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Prefixes and the delimitation of events¹

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1. Introduction

In Slavic languages, verbal prefixes can be applied to perfective verbs deriving new perfective verbs, and multiple prefixes can occur in a single verb. This well-known type of data has not yet been adequately analyzed within current approaches to the semantics of Slavic verbal prefixes and aspect. The notion ‘aspect’ covers ‘grammatical aspect’, or ‘viewpoint aspect’ (see Smith 1991/97), best characterized by the formal perfective vs. imperfective distinction, which is often expressed by inflectional morphology (as in Romance languages), and corresponds to propositional operators at the semantic level of representation. It also covers ‘lexical aspect’, ‘situation aspect’ (see Smith *ibid.*), ‘eventuality types’ (Bach 1981, 1986), or ‘Aktionsart’² (as in Hinrichs 1985, Van Valin 1990, Dowty 1999, Paslawska and von Stechow 2002, for example), which regards the telic vs. atelic distinction and its Vendlerian subcategories (activities, accomplishments, achievements and states). It is lexicalized by verbs, encoded by derivational morphology, or by a variety of elements at the level of syntax, among which the direct object argument has a prominent role, however, the subject (external) argument is arguably a contributing factor, as well (see Dowty 1991, for example). These two ‘aspect’ categories are orthogonal to each other and interact in systematic ways (see also Filip 1992, 1997, 1993/99, de Swart 1998, Paslawska and von Stechow 2002, Rothstein 2003, for example).

Multiple prefixation and application of verbal prefixes to perfective bases is excluded by the common view of Slavic prefixes, according to which all perfective verbs are telic and prefixes constitute a uniform class of ‘perfective’ markers that are applied to imperfective verbs that are atelic and derive perfective verbs that are telic. Moreover, this view of perfective verbs and prefixes predicts rampant violations of the intuitive ‘one delimitation per event’ constraint, whenever a prefix is applied to a perfective verb. This intuitive constraint is motivated by the observation that an event expressed within a single predication can be delimited only once: cp. **run a mile for ten minutes*, **wash the clothes clean white*.

The paper is structured as follows: In Section 2, I introduce the properties of ‘telicity’, ‘quantization’ and ‘homogeneity’. –They presuppose the general framework of event semantics with mereological structures, and provide the background for characterizing what has emerged as the common view of the Slavic perfective aspect and prefixation. In Section 3, this view is invalidated by examples in which verbal prefixes are applied to perfective verbs. In Section 4, I establish that prefixes do not uniformly

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²A German term for ‘manner of action’ coined by Agrell (1908).

function in all of their uses as telicity modifiers, and consequently, they may derive perfective verbs that fail to be telic. In Section 5, I show that certain apparent violations of the intuitive ‘one delimitation per event’ constraint, when prefixes are applied to perfective verbs, are tractable by means of semantic constraints that are directly related to basic general principles in the structuring of events. The semantic proposal advanced here has the advantage that it allows us to make predictions about admissible combinations of prefixes on one and the same verb in Slavic languages by relying on basic assumptions in the domain of event structure that are independently, and also cross-linguistically, motivated.

2. Background assumptions

2.1 Quantization and telicity

The form and meaning of complex nominal and verbal predicates are partly motivated by the intuition that “we do not use the expressions that chunk up our experience with (singular) expressions that provide that experience already chunked up” (Bach 1981, p.74). For example, we judge **a pound of an orange* to be unacceptable, because *an orange*, a singular count NP, picks out clearly individuated objects, each separate from the other by a fixed boundary. This does not hold for a mass noun like *sugar*, and hence it can be ‘packaged’ by means of explicit measure expressions like *a pound of*, as in *a pound of sugar*. Similarly, *a pound of oranges* is acceptable, because bare plurals like *oranges* describe unlimited quantities of objects that can be bundled into bunches.

