. Therefore, *od* ‘away from’ can be used both as a prefix and as a preposition.

Let us now turn to preposition-prefix pairs where there is no identity. As an example, recall the meaning ‘out of,’ which is expressed by the prefix *vy-* and the preposition *z*, recall (43), repeated in (51).

- (51) **Vy**-hnali mě **z**/***vy** bazénu.
 out-chased.3PL me out.of pool
 ‘They chased me out of the pool.’

The reason why the identity between prefixes and prepositions fails in such cases is that syncretism is never obligatory. Specifically, the syncretism in (50) only arises because there is no dedicated morpheme for the [FROM AT] PathP node. If there were a dedicated lexical entry for the prepositional structure, syncretism would fail to arise. Since this is what we find for the lexical items in (51), we analyze this using the entries in (52) and (53).



The entry (52) can (once again) be used to spell out both the prefix structure and also the preposition structure. However, since the entry (53) can also pronounce a PathP constituent corresponding to the preposition, the entries (52) and (53) compete for the spellout of the preposition structure. The entry (53) is a perfect match (it has no superfluous features), and it therefore wins in competition (due to a principle known as the Elsewhere Condition, Kiparsky 1973). As a result, the prefix structure is pronounced as *vy-* ‘out of,’ while the preposition with the same meaning is different.

Let us now turn to what the head EX stands for. An idea defended in Svenonius (2004) (cf., Romanova 2007) is that Slavic prefixes are analogous to English particles, and that particles are in turn nothing else but intransitive prepositions. To see the reasoning, consider the following examples from Svenonius (2007):

- (54) a. The police will fire tear gas **in** the window.
 b. The police will fire tear gas **in**.

According to Svenonius, the preposition *in* found in (54a) relates two arguments: Figure (*tear gas*) and Ground (*the window*). In the event, the Figure is the mobile entity and travels along a Path that is defined with respect to the Ground, i.e., *the window*. The particle in (54b) corresponds to the same morpheme as the preposition, and differs from it in that it lacks an overt Ground. According to Svenonius, this is the essential difference between prepositions and particles. In the case of particles, the precise end point of the Path (the Ground) has to be inferred from the context.

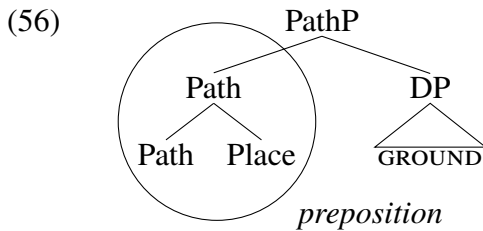
This description naturally extends to the Slavic situation (as Svenonius 2004 points out); the pair of examples in (55) brings it out.

- (55) a. Petr kráčel **od** fakulty.
 Petr walked away.from faculty
 ‘Petr walked away from the faculty.’

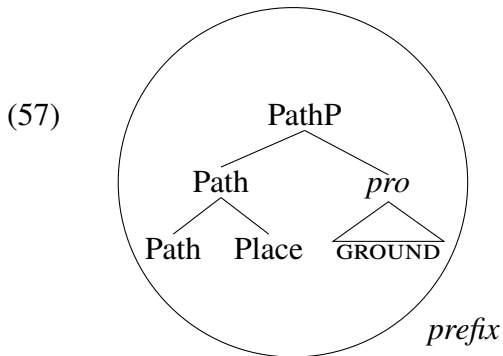
- b. Petr **od**-kráčel.
 Petr away-walked
 ‘Petr walked away.’

In terms of our theory, we can encode this descriptive difference by proposing that particles/prefixes lack the Ground argument because they incorporate it. Under this view, the Ground argument is present in the structure, and corresponds to a *pro*-type DP whose reference must be determined from the context. This *pro*, we propose, is the mysterious *EX* that is contained in prefixes (and missing in prepositions).

In order to see how that works in detail, consider first the structure we have proposed above for prepositions in (44). We give its essence in (56), where we ignore the head-movement step.



In this structure, the rough constituency is the same as in (44) in that we have Place and Path grouped in a single constituent, and the Ground is outside of this constituent. What we propose is that when the Ground argument is missing, it is spelled out inside the prefix, as in (57).



This is nothing but a specific implementation of the idea that prefixes and prepositions are not identical, but they stand in a containment relation (with prefixes containing prepositions).

However, the lack of the Ground argument is not the only difference between prepositions and verbal prefixes. To see that, consider the fact that some prepositions in Czech (the so-called ‘improper’ prepositions) simply allow for the Ground argument to go missing without automatically turning into prefixes. An example is given in (58).

- (58) Improper prepositions
- a. Petr kráčel **kolem** fakulty.
Petr walked around faculty
'Petr walked past/around the faculty.'
 - b. Petr kráčel **kolem**.
Petr walked around
'Petr walked by.'
 - c. *Petr **kolem**-kráčel.
Petr around-walked
'Petr passed by.'

The data show that an adposition like *around* (seen in (58a)) can be used intransitively, as in (58b), but this does not immediately lead to prefixation; in fact, the adposition *kolem* cannot be prefixed to the verb at all, see (58c). Therefore, there must be at least one more thing that distinguishes prepositions and prefixes (the surface absence of the Ground argument on its own is not enough).

Let us now therefore focus on the difference between items like *kolem* 'around' and items like *od* 'away from.' The pattern in (59) provides a minimal pair to the one in (58).

- (59)
- a. Petr kráčel **od** fakulty
Petr walked away.from faculty
'Petr walked away from the faculty.'
 - b. *Petr kráčel **od**
Petr walked away.from
 - c. Petr **od**-kráčel
Petr away-walked
'Petr walked away.'

What we can see is that the adposition *od*- 'away from' differs from *kolem* 'around' in its positioning. While *kolem* 'around' cannot be prefixed (recall (58c)), *od*- 'away from' must be prefixed.

A related difference concerns interpretation. The sentence with the prefix is interpreted as perfective, while the sentence without the prefix is imperfective. Specifically, the prefixed verb is incompatible with *začít* 'start,' see (60a), while the non-prefixed verb is, see (60b).

- (60)
- a. *Petr začal **od**-kráčel.
Petr started away-walk
Intended: 'Petr started to walk away.'
 - b. Petr začal kráčel **kolem**.
Petr started walk around
'Petr started to walk around.'

These observations lead us to the conclusion that the absence of Ground is not the only difference between prefixes and prepositions: prefixes also have a special position and semantic contribution.

These conclusions are strengthened by the fact that Czech actually has a prefix corresponding to the meaning ‘around,’ namely *ob-*. When prefixed to the verb, it changes the aspect, compare (61a,b).

- (61) a. Petr *motal* provaz **kolem** stromu (dvě hodiny).
 Petr wrapped rope around tree (two hours)
 ‘Petr wrapped the rope around the tree (for two hours).’
 b. Petr **ob-***motal* provaz **kolem** stromu (za dvě hodiny).
 Petr round-wrapped rope around tree in two hours
 ‘Petr wrapped the rope around the tree (in two hours).’

All of this shows that it is not enough to say that Czech prefixes are intransitive prepositions. We must make an additional distinction between intransitive prepositions like *kolem* and prefixes like *ob-* (both ‘around’). The crucial difference is that prefixes – in addition to being intransitive prepositions – also trigger perfectivity.

In order to theoretically encode this difference, we will rely on the idea put forth in Ramchand & Svenonius (2002) for English and elaborated for Slavic in work by Romanova (2007). The idea is that prefixes (very much like particles in English) also add a result state to the event expressed by the verb, which makes the verb telic. The technical aspects of this proposal are couched in Ramchand’s (2008b) decomposed-VP model, which corresponds to the second crucial ingredient of our approach.

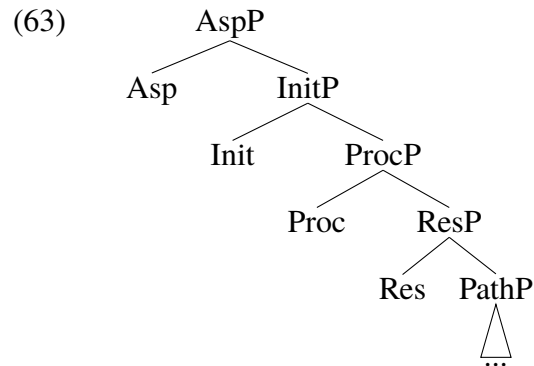
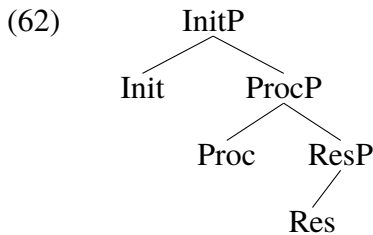
1.6 Prefixes as resultatives

In this section, we put forth a proposal concerning the non-spatial contribution of verbal prefixes. Broadly speaking, the non-spatial contribution is aspectual: prefixes make verbs telic and perfective, though not necessarily both at the same time. In order to understand the aspectual contribution of prefixes, we describe the decompositional approach to verb structure explored in Ramchand’s (2008b) work. This is going to allow us to identify the specific parts of the verb phrase that are influenced by the prefix’ presence, thereby being able to identify the specific meaning components contributed by the prefix. This part of the theory is going to be relevant first of all for differentiating between intransitive prepositions (adverbs) like *kolem* ‘around’ and prefixes like *ob-*. Second of all, the proposal also provides the basis for differentiating the role of the prefix in nominal and verbal environments.

In Ramchand’s decompositional approach to verbs, each event may contain up to three different sub-eventual components: Initiation, Process and Result. For example, a verb like *give* in

Mary gave Bill the book is going to have all three components: *Mary* initiates/causes a process where *the book* is changing location/possession. This process in turn leads to the result that *Bill* has the book.

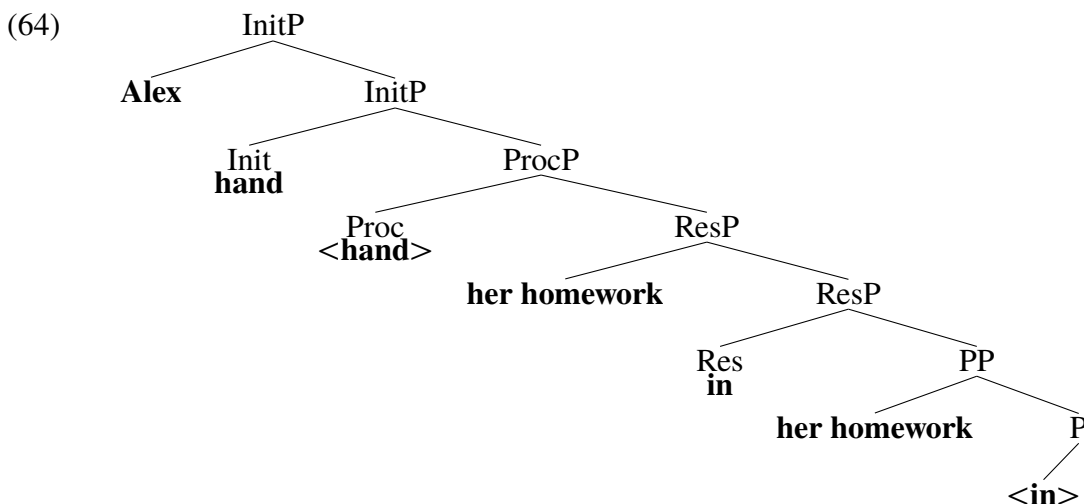
These three components (called Init, Proc, Res) are structured as shown in (62). We have Init as the topmost sub-event, and in Ramchand's system, it is linked by a 'lead-to' relation with its complement. The complement is complex, and it includes the Proc(ess) head, which is again linked by the 'lead-to' relation with the result.



The aspectual information, we assume, is still higher up in the structure (above Init). We will have more to say about the distinction between a perfective and imperfective aspect later on.