One useful way of understanding the basic distinction between singular count nouns, on the one hand, and bare plural and mass nouns, on the other hand, is in terms of the logic of part-whole structures, or mereology. Following Link (1983, 1987), such structures are modeled by means of the algebraic device of join semilattices, atomic and non-atomic ones. Atomic semilattices, from which singular count nouns take their denotation, have smallest discrete elements, atoms. In contrast, non-atomic (i.e., not necessarily atomic) semilattices may not, and they serve to represent the denotations of bare plural and mass nouns. Based on such assumptions, we may define a class of quantized predicates and a class of homogeneous predicates, as in (1) and (2). The definition of quantized predicates given in (1) is due to Krifka (1986). Homogeneous predicates are defined as having the properties of divisivity (2a) and cumulativity (2b), following some suggestions in Moltmann (1991) and Kiparsky (1998). The notion of ‘cumulative reference’ is due to Quine (1960, p. 91), and Krifka’s (1986) definition is given in (2b).

$$(1) \text{ QUA}(P) \leftrightarrow \forall x,y[P(x) \wedge P(y) \rightarrow \neg y < x]$$

A predicate P is quantized iff, whenever it applies to x and y , y cannot be a proper part of x .

‘<’: the proper part relation: $\forall x,y \in U [x < y \leftrightarrow x \leq y \wedge x \neq y]$

‘≤’: the part relation: $\forall x,y \in U [x \leq y \leftrightarrow x \oplus y = y]$

‘⊕’: the binary sum operation, a function from $U \times U$ to U , it is idempotent, commutative, and associative.

- (2) $\text{HOM}(P) \leftrightarrow \text{DIV}(P) \wedge \text{CML}(P)$
- a. $\text{DIV}(P) \leftrightarrow \forall x,y[P(x) \wedge y < x \rightarrow P(y)]$
 A predicate is divisive if and only if whenever P applies to x , then it must also apply to any y that is properly included in x .
- b. $\text{CML}(P) \leftrightarrow \forall x,y[P(x) \wedge P(y) \rightarrow P(x \oplus y)] \wedge \exists x,y[P(x) \wedge P(y) \wedge \neg x = y]$
 A predicate P is cumulative if and only if, whenever P applies to any x and y , it also applies to the sum of x and y , and P should apply to at least two distinct entities.

According to (1), *an orange* is quantized, because no proper part of *an orange* can ever fall under the denotation of *an orange*³. *Sugar* is homogeneous, because any proper part of some quantity of *sugar* will count as *sugar* (disregarding certain minimal or smallest ‘parts’), and adding *sugar* to *sugar* amounts to something that again falls under the denotation of *sugar*. Similarly, bare plurals like *oranges* are homogeneous: If x and y fall under the denotation of *oranges*, then their sum does, as well. *Oranges* will also have proper parts (down to groups of two) that fall under *oranges*⁴.

The notions of ‘quantization’ and ‘homogeneity’ are not complementary properties. ‘Quantization’ guarantees that no P -entity has a proper part which is a P -entity. ‘Divisivity’ and ‘cumulativity’ ensure that every proper part of a P -entity is a P -entity. There are predicates that are divisive, but not cumulative (*a few books*), and predicates that are cumulative, but not divisive (*many books*).

Quantized predicates can be formed with (extensive) measure functions⁵. For example, *sugar* and *oranges* are homogeneous, combining them with the extensive measure function expressed by *a pound of*, yields a quantized predicate *a pound of sugar* / *a pound of oranges*.

- (3) a. *a pound of sugar* a.’ **a kilo of a pound of sugar*
 b. *a pound of oranges* b.’ **a kilo of a pound of oranges*

Quantizing modifiers like extensive measure functions can only be applied to homogeneous predicates, but not to quantized predicates, as we see in (3a’-b’). Based on this, Bach’s observation cited at the outset of this section can be recast in the form of the general quantizing constraint as follows:

(4) **The quantizing constraint**

Quantizing modifiers express functions that map homogeneous predicates onto quantized predicates: $\lambda P \lambda e [P(e) \wedge \text{HOM}(P)(e)] \rightarrow \lambda P \lambda e [P(e) \wedge \text{QUA}(P)(e)]$.