In addition to the aspectual head above Init and Proc, in (63), we also place a PathP in the complement position of the Res head. This is the same place where Ramchand also places directionals.

In Ramchand (2008b: p. 131ff) (cf., Ramchand & Svenonius 2002), English particles are introduced as adpositional heads below Res, but obligatory move up to Res and provide a result to the whole event. Ramchand's proposal for the sentence *Alex handed her homework in* is shown below:



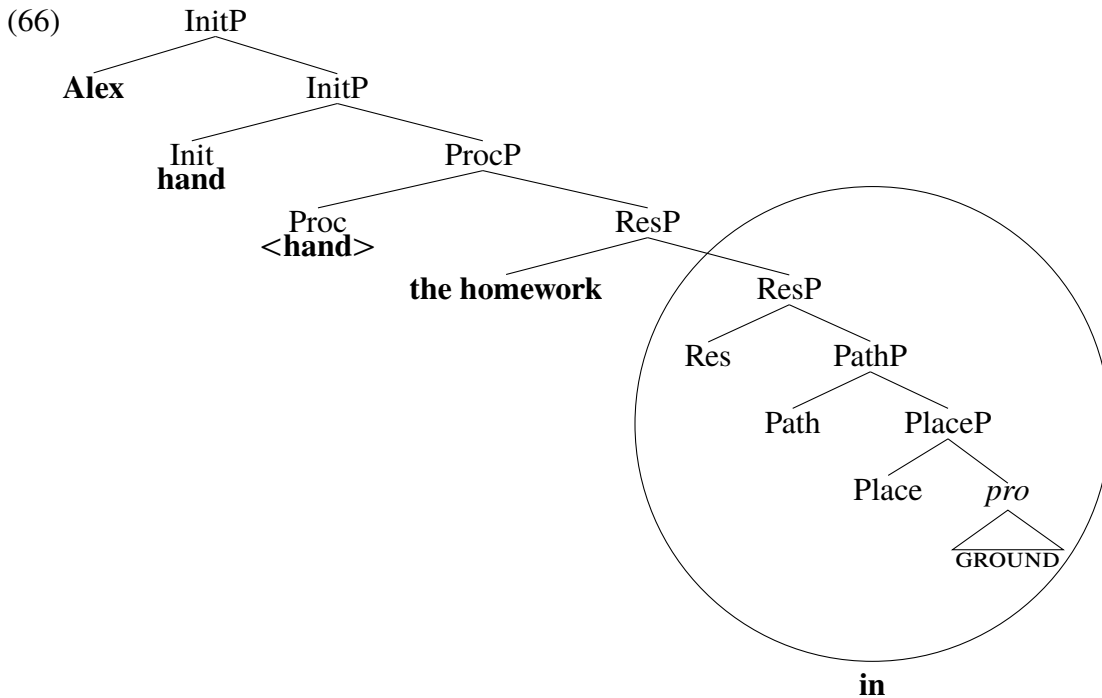
What we see here is that the particle *in* lexicalizes both a P head in the complement of Res and also Res itself. In Ramchand's terminology, the particle 'identifies' the resulting state: as a result

of the event, the homework is ‘in.’ Romanova (2007: p. 104) extends this approach to Russian prefixation and we shall adopt a version of it here as well: what is crucial for us is the idea that prefixes are not only intransitive prepositions (describing a Path with respect to some implicit Ground), they also provide a result to the event by lexicalizing the Res head, thereby making the verb telic.

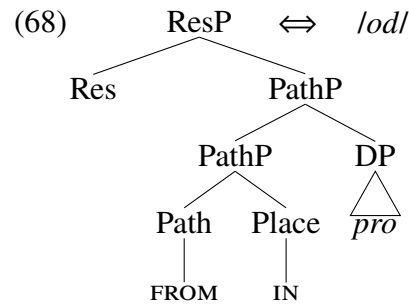
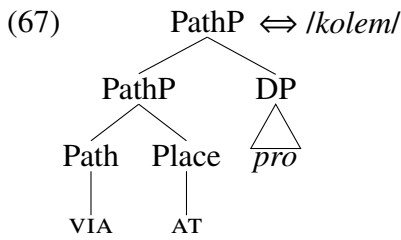
The idea that prefixes lexicalize Res will, in our account, be one of the properties that distinguishes them from regular intransitive prepositions like ‘around;’ recall the contrast in (65).

- (65) a. Petr **od-** / ***kolem-** kráčel
 Petr away around walked
 ‘Petr walked away/around.’
 b. Petr kráčel ***od** / **kolem**
 Petr walked away around
 ‘Petr walked away/around.’

The specific way in which we shall implement this proposal is by adding the Res head into the set of heads spelled out by the prefixes. The following diagram depicts the bare bones of our idea on the very same English sentence discussed in Ramchand, see (66). The reason why we show this tree is not to provide an account for English; rather, the goal is to show that our proposal is related to other similar ideas in the literature with small differences of a rather technical nature.



In sum, what we are proposing is that Czech intransitive prepositions like *kolem* ‘around’ lexicalize the structure as in (67), while prefixes lexicalize the Res head in addition, see (68).



The presence of Res is what gives prefixes the extra resultative value compared to regular (intransitive) prepositions like ‘around.’ In plain terms, lexicalizing Res turns an intransitive preposition into a morpheme that is simultaneously making the verb telic.

At this point, we have theoretically encoded a difference between three kinds of objects, see (69).

- (69)
- a. regular prepositions (spell out Path+Place)
 - b. intransitive prepositions (spell out Path+Place and GROUND)
 - c. prefixes (spell out Path+Place, GROUND and Res)

What we have, however, still not touched upon is the relationship between long vs. short prefixes, i.e., we have not yet provided a proposal as to what the difference between *vy-/vý-* (both ‘out’) is. The obvious point about these two prefixes is that both are prefixes, i.e., they must be both different from *kolem* ‘around,’ which is not a prefix. Guided by this simple reasoning, what we now need to provide is a further bifurcation within the class of prefixes given (69c).

The specific way in which we shall implement the bifurcation will be guided by two types of considerations. The first thing we need to capture is the systematic nature of the alternation in the class of alternating prefixes: there is a clear and predictable relation between the verbal version of the prefix and the nominal version, specifically, the nominal allomorph equals to the verbal allomorph plus length. This is something that we have already seen in Table (20), which we repeat (in an abbreviated form) for convenience in (70).

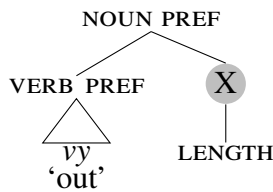
(70) Vowel final prefixes

	VERB	NOUN	
ALTERNATING PREF			
get on	<i>na-stup</i>	<i>ná-stup</i>	onboarding
get out	<i>vy-stup</i>	<i>vý-stup</i>	offboarding
NON-ALTERNATING PREF			
change (vehicle)	<i>pře-stup</i>	<i>pře-stup</i>	transfer
move on	<i>po-stup</i>	<i>po-stup</i>	<i>progression</i>
SUPPLETIVE PREF			
to join by flowing	<i>s-tékat</i>	<i>sou-tok</i>	confluence

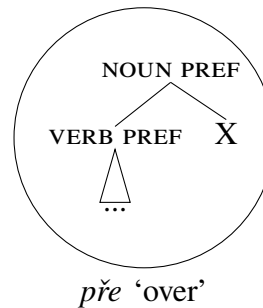
At the same time, we need to capture the fact that there are also two additional classes, which we have called non-alternating and suppletive.

The need to capture these three classes leads us to the following proposal. First of all, the regularity of the alternation is suggestive of a morphological decomposition where length is the morphological realization of a particular feature, present in the nominal prefix but lacking in the verbal prefix. We show this idea in (71). What we depict here is a situation such that the alternating prefix (e.g., *vy-* ‘out’) spells out a particular projection labeled **VERB PREF**. This is the prefix structure that attaches to verbs. With nouns, an extra feature **X** must be present, highlighted by shading. The length spells out this additional feature. In this setting, the alternation between *vy* and *vý* is then morphologically compositional, even though the length is phonologically realized jointly with the prefix.

(71)



(72)



Under this view, non-alternating prefixes can be captured as in (72). The idea is that non-alternating prefixes are lexically stored in a way that they can spell out the full nominal prefix as one piece. This blocks the insertion of length as an independent realization of the projection **X**, and makes sure that such prefixes can also spell out (due to the Superset Principle) any structure that is contained within this prefix; this includes the structure of the verbal prefix. As a

consequence, the prefixes do not alternate, because the same lexical item spells out the larger nominal-prefix structure as well as the verbal-prefix structure.

Finally, the analysis depicted in (72) also allows us to capture the irregular alternation between *s-* and *sou-* ‘together.’ The way these prefixes can be incorporated into the theory is by treating *sou-* as the spell out of the nominal-prefix structure, while *s(e)-* will be stored as the spell out of the smaller (verbal-prefix) tree that lacks X. Therefore, even though *sou-* can in principle spell out the verbal-prefix structure (just like any nominal prefix can), once X is missing, *sou-* will lose in competition to *s(e)-*.

Note that the competition between *sou-* and *s(e)-* should have the same result (*s(e)* winning) also for the prepositional structure, which is still embedded inside the verbal-prefix structure. Therefore, if there was no dedicated preposition for the relevant meaning, *s(e)* should again be a better match for the prepositional structure. This is a correct result, since *s(e)* can be used as a preposition meaning ‘(together) with.’

Let us now systematize these observations. The essence of our proposal as it now stands is that the nominal prefix contains the verbal prefix, and that the verbal prefix in turn contains a prepositional structure. This leads to a type of a nesting relation, where a *ABA constraint is expected to hold over the forms of the nominal prefix, the verbal prefix and a preposition. We note this in (73).

(73) A *ABA constraint on the shape of Ps

In the sequence NOMINAL PREFIX – VERBAL PREFIX – PREPOSITION, only contiguous regions can be marked the same.

This constraint is a correct description of the Czech situation. In Table (74), we illustrate the allowed (contiguous) syncretisms. In the first two lines, we see the items that we call ‘non-alternating’ prefixes. This is because they have the same shape for the verbal-prefix column and the nominal-prefix column. The two lines differ in whether the non-alternating prefix is different from the corresponding preposition (AAB) or identical to it (AAA).

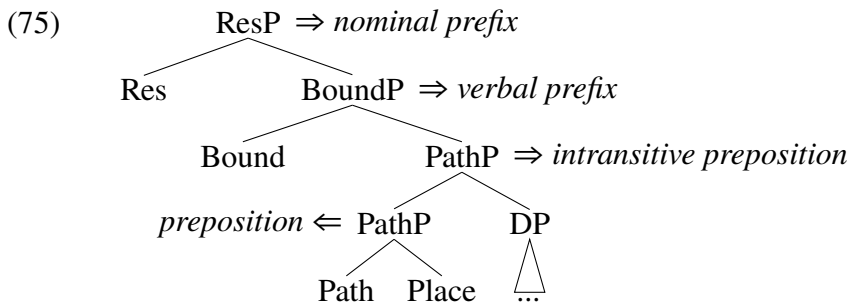
(74) Patterns of syncretism

GLOSS	NOMINAL PREFIX	VERBAL PREFIX	PREPOSITION	PATTERN
over	<i>pře</i>	<i>pře</i>	<i>přes</i>	AAB
under	<i>pod</i>	<i>pod</i>	<i>pod</i>	AAA
on	<i>ná</i>	<i>na</i>	<i>na</i>	ABB
through	<i>prů</i>	<i>pro</i>	<i>skrz</i>	ABC

The bottom two rows show alternating prefixes, i.e., those that have a different allomorph as verbal and nominal prefixes. These always give rise to AB... patterns. When the verbal prefix is the same as the corresponding adposition (e.g., *na*), we get an ABB pattern. When the

preposition is different, we get an ABC pattern. Crucially, the *ABA pattern is missing. We take this to be an important observation that suggests that our morphological decomposition of the prefixes is on the right track.