Examples of quantizing modifiers: *a pound of*, *a jar of*.

³The property of ‘quantization’, as defined in (1), is problematic in many cases, as pointed out in Zucchi and White (1996, 2001) and Krifka (1998). An extensive critical discussion of Krifka’s notion of ‘quantization’ can be found in Rothstein (2003).

⁴Contrary to mereological proposals like Link’s (1983), for example, Borer (2002) argues that bare plurals presuppose any type of division at all, including some that has no completed “cells” (zero cells), that is, no atoms or individuals at all as well as non-canonical cells, such as fractions of all kinds. On Borer’s account of bare plurals it is felicitous to describe a half of an apple with *apples*. Mass nouns have denotations with no divisions.

⁵For a definition of an extensive measure function, see Higginbotham (1995), Krifka (1998) and here Section 5.2.

The quantizing constraint, as it is formulated in (4), is best thought of as an abstraction over more specific constraints that are still under much discussion. The behavior of nominal measure expressions is notoriously intriguing and complex (see Parsons 1970[1979], Higginbotham 1995, Schwarzschild 2002).

Quantization and homogeneity are also properties of predicates of eventualities⁶. In (1)-(3), P is a variable over nominal predicates or verbal predicates, x and y are variables that range over individuals or eventualities. For example, the predicate *ran*, in a sentence like *John ran*, is homogeneous. It is divisive, according to (2a), because it describes an eventuality that will have proper parts that can be described by *(John) ran*. It is also cumulative, according to (2b), because it describes some unspecified length of running, and if we add it to the same type of eventuality also described by *(John) ran*, we get some chunk of running, which is again describable by *(John) ran*. (A verbal predicate is cumulative only with respect to temporally adjacent events and under identity of its participants.) Homogenous predicates are divided into process predicates (*ran*, *lived in California*, *hammered the metal*) and state predicates (*knew the answer*). Quantized predicates correspond to certain event predicates. An example of a quantized predicate is *find the key*: No proper part of an event described by this predicate can fall under the denotation of *find the key*. (The tripartite division ‘process-state-event’ is due to Mourelatos 1978/1981 and Bach 1981, 1986.) Hence, the domain of eventualities E is a union of the set S of states, the set P of processes and the set E of events: $E = S \cup P \cup E$.

(5) The quantized-homogeneous distinction and eventuality types

$E = S \cup P \cup E$	QUANTIZED	HOMOGENEOUS	
eventuality type	event	process	state
examples	<i>find the key</i>	<i>ran</i>	<i>knew the answer</i>

Just as we can package stuff and pluralities of individuals into portions of various types, so can we package situations into delimited ‘portions,’ as is shown in (6).

- (6) a. John ran *for an hour / a mile / to the end of the track*.
 b. John lived in California *for nine years*.
 c. John hammered the metal *flat*.

Here, the relevant ‘portions’ are expressed by the measure phrases *for an hour*, *a mile*, *for nine years*, the directional PP *to the end of the track*, and the resultative phrase *flat*. When applied to homogeneous predicates like *ran*, *lived in California*, *hammered the metal*, which denote eventualities with no inherent limits, they yield predicates that are delimited. However, it turns out that they are not quantized. Here is why.

⁶Originally, the mereologically based properties of quantization and homogeneity were applied to verbal predicates for two main reasons: (i) to capture certain well-known structural parallels between the denotational domains of nominal and verbal predicates (see Taylor 1977, Mourelatos 1978/1981, Bach 1981, 1986, Link 1987, Hinrichs 1985, Krifka 1986, Partee 1999, and others), and (ii) to account for interactions between verbal and nominal predicates (see Krifka 1986, 1992).