There are, nevertheless, several questions remaining. The first question is what the actual projection is that differentiates verbal and nominal prefixes (so far, we have been using X). Let us address this now. We know that both verbal and nominal prefixes (qua prefixes) contain Res. We will investigate here the option that Res is the highest of all the projections: in other words that Res is X. This requires us, however, to have one more lower projection that is present with prefixes and missing with intransitive prepositions like *kolem* ‘around.’ We will tentatively identify this projection as a node that contributes a Bounded interpretation of Paths (the idea of a Bound head in the structure of PPs is originally postulated in Pantcheva 2011). In sum, our final proposal that incorporates all the morphological guises of adpositional-type markers is as in (75):



The remaining questions concern three aspects of prefixes. (i) Their prefixal nature: what makes these morphemes prefixal in Czech, but not in English? (ii) What governs the distribution of the long-short prefix? Why do we get the smaller prefix structure with verbs and the bigger one with nouns? (iii) And finally, how can we use that proposal to account for the special ‘non-phonological’ distribution of $e \sim \emptyset$ alternation with the set of alternating roots investigated in Section 1.4?

In the remaining sections, we first provide a proposal for the positioning of the prefix with respect to the verb (Section 1.7). Then we turn to the issue as to how exactly the alternation between verbal and nominal prefixes arises, focussing primarily on the length alternation (Section 1.8-1.9). Finally, in Section 1.10, we address the question how the $e \sim \emptyset$ alternation can be explained within the same set of analytical assumptions.

1.7 Spelling out the structure of zero nouns

In order to have a concrete example to work with, let us now turn to one of the verbs that have an alternating vowel in their root, namely *br-á-t* ‘to take.’ Recall that what we need to capture are

two types of prefix alternations. The first one is the alternation between ‘short’ verbal prefixes (76a,b) and long ‘nominal’ prefixes (76c).

- (76)
- a. Petr **na- br -a -l** doktorandy.
Petr on take TH PAST graduate_students
‘Petr recruited graduate students.’
 - b. Petr **na- ber -e** doktorandy.
Petr on take PRES graduate_students
‘Petr will recruit graduate students.’
 - c. Petrův **ná- bor** doktorandů
Petr’s on take graduate_students
‘Petr’s recruitment of graduate students’

The second fact we need to explain is that with roots such as ‘take,’ we get an alternation between a vowel-final allomorph and a consonant-final allomorph in the same set of environments.

- (77)
- a. Petr **roze- br -a -l** situaci.
Petr apart take TH PAST situation
‘Petr analyzed the situation.’
 - b. Petr **roze- ber -e** situaci.
Petr apart take PRES situation
‘Petr will analyze the situation.’
 - c. Petrův **roz -bor** situace
Petr’s apart take situation.GEN
‘Petr’s analysis of the situation’

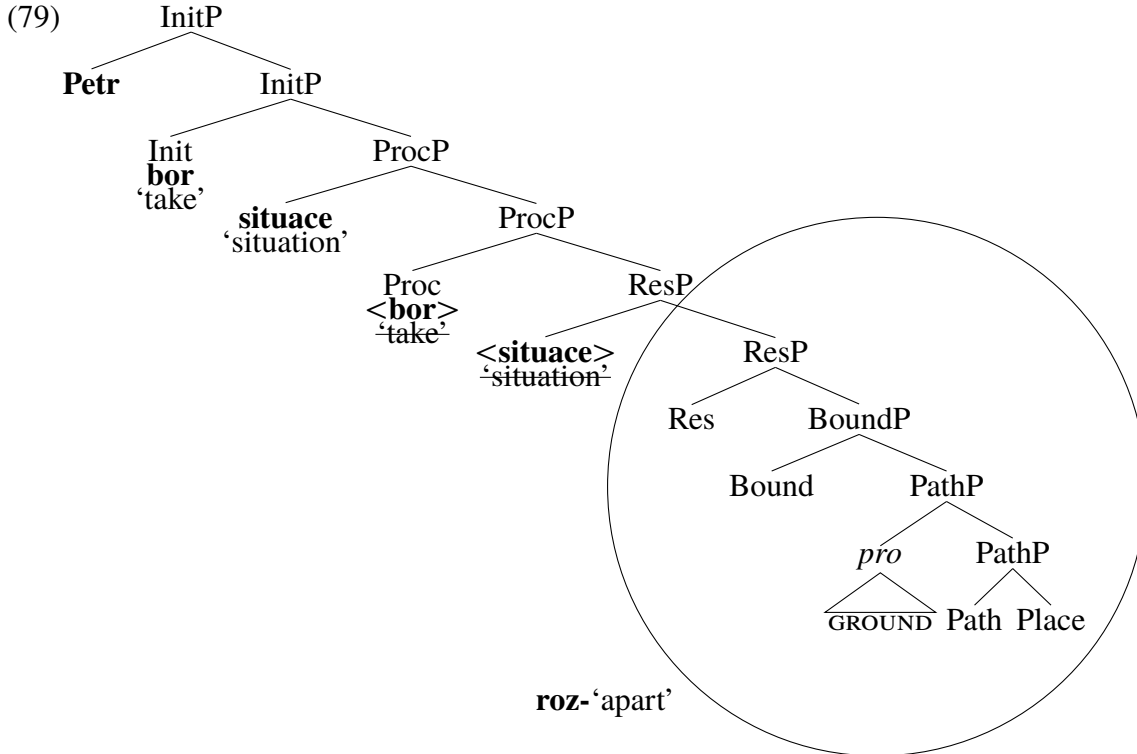
In our analysis of these examples (and the other examples discussed in Section 1.4), we shall need to distinguish three mildly suppletive forms of the root ‘take,’ see (78).

- (78)
- Three types of roots
 - a. Past participle root (*br*, CC)
 - b. Present tense root (*ber*, CVC)
 - c. Nominal root (*bor*, CVC)

Given this collection of different roots, what we would like to derive is the fact that the prefix selected by roots (78a,b) is the same, while the nominal root (78c) combines with a different form of the prefix. The account will be morphological (rather than phonological) in nature, since the phonology of the roots apparently groups (78b,c) together (CVC) against (78a) (CC); but as already mentioned, the prefix has one shape in verbs (78a,b) and a different shape in nouns (78c).

In this section, we show how the nominal structure is derived. We shall work under the assumption (Borer 2014, Fábregas 2014) that the structure of zero nouns is contained inside

the structure of verbs. The nouns that we are looking at here in (76c) and (77c) are simplex event nouns, containing potentially the slot for the Initiator and the Undergoer (in Ramchand's 2008b terminology). We will therefore analyze the nominal root as an item that is capable of lexicalizing the projections that introduce the Initiator and the Undergoer of the event. The specific way we divide the work between the root 'take' and the prefix 'apart' is as shown in (79).



At the bottom of the tree, we find an elaborate ResP, which includes all the projections that we have introduced in the previous section. In (79), the ResP is spelled out by a non-alternating C-final prefix *roz-* 'apart.' In the previous section, we have made it clear that if the structure included an alternating prefix like *vy-* 'out,' the bottom part of the structure would be bi-partite: we would have *vy-* 'out' spelling out BoundP, and Res would be spelled out by the extra length. Jointly, the two pieces would provide the spell out of ResP as *vý-* 'out' (with a long vowel).

Above the ResP, we find a 'classical' Ramchand-style structure, similar to her analysis of the light verb 'take' in Hindi Ramchand (2008b: 146). In this structure, we place the nominal root *bor* 'take' as the spellout of the heads Proc and Init. The lower position is placed in <angled brackets>, a notation that Ramchand uses for traces. Similarly, the noun *situace* 'situation' occupies two positions in the structure, since it is both the Resultee (it ends up 'taken apart/analyzed' as a result of the event) and it is also the Undergoer as it is getting analyzed in the course of the event.

What is important about this structure is not the word order: as we can see, the particle follows the root *bor* 'take' here, which is correct for English but wrong for Czech. We shall

look into this issue immediately; what we want to do first is to establish the idea that the verb ‘take’ (represented by the nominal root *bor* in (79)) lexicalizes two components of the structure, namely Init and Proc. As to how exactly this happens within Nanosyntax and how the correct order is derived will be dealt with in the following paragraphs.

In the structure, we also include the two arguments of the verb ‘analyze.’ We have already mentioned the Undergoer/Resultee, but there is also the argument *Petr*, which is the Initiator. In the course of the derivation, the Initiator ultimately moves out of the (decomposed) VP and ends up in a specifier of some verbal or nominal functional projection, a standard proposal for subjects. Following a derivation described in Caha & Ziková (2016), we are assuming that also the second argument ‘situation’ moves out of the decomposed VP to the specifier of a functional head analogous to the AgrOP of Chomsky (1993), which is higher than the InitP (cf., Kayne 1998, Taraldsen 2000). After the arguments evacuate the InitP, the InitP only contains the head material and it is the spellout of such a constituent that we will be describing in what follows. We shall come back to the placement of the verb with respect to the arguments later in (92).

With our assumptions about the arguments clarified, let us now focus on the issue of how the nominal root *bor* ‘take’ spells out the projections Init and Proc. In our theory of lexicalization (which is based on phrasal spellout), these two heads must form a constituent. There are (in principle) multiple ways in which this can happen, and different languages may use different strategies. For example, in English, we shall propose that these two heads are merged together in a separate constituent in a manner that resembles the result of head movement of Proc to Init. In Czech, however, a different option emerges, namely one where the two heads form a constituent after the prefix evacuates the InitP and moves to the left (thereby preceding the verb).

We shall now present an algorithmic approach to phrasal spellout (based on Starke 2018) that allows us to formalize the precise sequence of derivational steps that lead to the creation of constituents that are lexicalized in individual languages. This algorithm is currently standardly used in Nanosyntax in order to drive derivations in many empirical domains.⁴

A crucial part of this algorithm is the idea that spell out proceeds cyclically. We state this as (80) for clarity, although we note that in the actual implementation, Cyclic Phrasal Spellout is ultimately the consequence of the spellout algorithm to be presented shortly, rather than its pre-requisite.

(80) Cyclic Phrasal Spellout

Spell out must successfully apply to the output of every Merge F operation. Since Merge proceeds bottom-up, so does spellout. After successful spellout, the derivation may terminate, or proceed to another round of Merge F.

⁴For work using this type of derivations, see De Clercq & Vanden Wyngaerd (2017), De Clercq & Vanden Wyngaerd (2018), Baunaz & Lander (2018), Bergsma (2019), Caha, De Clercq & Vanden Wyngaerd (2019), De Clercq (2019), Wiland (2019), Caha (to appear), Vanden Wyngaerd et al. (2020), Kloudová (2020), Ziková & Faltýnková (2021).

The Spellout algorithm itself is as formulated in (81).

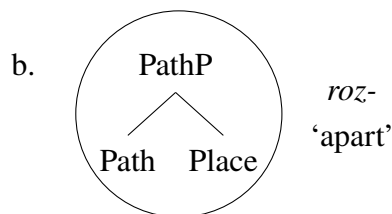
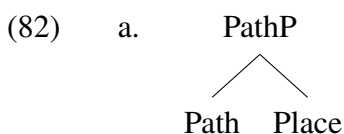
(81) Spellout Algorithm (based on Starke 2018)

- a. Merge F and spell out.
- b. If (a) fails, try Spec-to-Spec movement of the node inserted at the previous cycle, and spell out.
- c. If (b) fails, move the complement of F, and spell out.