Take *walk for an hour*, for example. If *walk for an hour* is a predicate that applies to all eventualities that have a run time between 8a.m. and 9a.m., then *walk for an hour*, $\lambda x, e[\mathbf{walk}'(x, e) \wedge \mathbf{hour}'(e) = 1]$, is telic, but not quantized. It is not quantized, because it might apply to two temporally overlapping eventualities and their sum (see Krifka 1998, p.207 and 245). For example, let us take two events e and e' that do not overlap mereologically, but that overlap temporally: e is a walking of John that goes on from 8a.m. 9a.m. and e' is a walking of Mary that also lasts from 8a.m. to 9a.m. In this situation, $e \oplus e'$ also falls under *walk for an hour*. Given that e , e' , and $e'' = e \oplus e'$ all fall under *walk for an hour*, this predicate cannot be quantized. However, *for an hour* delimits a bounded chunk of walking in the denotation of *walk for an hour*, and hence it is *telic*: If John started walking, and made a few steps in a normal fashion and then stopped, then we can describe this situation with *John walked*, but not with *John walked for an hour*.

This leads Krifka (1998) to characterize telicity as the property of an event predicate P such that all parts of e that fall under P are initial and final parts of e . This amounts to the following: If a telic predicate P applies to e and e' , and e' is a part of e , then e' and e must have the same run time. 'Telicity' is here essentially restricted to 'temporal quantization', even though Krifka's definition of telicity avoids any reference to time points. 'Quantization' is a stricter notion than 'telicity', because all quantized predicates are necessarily telic, but not every telic predicate is quantized.

However, if 'telic' means 'temporally quantized', then we are still faced with the problems related to the notion of 'quantization' and aspectual compositionality. Problematic are predicates that contain nominal heads like *ribbon*, *sequence*, *twig*, *fence*, *wall*, nonstandard vague measures of amount like *distance*, *quantity*, *piece*, and vague determiner quantifiers like *many*, *a lot*, *(a) few*, *most*, *some*, *at least/at most three*, *less/more than three*. They fail to be quantized, when analyzed in isolation as predicates, nevertheless they behave like quantized noun phrases with respect to aspectual composition and temporal adverbials (see L. Carlson 1981, p.54, Mittwoch 1988, fn.24, Dahl 1991, p.815, Moltmann 1991, White 1994, Zucchi and White 1996, 2001, Borer 2002, Rothstein 1999, 2003, for example)⁷. To illustrate this point, take an example from Zucchi and White (2001): The sequence $1, 2, 3, 4$ has the sequence $1, 2, 3$, the sequence $2, 3, 4$, and $2, 3$ as its proper parts. Since there are members of the extension of *a sequence (of numbers)* having proper parts which are also members of the extension of *a sequence (of numbers)*, the predicate *is a sequence (of numbers)* cannot be quantized, according to the definition in (1). Yet, *a sequence (of numbers)* interacts with time-span *in*-adverbials in the same way as quantized noun phrases like *a letter* do: cp. *John wrote a letter ??for an hour / in an hour* and *John wrote a sequence (of numbers) ??for ten minutes / in ten minutes*.

Given the problems related to the notion of 'telicity' based on 'quantization', I will assume the following definition of 'telicity', which presupposes the criterion of contextually determined atomicity, following suggestions in Rothstein (2003):

- (7) a. A verbal predicate is telic if (i) it denotes a set P_C , i.e., a set of single atomic events contextually restricted by t (a time index) and M (a measure statement for

⁷The same problematic behavior is also exhibited by definite noun phrases like *the water* and possessive noun phrases like *my friends*.

P), or (ii) a plural set of atomic events of definite cardinality. Otherwise, the predicate is atelic.

$M: \forall e[P(e) \wedge Q(e) \rightarrow |e|=1]$, whereby Q is a context-dependent variable

b. Example:

John walked for an hour.

$\exists e, t[\mathbf{walk}'(j', x, e) \wedge |e| <_{t, \forall e} [\mathbf{walk}'(j', x, e) \wedge \text{HOUR}(e)=1 \rightarrow |e|=1] > = 1 \wedge \text{AT}(e, t)]$

(In what follows I will adopt Rothstein's formalism exemplified by (7b)). In the simplest terms, telicity has to do with the identification of atomic events. What counts as an atom cannot be determined in absolute terms once and for all, but rather it must be determined relative to a given context of use. A context consists of a time index t and a measure statement for P that involves the criterion of individuation Q , or a means of identifying an atomic event, here implemented as assigning the cardinality of 1. A predicate is telic if it denotes a set of events for which the criterion for individuating a single atomic event is fully recoverable relative to a certain context. The range of telic predicates is thus constrained by the different ways in which the cardinality of 1, or atomicity, of verbal predicates are determined.

The definition of telicity given in (7) fits well with independently made arguments that the interpretation of predicates (and sentences) as telic or atelic depends not only on semantic factors (e.g., the lexical semantics of the main predicate, the lexical semantic and referential properties of its nominal arguments), but also on pragmatic factors like the elements of the extralinguistic context of the described eventuality (see Moltmann 1991, Filip 1993/99, Jackendoff 1996, among others).

Unlike Rothstein (2003), I require that 'telic pluralization' only concerns plural sets of definite cardinality, as in *John ran a mile twice*, which denotes sets of two atomic events, whereby each single atomic event is an event of running a mile. This ensures that iterative predicates (as in *John ran many times*) and generic predicates (as in *John often ran*) and pluractional verbs do not express telic predicates. They are arguably homogeneous and cumulative just like bare plural nominals. Pluractional verbs express a multiplicity of actions that involve multiple participants, times or locations (see Lasersohn 1995, p. 240). Pluractionality may be expressed by morphemes that are typically affixed to the verb, as in the languages of North America, West Africa, Dravidian languages, and American Sign language, for example (for references see Lasersohn 1995, Matthewson 1998, for example), but also in Slavic languages (see Filip and Carlson 2001). Examples of pluractional verbs in Czech are: *poskakovat* (ipf.) 'to hop repeatedly', *seběhnout se* (pf.) 'to gather by running', 'to run (all) to the same place', and distributive verbs like *poumírat* (pf.) 'to die out (all gradually)'.

The properties of quantization, homogeneity and telicity are properties of predicates of eventualities, i.e., properties of second order, and not properties of eventualities. (Hence, it does not make sense to talk about 'telic events' or 'quantized events'.) The relevant classificatory criteria that underlie these properties are not inherent in the eventualities themselves but in verbal predicates. For example, if you saw John drinking coffee (from a cup), you can represent what you saw either by means of an atelic sentence *John drank coffee* or a telic sentence *John drank a cup of coffee*. An

analogous situation obtains for the referential relation between noun phrases and entities in the world. For example, we may point to a piece of gold and felicitously assert *This is gold* using a mass noun phrase or *This is a nugget* with a count noun phrase (the example is taken from Dahl 1981, p.83)⁸.

As we have seen in (3), we cannot measure a given quantity twice within the same nominal predicate, and this observation also motivates the general quantizing constraint given in (4). In the domain of verbal predicates, what needs to be captured is the observation that it is impossible to delimit a single event more than once within a single predication, as we see in (8). (8a-d) contain two occurrences of phrases that serve to form telic predicates in English: measure phrases (*a mile, for ten minutes, for an hour*), goal phrases (*to the creek, to the top of the hill, to the end of the track*) and resultatives (*clean, white, exhausted*). (8e) is odd, because the predicate *found a penny* entails a ‘set terminal point’ and the measure phrase *for an hour* adds another limit to the same event.

- (8) a. *John ran [*a mile*] [*for ten minutes*].
 b. *Bill rolled the log [*to the creek*] [*to the top of the hill*]. Tenny 1994
 c. *John washed the clothes [*clean*] [*white*]. Rothstein 1983, Simpson 1983
 d. *Jonathan ran himself [*exhausted*] [*to the end of the track*]. Tenny 1994
 e. ??I found a penny [*for an hour*].