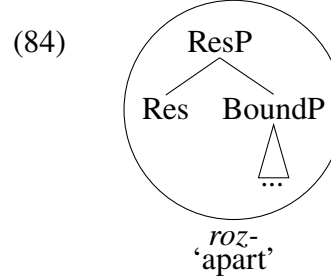
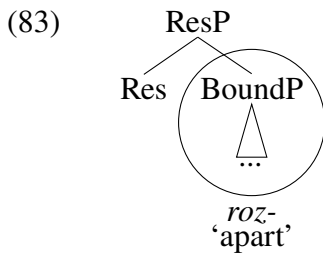
We can see that the algorithm (81) is the actual piece of the theory which implements cyclicity. This is due to the fact that all the derivational options always insist on the sequence of steps MergeF – try to spell out, see, e.g., (81a). Additional Merge F may only continue if spellout succeeds, and hence, with cyclic spellout as a result.

If direct spellout fails, the clauses (81b,c) of the algorithm say that syntax must perform certain types of ‘rescue’ movements: Spec movement or complement movement. These apply in a pre-defined order given in (81b,c) – and after each of these is tried, we must again try to spell out the structure by matching it against lexical items stored in the postsyntactic lexicon. However, there is no option of adding another feature before spell out succeeds. Cyclicity is thus result of the definitions in (81).

Let us now go step by step through the derivation of the zero nominalization, using the algorithm (81). In our particular case, the derivation starts by assembling the Path and Place features, as in (82a), and tries to spell out the phrase thus constructed. Spellout is successful, since *roz-* ‘apart’ matches this constituent, see (82b).

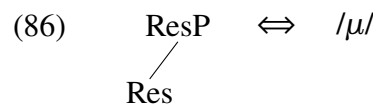
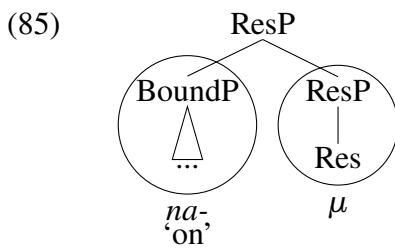


When spellout succeeds, the derivation continues by adding features and spelling out again. Let us suppose that the derivation continues in this way until the whole BoundP is assembled, spelled out as *roz-* ‘apart’ and subsequently merged with the Res head, yielding (83). (The structure (83) corresponds to the nominal prefix.) The newly formed structure must now be spelled out, as required by the spellout algorithm (83). The whole structure can still be spelled out by the C-final prefix *roz-* ‘apart’ without any movements, see (84). Recall that *roz-* is a non-alternating prefix, whose lexical entry can spell out all the features of the nominal prefix.



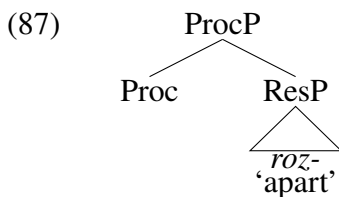
The reason why this derivational step is interesting is because it proceeds differently with alternating V-final prefixes, such as the prefix *na-* ‘on.’ This prefix can only spell out BoundP. This means that when Res is merged on top of this prefix, yielding a structure like the one in (83), spellout without movement fails: the lexical entry of *na-* ‘on’ does not contain Res. (This is the defining characteristic of alternating prefixes.)

When direct spellout fails, this means that other options of the spellout algorithm (83) have to be tried. The first option is the so-called Spec movement, which says that the Spec of the complement should be moved across the newly added feature. However, the phrase in (83) has no movable Spec, and so we try the next option, which is the complement movement step. This step takes the complement of Res and moves it to the left, producing the structure (85). In the tree (85), we are leaving out the trace of the moved element, since Starke (2018) suggests that movements triggered by the Spellout algorithm (83) leave no trace.

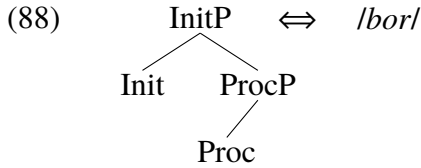


What we are assuming is that the lexical entry for the length marker is as in (86), inserting an extra mora (μ). When Spellout algorithm moves BoundP to the Spec of Res, as in (85), the lexical entry (86) perfectly matches the remnant ResP and spells it out, as the right-hand circle in (85) shows. As a result, the extra mora is inserted as the realization of Res and the prefix is lengthened.

So at this point, we have the long (nominal) prefix *ná-* ‘on.’ The derivation now continues by merging Proc on top of ResP. Suppose we merge it on top of the prefix is *roz-* ‘apart,’ yielding (87).

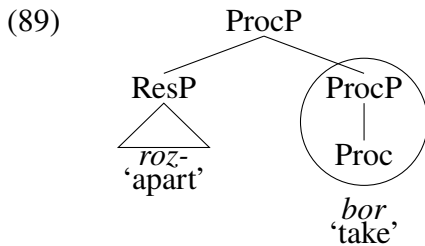


Our idea about the lexical entry for the nominal root *bor* ‘take’ is as given in (88). This lexical entry spells out the features Init and Proc, as tentatively proposed in (79).



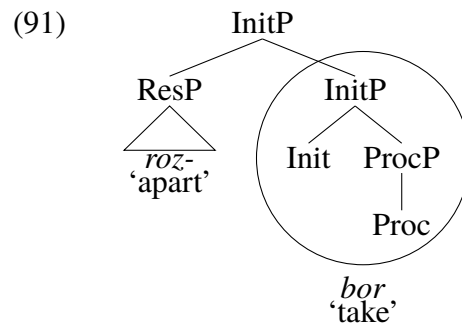
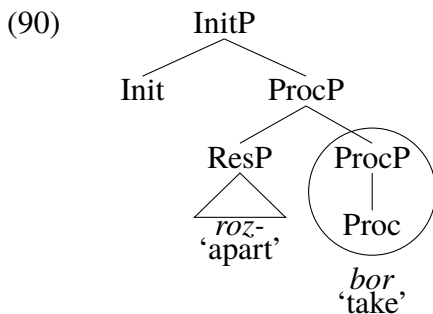
However, the entry cannot be used to spell out the ProcP in (87), because it does not contain this structure. Therefore, spellout without movement fails. Recall that when this happens, the spellout algorithm requires that repair movements take place. The first repair movement is the movement of the Spec of Proc’s complement. However, there is no such Spec in (87), and so this repair movement cannot be executed. As a result, there is no change and spellout still fails.

After Spec movement fails, the movement of Proc’s complement takes place. The complement corresponds to the ResP spelled out by the prefix *roz-*. Therefore, this movement places the prefix to the left of the root, see (89).



After this movement the remnant ProcP is spelled out by *bor*, see the circle in (89). Spellout is now possible since the circled ProcP is contained in (88).

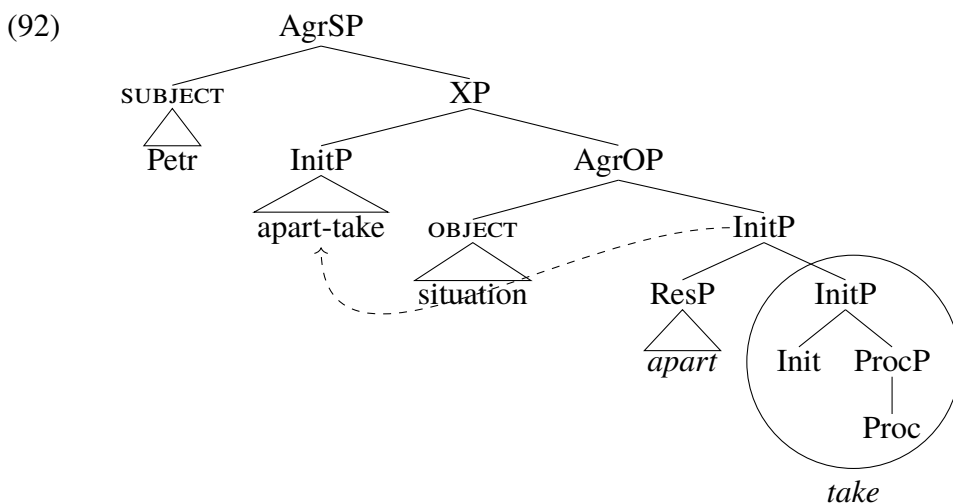
The derivation now continues by adding Init on top of (89), yielding the structure (90), which fails to spell out without any movement. Therefore, Spec movement is tried, yielding (91). Once again, the trace is ignored.



After movement, the remnant InitP is matched by the lexical item for *bor* ‘take.’ This way, we derive the prefixed noun *roz-bor* ‘analysis’ in Czech (recall (77) where we present this noun in a larger context).

Had we merged the Proc and Init heads on top of a ResP spelled out by the prefix *ná-* (recall (85)), we would derive the form *ná-bor* ‘recruitment.’ (This noun was introduced in (76).) The structure of the noun would be very much the same as in (91), with a difference in the prefix structure, as we have proposed this above in (85). In sum, the derivations described here correctly derive the forms *roz-bor* ‘analysis’ (with a non-alternating prefix) and *ná-bor* (with a long alternating prefix).

The last thing we want to make clear is what the arguments are doing. Recall that we are assuming that these arguments extract out of the InitP into positions that we are labeling as AgrS and AgrO for the lack of a better term. We assume that this happens both in clauses as well as in nominalizations, where the movement targets the nominal equivalent of these positions. The main point is that the complex InitP (whose spellout we just discussed) then moves in between the arguments that had extracted out of the VP as in (92). Recall again that even though we are labelling the landing sites of the subject and the object as AgrS and AgrO respectively; this is meant mainly as a variable for the relevant projection where the arguments move.



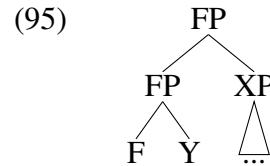
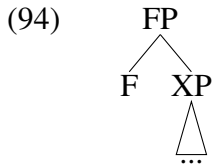
1.8 Merge F > Move FP > Merge FP

In this section, we look at how the nominal structure gets expanded into a verbal structure. In order to see what we need to account for, consider the pair in (93), repeated from (76).

- (93)
- a. Petrův **ná- bor** doktorandů
 Petr's on take graduate_students
 'Petr's recruitment of graduate students'
 - b. Petr **na- br -a -l** doktorandy.
 Petr on take TH PAST graduate_students
 'Petr recruited graduate students.'

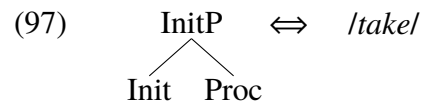
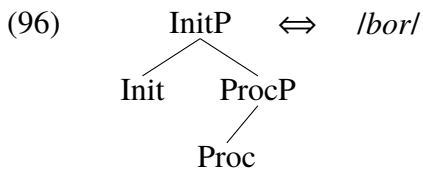
First, the nominal root (*bor*) changes into a verbal root *br* (the present tense shape *ber* will be tackled later). Second, the prefix changes from the nominal allomorph *ná-* to the verbal allomorph *na-*, and this activates its aspectual value (recall from (17) that the noun is aspectless). The final (third) change is the appearance of the thematic vowel *-a*.

In order to address these issues (the prefix alternation in particular), we need to introduce new derivational options offered by Nanosyntax. Specifically, we need to look into what happens when a feature *F* is merged and it actually cannot be spelled out at all, not even when all the options in the Spellout algorithm (83) are tried. The idea suggested in Starke (2018) is that if no spellout option works when *F* is introduced as a head (i.e., in a structure like (94)), then the feature *F* must be incorporated into a specifier, and the resulting FP is then added to the phrase marker instead of a single feature, see (95).



The two different ways of ‘providing *F*’ (namely (94) and (95)) are called ‘Merge *F*’ and ‘Merge *FP*’ respectively. Starke’s idea is that Merge *F* must be tried first, and only if it fails, Merge *FP* is tried.

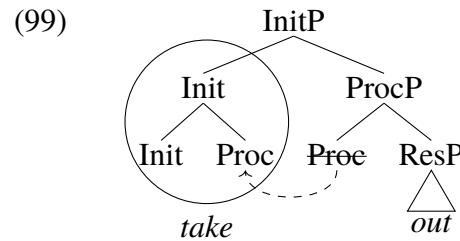
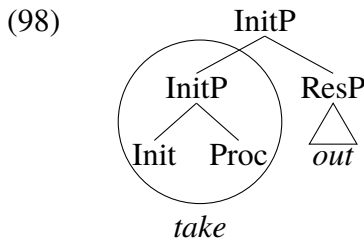
In order to see an actual example of how such a system works, consider the derivation of the English phrase *take out*. This phrase differs from the corresponding Czech phrase in the order of the root and the particle. (In Czech the particle precedes the root, in English, it follows.) A classical Nanosyntactic analysis attributes this difference in order to the two derivational options: while Czech introduces the verb using the Merge *F* option as in (94) (with subsequent movement of *XP* across *F*), English uses the ‘Merge *FP*’ option, where the verb corresponds to the *FP* that precedes the particle spelling out *XP*. In order to see why there is this difference, let us compare the lexical entry that we are assuming for the Czech *bor* ‘take’ and for the English verb *take*. While the Czech verb has a lexical entry as in (96) (repeated from (88)), English has an entry as in (97).



The English entry (97) will never be insertable in a configuration where *Proc* has a complement in syntax (i.e., *ResP*). That is because the entry cannot lexicalize such a structure. For this to be possible, the complement of *Proc* (i.e., *ResP*) would have to move out (as it does in Czech). But then when the complement moves out of *ProcP*, it leaves just a single feature *Proc* inside

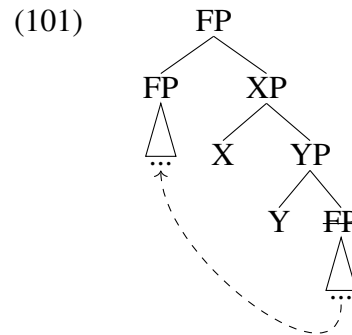
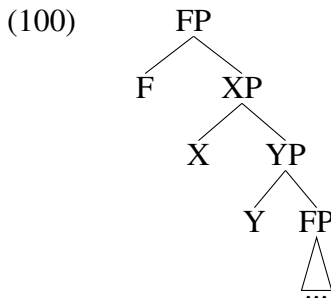
ProcP, such that Proc is dominated by a unary branching node, as in the Czech (96). However, the English entry has a different geometrical shape. Therefore, it can not apply to a structure where Proc has a complement.

As a result of English having the entry (97), the Merge F option fails in English. What must happen is that Init and Proc are merged in a separate derivational workspace, and only after they are assembled in a constituent, they are Merged (as a phrase) with ResP, see (98). This derivation is similar to a classical head-movement type of analysis, compare (98) and (99).



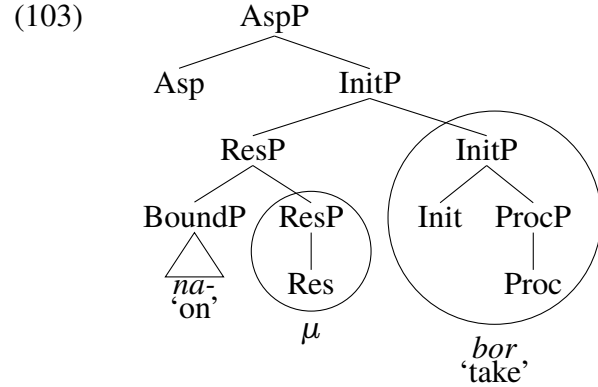
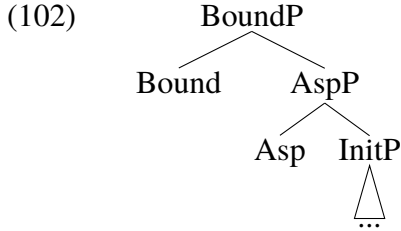
The final derivational option that has not been discussed yet, and which we shall need to drive prefix movement, is Move FP. This derivational option is explored in De Clercq (2019), who suggests that if Merge F fails (as in the case of English verbs), we do not jump directly to the Merge FP option, but we first try to move an FP. The ‘Move FP’ option consists in scanning the existing phrase marker for a phrase that already contains the feature F (which had failed to spell out via the Merge F option), and placing it on top of the existing phrase marker.

We depict this in (100) and (101). The idea is that we first try Merge F, yielding a structure like (100). We follow all the steps of the Spellout algorithm, but ultimately fail. Therefore, the existing phrase marker is scanned for a phrase containing F. If such a phrase is found (as it is in (101)), the phrase is attracted to the top of the phrase marker and ‘provides F’ as a label to the whole phrase. To repeat, the idea is that the derivational option of moving an FP is tried after Merge F fails, but before Merge FP, i.e., before creating a wholly new FP of the same type.

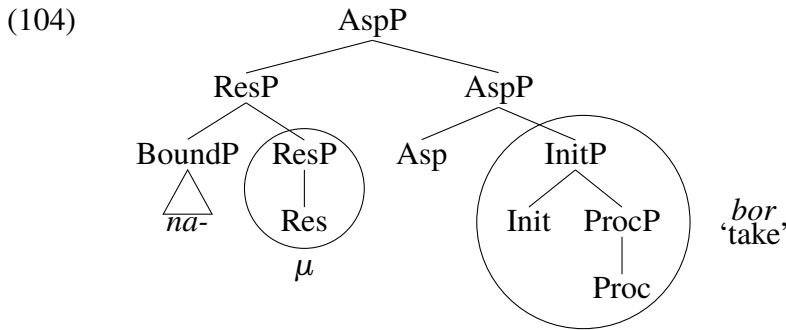


With all of this in place, let us now turn to the derivation of the Czech verb. The place where we left it was at the stage when Proc and Init were introduced, yielding a structure that (under our analysis) corresponds to the zero nominalization. When additional functional heads are added

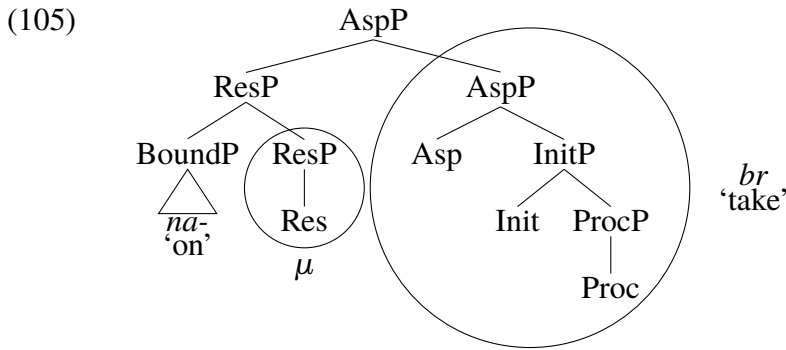
on top of the argument structure projections, a verb emerges. What we are suggesting is that above the argument structure projections, we find aspect. We shall pursue here an approach with two aspectual heads, Asp and Bound, see (102). The idea we follow is that if we add just Asp, we get the default imperfective aspect. When the aspect is perfective (delimited/bounded), we get the perfective aspect. The important thing here is that the boundedness of events (perfectivity) is linked to the same feature as the boundedness of Paths.



In (103), we apply this idea to the case of the noun *ná-bor* ‘recruitment’ (literally ‘on-take’). Specifically, we are continuing in a cyclic derivation, starting at InitP (whose spellout has been discussed in the previous section) and adding one head at a time. In (103), we are adding the Asp head. This structure cannot be spelled out ‘as is,’ and it will lead to movements. The first movement that must be tried according to the Spellout algorithm is Spec movement (of ResP), yielding (104).

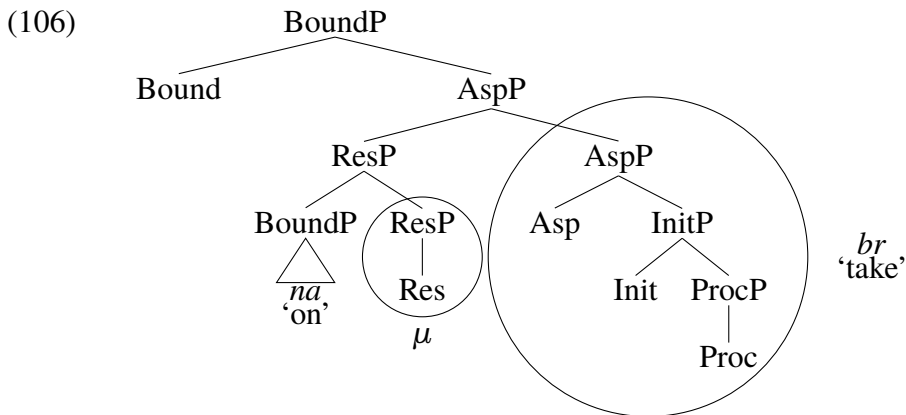


We shall proceed under the hypothesis that this spellout option leads to a successful lexicalization by the root allomorph *br*, yielding (105):



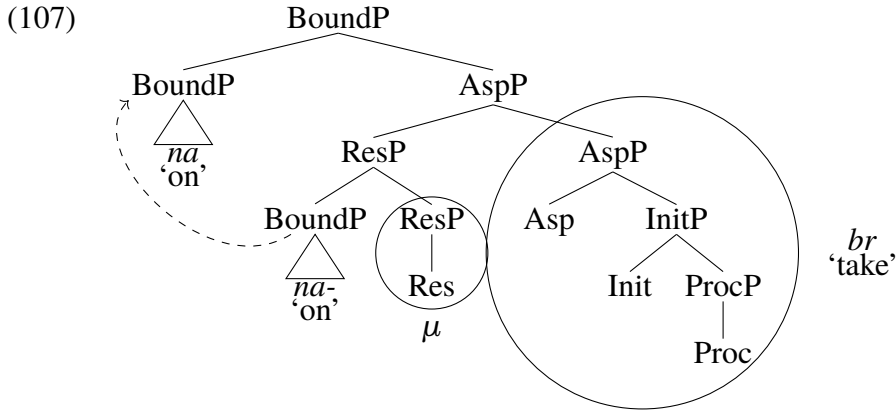
Note that at this point we have a structure that is no longer nominal; due to the presence of Asp, we are crossing into the realm of verbs (though the precise boundary is in part arbitrary). However, despite the fact that the root has taken on the verbal shape, the prefix is still long.

Let us now therefore consider how the prefix shortens. As we have highlighted above, perfectivity only arises when the perfective feature Bound is introduced on top of the imperfective structure (105), see (106).