In analogy to the general quantizing constraint given in (4), we may formulate the *telicity constraint*, which governs the semantic input-output of telicity inducing modifiers⁹:

(9) **The telicity constraint**

Telicity modifiers express functions that map atelic (homogeneous) predicates onto telic predicates: $\lambda P\lambda e[P(e) \wedge \text{HOM}(P)(e)] \rightarrow \lambda P\lambda e[P(e) \wedge \text{TEL}(P)(e)]$.

Examples: *to the store, for an hour, a mile, flat*.

Given our definition of telicity in (7), modifiers like *to the store, for an hour, a mile, flat* denote functions from denotations of atelic (homogeneous) predicates onto sets of contextually restricted atomic events, expressed by telic predicates. A combination of a homogeneous predicate like *ran* with *a mile* behaves like a telic predicate. As we see in (8a), *ran a mile* cannot be combined with the temporal measure phrase *for ten minutes*.

⁸The view that the classification into eventuality types (telic vs. atelic, quantized vs. homogeneous) is a classification that concerns predicates is argued for in Krifka (1989, 1992), Filip (1993/1999) and Partee (1999), for instance. However, as one anonymous referee points out, this is not the only way of understanding what entities are classified into eventuality types. For example, Bach (1981, 1986) along with Parsons (1990) consider the classification into eventuality types to be an ontological (sortal) classification.

⁹Although resultatives are here classified as telicity modifiers, they can be applied not only to atelic (homogeneous) predicates, just like other telicity modifiers, but also to telic predicates: cp. *The pond froze solid*. Resultative phrases are one of the most productive means of forming complex telic predicates in English. If resultatives are taken to apply to atelic (homogeneous) predicates in the default case (see Dowty 1979, p.249ff., Jackendoff 1990, p.240, Tenny 1987, 1994, Levin and Rappaport Hovav 1995, Rappaport Hovav and Levin 1999), then a special strategy is needed to accommodate cases like *The pond froze solid*. There is an alternative view of resultatives, on which the domain of application of resultatives is that of telic predicates, as Van Valin (1990, p.255) or Rothstein (2000, p.256ff.) propose. Rothstein argues that resultatives cannot in general introduce culmination points. On her account, sentences with resultatives are represented by means of a PART-OF relation, which relates the culmination of the matrix telic predicate to the eventuality of the resultative predicate. If a matrix clause is headed by a homogeneous predicate (activity), a resultative induces its shift into a telic interpretation.

Similarly, *for an hour* in (8e) is odd, because it is applied to *found a penny*, which is telic (and quantized). Although *for an hour* cannot be directly applied to a telic predicate (8e), it can be applied to a derived atelic/homogeneous predicate, obtained as a result of pluralization, for example. A sentence like *The light flashed for an hour* is acceptable, if it is interpreted as meaning that *for an hour* measures a plurality of events, obtained as a result of coercing the singular quantized sentence *The light flashed* into a plural (iterative) interpretation.

Against the *telicity constraint* in (9), it could be objected that there are examples in which a predicate contains two telicity modifiers. For example, in (10), the spatial measure phrase *a mile* and the directional PP *to the store* each seem to contribute a separate ‘measurement’ of one and the same Path argument, apparently contradicting the *telicity constraint*. However, such a conclusion is based on a misanalysis of (10). A different analysis is proposed by Rothstein (2003). According to her, *a mile to the store* is a single constituent: It can function as a subject argument, as (11) shows, and the reverse order is unacceptable, as we see in (12). (Examples in (10-12) are taken from Rothstein 2003.)

- (10) Dafna ran a mile to the store.
- (11) A mile to the store is a long way.
- (12) #Dafna ran to the store a mile.

Based on Rothstein, it can be assumed that *a mile* and the directional Goal-PP in (10) constitute a single syntactic and semantic constituent. *A mile to the store* functions as a telicity modifier, which is here applied to the atelic base predicate *ran*, in compliance with the *telicity constraint* given in (9). If this is correct, examples like (10) do not constitute counterexamples to the *telicity constraint* given in (9).