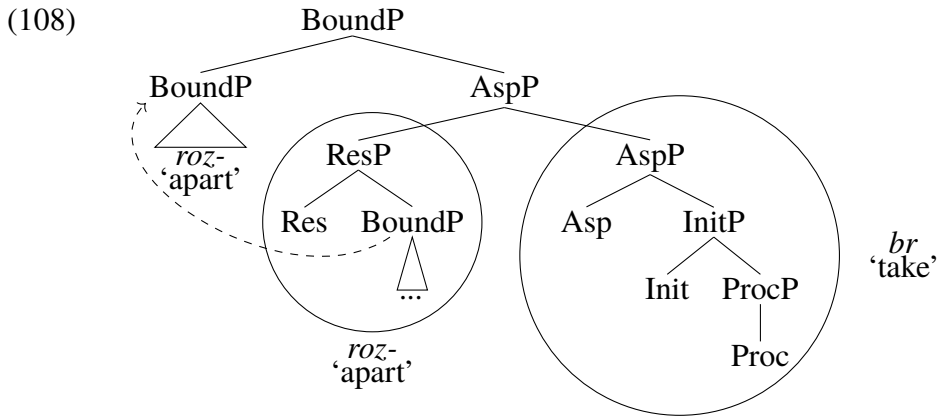


Ultimately, the derivation will lead to prefix shortening, which in Czech correlates with the structure becoming perfective. The way this happens is the following. First of all, we are assuming that there is no successful spellout for the Merge F option (there is no matching suffix spelling out the Bound feature). Therefore, once the spellout of (106) fails, the phrase marker is searched for a phrase that contains Bound, finding the prefix – and moving it up as in (107).⁵

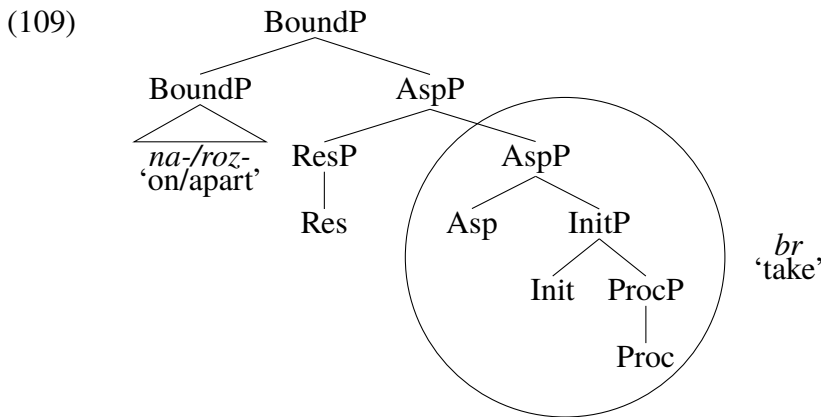
⁵This movement step is reminiscent of the Peeling derivations explored in Caha (2009; 2010), Taraldsen Medová & Wiland (2019). Sub-extraction is also explored in Wiland (2019).



Crucially, the very same sub-extraction is going to take place also with non-alternating prefixes such as *roz-*. The interesting difference here is that *roz-* actually spells out the whole ResP, and so sub-extraction (as if) disturbs the ‘lexical integrity’ of the prefix.



After the sub-extraction, we get a structure that looks as in (109), with the ResP left behind in Spec,Asp due to the sub-extraction of the BoundP from within that ResP.



After sub-extraction, the stranded Res head must be spelled out anew. This is clear in the case of the prefix *roz-*, see (108), where the leftover Res head clearly can no longer be spelled out by the prefix. Therefore, the previous lexicalization of ResP must be redone. In requiring re-lexicalization of the stranded Res, we follow the parallel to the Peeling derivations explored in

Caha (2009; 2010). In that work, the ‘re-lexicalization’ requirement was phrased as a requirement that leftover peels must be spelled out, which is itself just an instantiation of the general principle that all features must be spelled out (cf., Fábregas 2007).⁶

We know that one possible way of spelling out Res is to spell it out agglutinatively by length (i.e., by the addition of an extra mora μ). Suppose that this would be the case. Such a scenario opens the possibility that the extra length will remain in the morphological structure, but it will not be realized on the prefix, because the extra mora no longer forms a constituent with the prefix. Rather, after the movement, the extra length forms a constituent with the verb root, see (109). Hence, we could expect to see cases where a root – which is short in the zero nominalization – becomes long in exactly those forms where the prefix becomes short. Interestingly there are potential candidates for such an alternation, see (110).

(110)

ROOT	NOUN			GLOSS			VERB	GLOSS		
burn	zá-	pal	excitement	za-	pál	-i-l	set on fire			
target	zá-	měr	goal, aim	za-	mír	-i-l	took aim			
mix	pří-	měs	admixture	při-	mís	-i-l	mixed in			
burden	pří-	těž	burden	při-	tíž	-i-l	burdened			
buy	ná-	kup	shopping	na-	koup	-i-l	shopped			
extract	vý-	luh	extract	vy-	louž	-i-l	extracted			
blow	vý-	fuk	exhaust pipe	vy-	fouk	-a-l	blew out			
bite	vý-	kus	bite-off	vy-	kous	-a-l	bit out			
beat	vý-	prask	beating	vy-	prásk	-a-l	beat out			
twitch	ú-	štěp	splinter	u-	štíp	-a-l	pinch off			
tie	ú-	vaz	knot	u-	váz	-a-l	tied			
preach	pří-	kaz	order	při-	káz	-a-l	ordered			

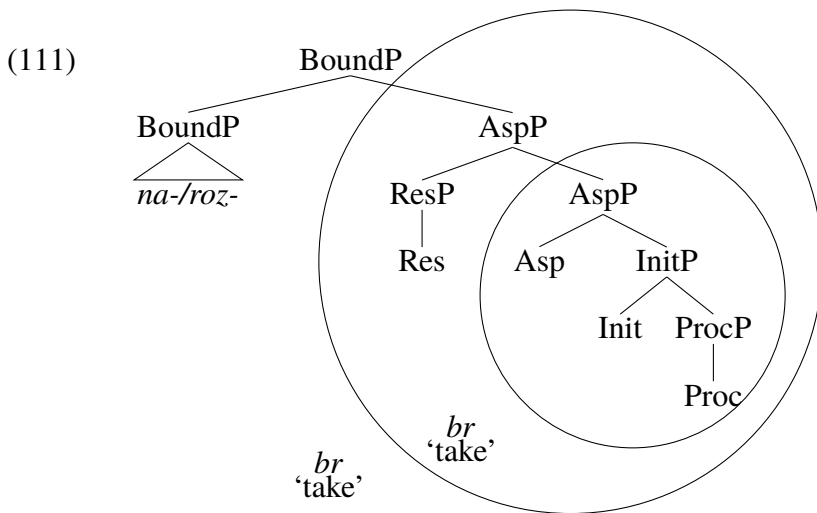
In the table, the root is always lengthened as we go from the noun to the verb, while the prefix is shortened; the list is not exhaustive.

It is interesting to note that if we adopted the traditional perspective where the noun is derived from the verb, we would describe the facts in the table as prefix lengthening – with a corresponding shortening of the root. This is the perspective taken in Scheer (2001), where he proposes that there is a phonological constraint imposed on the nominalization such that the combined phonological weight of the noun and the prefix cannot exceed 3 moras. Scheer’s idea is therefore that as the prefix lengthens (going from verb to noun), the root must shorten so that the overall weight does not exceed the trimoraic template.

⁶As we shall see, the spellout of the remnant ResP is going to succeed. On general grounds, we add to this that if it had failed, then the sub-extraction movement wouldn’t be possible. Instead, the derivation would move on to the Merge FP scenario.

In our account, the perspective is reversed: as the prefix shortens (due to sub-extraction), the stranded length is picked up by the root, which lengthens.⁷ This perspective allows us to extend the same account to cases with non-alternating prefixes such as *do-* ‘to.’ We shall say more about non-alternating prefixes later on, but the idea is that they too strand Res behind, even though this has no effect on the shape of the prefix (since the sub-extracted BoundP is spelled out the same as the original ResP). However, Res is still stranded and may trigger the lengthening of the verbal root, providing an explanation for pairs such as *do-táz* ‘a question’ and *do-tázat* ‘to ask.’ Specifically, our idea is that even though the prefix *do-* does not change shape, it still strands Res in the verbal form, hence the originally short root lengthens as a consequence of this. In Scheer’s account, adopting the reverse perspective, it is not clear why the root has a short vowel in the nominalization, since a hypothetical form such as **do-táz* ‘a question’ does not violate the trimoraic constraint.

At the same time, it is important to note that we do not necessarily expect that such length transfer from the prefix onto the root is always going to take place. This is because there are more options of spelling out Res than agglutinatively. Specifically, Res may also be spelled out as a part of the verb root, as in (111). In fact, whenever possible, this lexicalization option is preferred over agglutinative spellout due to the fact that lexicalization of phrasal nodes (whenever possible) will override the previous lexicalizations at lower nodes (Starke’s 2009 ‘Biggest Wins’ Theorem).



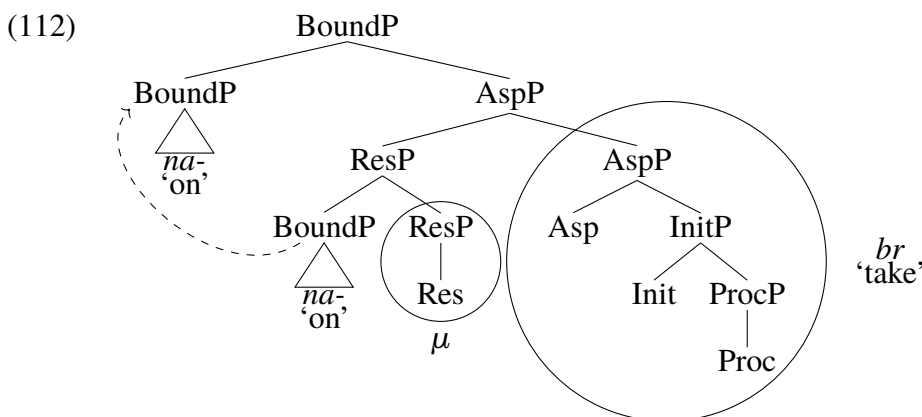
We believe that this phrasal-lexicalization option is what is correct for the root ‘take,’ as depicted in (111). Recall that at this stage, we have already switched from the nominal root *bor* ‘take’ (incapable of spelling out Asp) to the verbal root *br* ‘take.’ This verbal root can be part of both perfective structures (when it spells out Res) and also a part of imperfective structures (when it does not spell out Res). The latter option is relevant when there is no prefix in the structure.

⁷See also Ševčíková (2021) for a discussion of the directionality of derivation in noun-verb pairs.

Before we explore the derivation further, let us make explicit one thing about the structure (111). In particular, we shall assume that the structure depicted there is the common core contained in various verbal forms, including the present tense (*na-ber-e/roze-ber-e*) and the past participle (*na-br-a-l/roze-br-al*). All these verbal forms will include the steps of the derivation discussed here, by which we mean the addition of Asp and the sub-extraction of the BoundP phrase from within the prefix. The sub-extraction of the prefix leads to the need to re-lexicalize Res, and we have discussed this briefly in this section. There is, however, another relevant part, which is that also the prefix may need to undergo re-lexicalization, because it spells out ResP before movement, and BoundP after movement. In the next section, we shall therefore look in detail at how the shape of the prefix is derived in (109). This is important, because ultimately, the BoundP is going to correspond to the shape of the prefix that we shall see in all verbal forms.

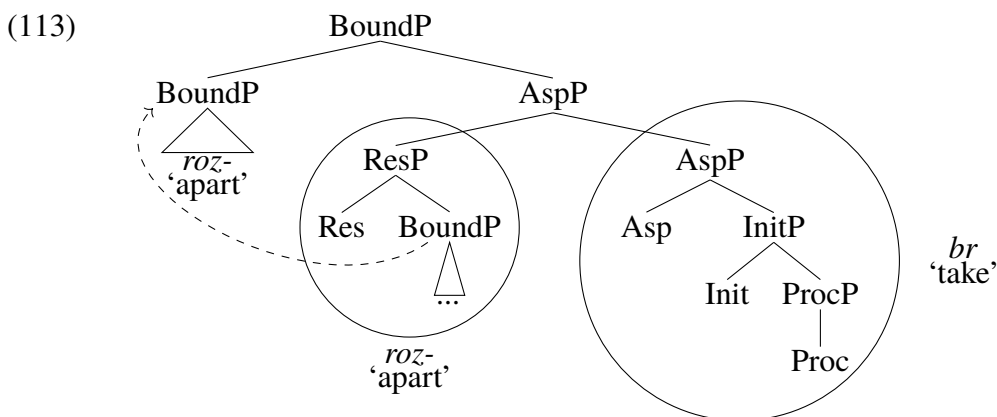
1.9 Re-lexicalizing prefixes

Our ideas about the fate of prefixes split in two branches. The first kind of narrative pertains to length-alternating vowel-final prefixes. Their derivation is shown in (112).



What we see here is that an alternating prefix like *na-* ‘on’ spells out exactly the same projection at the landing site as before movement. Therefore, there is nothing remarkable to be said about this prefix: the only interesting thing is what happens to the stranded Res head, and this is something that we have already covered in the previous section.

However, when the same movement targets a non-alternating prefix, an interesting thing happens, see (113).



In particular, the sub-extraction step takes place from within a lexicalized constituent, thereby (as if) disturbing the lexical integrity of a prefix like *roz-*. The main idea that we shall pursue here is that as a result of disturbing the lexical integrity of the prefix, the sub-extracted BoundP has to be lexicalized afresh, and that this re-lexicalization happens in the landing position of the prefix (i.e., after the movement).

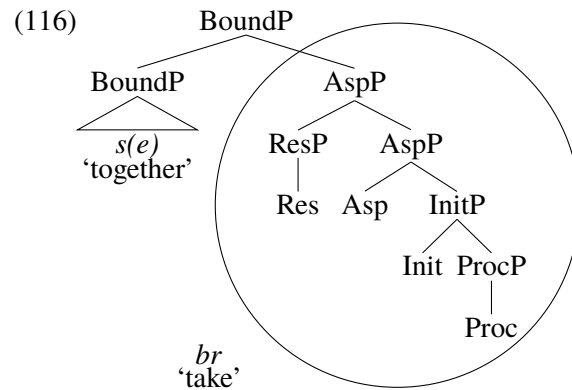
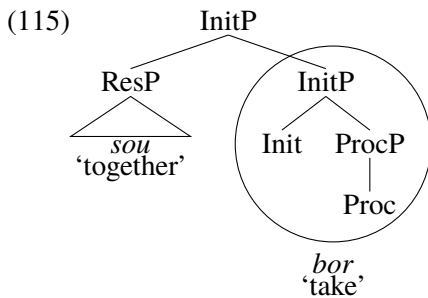
The clearest case in favor of re-lexicalization are suppletive prefixes, namely *sou-* vs. *s-* ‘together.’ This pair of prefixes gives rise to alternations like those in (114).

(114)

ROOT	NOUN		VERB	
take	sou-	bor	se-	br-a-l
write	sou-	pis	se-	ps-a-l
play	sou-	hr-a	se-	hr-á-l
flow	sou-	tok	s-	ték-a-l
tune	sou-	lad	s-	lad-i-l

Take a look, for instance, on the first line of this table. This line contains the well-known root ‘take.’ When we combine this root with *se-/sou-* ‘together,’ we get the verb *se-br-a-l* ‘collected,’ and the noun *sou-bor* ‘collection.’ The root alternates in the way we now expect, but the alternation between *s(e)-* and *sou-* is irregular (suppletive). (There is no productive phonological process in Czech where *ou* alternates with *e* or \emptyset .)

Such a suppletive alternation fares well with the idea that if the sub-extraction of BoundP disturbs lexical integrity, the sub-extracted element in the landing site must be re-lexicalized. This clearly allows for the possibility that the sub-extracted constituent is spelled out by a completely different lexical item than the original ResP out of which we sub-extract. We depict the structure of the nominal *sou-bor* in (115), and the structure after sub-extraction in (116). In each structure, the lexical item inserted is different. Without assuming re-lexicalization, this would be difficult to capture.



Now notice that as a consequence of prefix re-lexicalization, the prefix *s(e)-* (which replaces *sou-* after movement) enters the picture at the stage of the derivation where the root has already changed its shape from *bor* to *br*. The latter root has a bogus cluster with an empty nucleus in between the consonants. As a result, we expect that the shape of the prefix will be *se-* (else we would have the sequence of two empty nuclei **sø-bø(r)*). From the perspective of phonology, this is perfectly regular and expected.

Importantly, there is no expectation that the realization of the prefix *s(e)* should be somehow sensitive to the shape of the root in the nominalization (*bor*). This is because there is never any stage in the derivation where *s(e)-* would be prefixed to *bor*. This is because at the stage when the root is *bor*, the prefixal structure is different, and its spellout is taken care of by an independent lexical item, namely *sou-*.

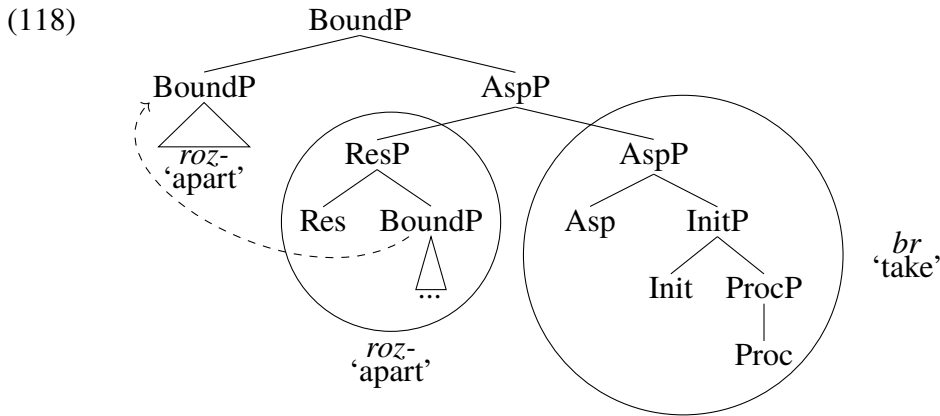
Similarly, we do not expect the shape *se-* before *bor*. The prefix that precedes *bor* spells out ResP, and *se-* does not even qualify as a candidate to spell out such a constituent, since in the lexicon, *s(e)-* has the size of BoundP. So, there is no expectation that the grammar will somehow extend the shape of the verbal prefix into the nominalization on the grounds of ‘paradigm uniformity.’

Let us now explore the consequences of this view for the class of non-alternating C-final prefixes like *roz(e)-* ‘apart.’ The concrete example we are trying to explain is as given in (117), repeated from (77).

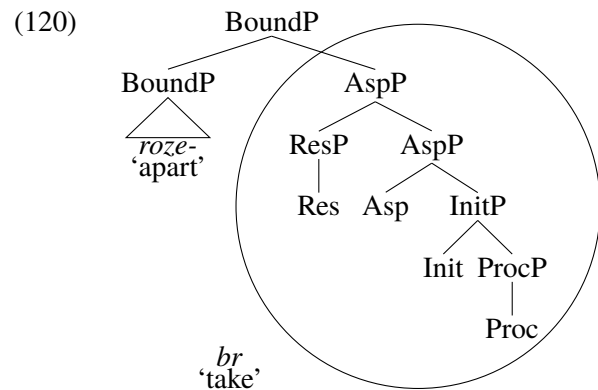
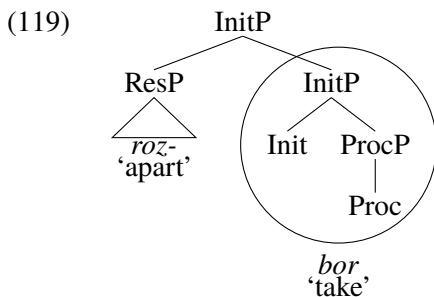
- (117)
- Petr **roze- br -a -l** situaci.
Petr apart take TH PAST situation
‘Petr analyzed the situation.’
 - Petr **roze- ber -e** situaci.
Petr apart take PRES situation
‘Petr will analyze the situation.’
 - Petrův **roz- bor** situace
Petr’s apart take situation.GEN
‘Petr’s analysis of the situation’

The main puzzling thing here is that the prefix ends with a vowel in (117b), where there does not seem to be any reasons for this. Hence, we observe here a type of a ‘paradigm-uniformity’ effect such that the vowel in (117b) is only needed because the root has a shape with no vowel elsewhere in the paradigm, i.e., in (117a). However, the challenge is to make the theory subtle enough in a way that we get such a paradigm effect in (117b), but not in (117c).

We believe that these facts can be captured under the idea of re-lexicalization as described above. In order to see that, let us take a look again at the structure (118), repeated from (113).



What we see here is that sub-extraction with prefixes such as *roz(e)-* disturbs lexical integrity, and therefore, that the sub-extracted BoundP must undergo re-lexicalization on the landing site. We propose that the need for re-lexicalization is what is responsible for the alternation between *roz-bor* and *roze-br-a-l*. In particular, when we create the nominal structure for *roz-bor* (which is structurally smallest and therefore derivationally prior), we insert the prefix as the lexicalization of a ResP. At this point, the prefix attaches to the nominal root *bor*. As a result, the prefix is realized without the vowel: *roz-bor*, see (119).



However, when BoundP sub-extracts from within the prefix, we must re-lexicalize the structure, and the prefix is inserted afresh: this time, however, it attaches to a different root, hence, *roze-bør* (**rozø-bør*). The fact that the prefix undergoes re-lexicalization prevents any influence between

the two prefix shapes; they are completely independent of each other and each of them reflects the phonology of the environment in which it gets inserted.

For what is going to follow, let us make explicit one assumption. Namely, we assume that whenever lexicalization succeeds, there is a round of phonological computation which runs over the sequence of morphemes that spell out the relevant constituent. In our case, this is the sequence *PREF-ROOT*. When we run phonological computation over the string *rozø-bør*, prefix vocalization applies and we get *roze-br*. The empty nucleus at the right edge of the prefix is filled (associated to melody), and from now on, the *e* will behave like any run-of-the-mill vowel (because that is what vowels are: nuclei associated to melody).

As a result, for as long as the prefix spells out the same constituent – namely *BoundP* – it will keep the shape *roze-*. The reason for this is not that there will be no further cycles of phonological computation that would involve the prefix and the root (there will be such cycles). However, in all these cycles, the prefix will behave as an object that has a regular vowel at its right edge, and so the shape will only change if an additional phonological rule would delete this vowel. Alternatively, the shape of the prefix could also change if there was another sub-extraction from within the *BoundP*; but barring any such event (vowel-deletion or sub-extraction), the shape *roze-* will be preserved.

The alternative (that there is no such cyclic phonological computation) would also be compatible with the facts so far, but it would just have two disconnected pieces: the prefix *rozø-* and the root *bør*. Each of them would contain just a single empty nucleus, and there would be no reason for prefix vocalization as yet. In this latter scenario, prefix vocalization could still happen at some later point. For example, we could wait with prefix vocalization until the whole word *rozø-bør-a-l* is derived, and only then considering the issue of whether the form has two consecutive empty nuclei (or not). That would actually give a good result in the case of *rozø-bør-a-l*. However, this view would fail to capture the paradigm uniformity effect in the form *roze-ber-e*, where there is no need to realize the vowel inside the prefix if prefix vocalization would be determined at the end of the whole derivation. Therefore, we shall now proceed under the assumption that at the point when (120) is derived, the prefix obtains the shape *roze-*, and that it keeps this shape unless some process would require otherwise.

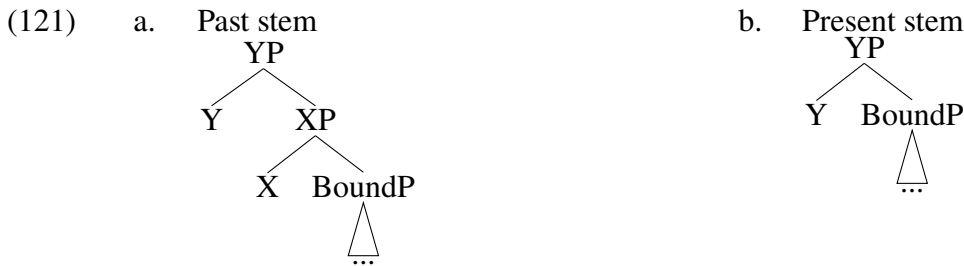
1.10 Capturing the paradigm-uniformity effect

Let us now finally turn to the derivation of the form *roze-ber-e* of the verb ‘analyze.’ *Roze-ber-e* has formally the same ending as a present tense form (*ber-e* ‘(s)he takes’), but it has a future interpretation ‘(s)he will analyze’ since the verb is perfective. In this form, the vowel of the prefix is ‘phonologically unjustified’ in that it appears before a CVC root. Our idea (as just described) is that this is an effect of derivational history; the prefix has a vowel in *roze-ber-e*, because the

prefix has obtained this vowel at a prior stage of the derivation, namely when the root had no vowel, as in (120).

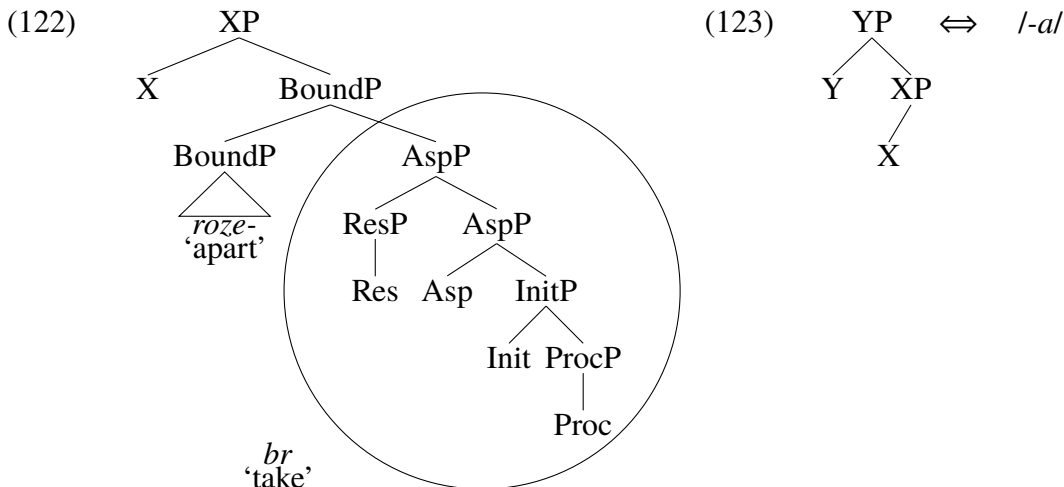
In order to see how this works, let us first mention the fact that the root *ber* appears in three types of forms, namely in the present tense, in the imperative, and in the present participle. In Czech grammars, these three forms are standardly grouped together as forms that are formed on the basis of the so-called ‘present stem.’ In contrast, the root *br* appears in the infinitive, in the passive participle and in the past participle (which appears in the past tense and also in the conditional). These latter forms are usually grouped together in traditional grammars as forms based on the ‘past stem.’

What we are going to assume – though much more investigation is needed – is that the present and past stem differ as shown in (121):

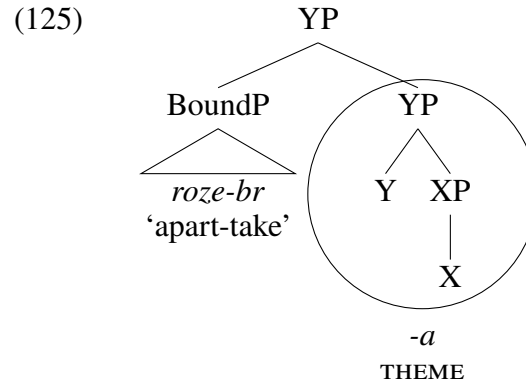
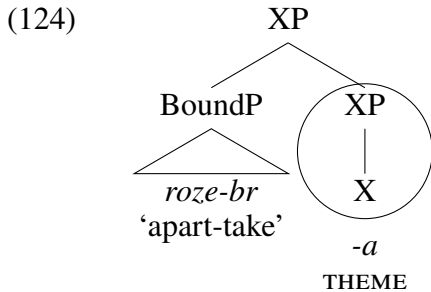


What this picture amounts to is the idea that both the present and the past stem are built on top of a common base, that corresponds to the BoundP in the case of prefixed verbs (and to AspP in the case of unprefixed verbs, though this is not shown in (121)). Another assumption depicted in (121) is that the past stem has an extra feature (X) that is missing in the present stem, which only has the feature Y. One could speculate that the missing head is some kind of a ‘low past tense,’ as it resides around the region where Rizzi & Cinque (2016: p. 150) place an anterior tense head.

Let us now go through the derivations of the past and the present stem respectively. The derivation of the past stem begins by merging the feature X, see (122).

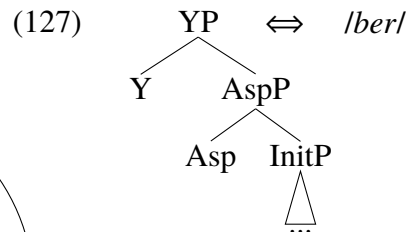
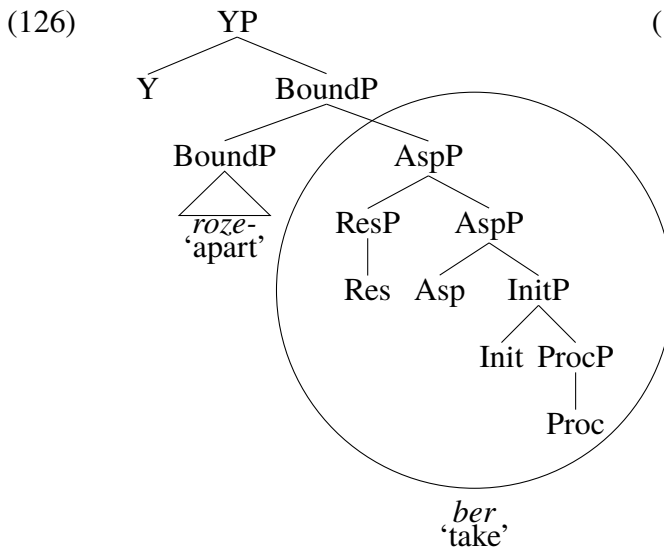


We assume that the theme vowel *-a* (characteristic for the past stem) spells out this head. Its lexical entry is as in (123). This thematic vowel is inserted once its complement undergoes complement movement, as in (124).



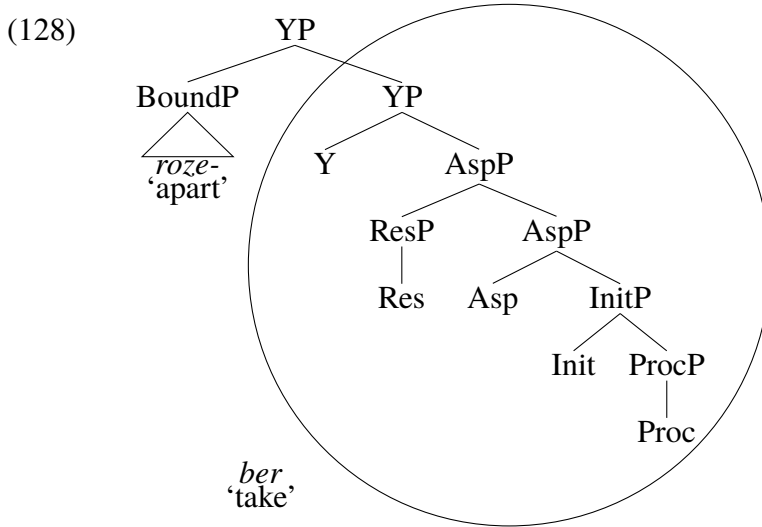
When Y is added, BoundP moves still higher up, forming the past stem *roze-br-a* as in (125). There are no tricky issues here.

The derivation of the present stem *ber* is more interesting. Unlike in (122), we are directly merging the feature Y, leaving out X. This gives us the picture in (126).



What we are assuming is that the feature Y is realized as a part of the present stem *ber*, which is therefore lexically specified for the whole YP, as in (127). This idea leads to the following derivation. Specifically, when Y is added on top of BoundP in (126), spellout fails. According to the Spellout algorithm (83), the first rescue movement to be tried is Spec movement. If we moved the Spec in (126) (and ignored its trace as usual), this gives us the tree in (128). In this tree, the present-tense root *ber* can apply to the YP, as indicated by the circle in (128).⁸

⁸The reader who has read up to here will notice that the Spec movement is non-standard. That is because we are moving a projecting Spec, unlike in the previous derivations, where we



In (128) a new root is inserted. This root contains a vowel. This vowel could potentially influence the shape of the prefix, but we know that in reality it does not. This can be explained as a result of the idea (which we described at the end of the preceding section) that when the prefix got first inserted as BoundP – which happened when it is sister to the root *br* – there was a cycle of phonological computation, which lead to vocalization: the allomorph *roze-* was derived. In subsequent movement steps, such as the one in (128), the prefix keeps spelling out the same constituent, and so it keeps the same shape, namely *roze-*.

This does not entail that there is no cycle of phonological computation over the string derived in (128), i.e., *roze-ber*. However, there is no rule that would require the deletion of the vowel at the right edge of the prefix, and so the vowel stays. Therefore, the data is compatible with the idea that phonological computation applies at every cycle of insertion.

The form *roze-ber* is, however, incompatible with the idea that prefix vocalization only happens at the stage (128) (or some later stage). If there were no prior cycles of phonological computation preceding (128), we would at this point have the string *rozø-ber*, where prefix vocalization is unjustified. Therefore, the facts do not seem to be compatible with such a view.

1.11 Conclusions

In this paper, it was our goal to explain two kinds of prefix alternations: a vowel length alternation and a vowel~ø alternation. These are usually seen as disconnected; however, we have argued that for a particular set of roots, they show the same type of distribution. This distribution is

were moving non-projecting Specs. There is currently an ongoing research into whether such a derivation should be available (quite likely not). However, there are some alternative suggestions how such derivations may proceed other than by Spec movement, an issue discussed for instance in Kloudová (2020). What we want to convey here is the intuition; the question of the precise implementation is left for some future occasion.

not phonological, and cares about whether the prefix is a part of a verbal form or a part of a zero-derived noun (and related forms). A unified explanation of these two alternations (i.e., for the cases where they overlap) is therefore called for.

In order to provide this explanation, we have explored a detailed morphosyntactic analysis of the relevant prefixes, addressing their relationship to regular prepositions and intransitive prepositions, while also addressing the morphological distinction between nominal and verbal prefixes. Along the way, we have proposed an interesting type of a *ABA constraint that seems to restrict the various shapes of adposition-like elements.

In the final part of the paper, we have laid our assumptions about the derivation of the relevant nominal and verbal forms, addressing both the issue of root and prefix allomorphy. We have proposed that nominal prefixes are structurally largest, and differ from verbal prefixes in that they spell out the Res feature. As such, they combine with roots that spell out the related argument structure projections Proc and Init. If no additional projections are added, we get a zero-derived noun with a nominal (ResP-sized) prefix.

Once aspectual information is added, the movement of BoundP from within ResP is triggered, leading to the stranding of Res. With prefixes where Res is realized as length, this leads to prefix shortening. With C-final prefixes that generally do not alternate (spelling out the whole ResP as one piece), this movement disturbs the lexical integrity of the prefix and leads to re-lexicalization. Due to re-lexicalization, this type of prefix movement is not subject to ‘paradigm-uniformity’ effects, thereby deriving the observation that C-final prefixes in nominalizations only care about the specific shape of the noun root, and prefixes in verbs only care about the shape of the root in verbs.

Finally, in order to account for ‘paradigm-uniformity’ effects within the verbal paradigm, we have proposed that after every round of successful spellout (and most relevantly after the step of prefix movement), there is a round of phonological computation that decides if the prefix is realized with a vowel or not. During this derivational stage, the prefix may obtain a vowel that is subsequently retained even if the root ultimately ends up with a vowel of its own, giving rise to paradigm-uniformity effects within the verbal paradigm.

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