What the *telicity constraint* in (9) captures is the set of phenomena that fall under the intuitive ‘one delimitation per event’ constraint. One example is Tenny’s ‘single delimiting constraint’ (1987, 1994), here given in (13):

- (13) **The Single Delimiting Constraint:** The event described by a verb may only have one measuring-out and be delimited only once (Tenny 1994, p.79).

The advantage of formulating the distribution and interpretation of telicity inducing operators with respect to predicates, as in (9), rather than with respect to events, as in (13), is that we avoid certain difficult questions regarding individuation of events, and closely related analytical and representational questions, to which we have no satisfactory answers yet. Obviously, we do not always find a one-to-one mapping between verbs (or simple clauses) and events described by them. For example, take *Jane cracked the egg into the bowl*. Here, *into the bowl* does not delimit the event expressed by the quantized predicate *cracked the egg*, but it generates a reference to an implicit directed motion event of the liquid part of the egg into the bowl. This means that *Jane cracked the egg into the bowl* may be analyzed in terms of two events (at least): The subevent described by the main predicate *cracked the egg* and the implicit motion event associated with the directional prepositional phrase *into the bowl*. Since each event comes with its own limit, the intuitive ‘one delimitation per event’ constraint is not

violated. Given that *crack* is a causative verb that entails a definite change of state, it will in turn be decomposed into further events. But how do we determine in a *systematic* way how many events a logical representation of such simple sentences as *Jane cracked the egg into the bowl* involves, and in which relation they stand to each other? We have no ready and convincing answers to such questions (see also Carlson 1998, p.49, fn.4).

The telicity constraint in given (9) is a useful common denominator for a variety of views that ascribe an event delimiting function to Slavic verbal prefixes: namely, as overt markers of telicity, and closely related event endings of various types, completion, culmination and result, for example.

2.2 The *common view* of Slavic verbal prefixes

One of the salient functions of verbal prefixes in Slavic languages is the delimitation of events: It is easy to find examples with prefixed perfective verbs that describe complete or culminated events, possibly with result states, and in which the semantic component of ‘completion’ or ‘result’ appears to be contributed by a prefix. Semantically, such prefixed perfective verbs thus straightforwardly correspond to telic predicates, or Vendler’s accomplishments and achievements. From this basic observation it is concluded that Slavic prefixes encode telicity on the verb, hence all prefixed verbs are telic. This view is also incorporated into generalizations regarding cross-linguistic marking of telicity. According to one dominant version (see Borer 2002, van Hout 2003, among others), Slavic languages exploit a verb-marking strategy for telicity. In contrast, English, Dutch and Finnish use an object-marking strategy for telicity: cp. *John ate soup* (atelic) vs. *John ate three apples* (telic).

This is the view of Slavic prefixes, in all its various manifestations, that I will dispute, and I will henceforth call it the *common view* of Slavic verbal prefixes. In the terminology introduced here it can be summarized as follows:

(14) The *common view* of Slavic verbal prefixes

- (i) Semantically, Slavic verbal prefixes are telicity modifiers. They express a function that maps atelic (homogeneous) predicates onto telic predicates:
For any prefix α , $\llbracket \alpha \rrbracket \Rightarrow \lambda P \lambda e [P(e) \wedge \text{HOM}(P)(e)] \rightarrow \lambda P \lambda e [P(e) \wedge \text{TEL}(P)(e)]$.

Related assumptions:

- (ii) All perfective verbs are telic.
(iii) Slavic verbal prefixes can *only* be applied to imperfective verbs.
(iv) Prefixes are morphological exponents of the perfective operator.
(Or, prefixes are grammatical markers of perfective aspect.)

Although (14) is supposed to characterize what is common to a number of researchers coming from different schools of thought, ‘telic’ is here based on atomicity, as defined in (7). It is reasonable to assume that ‘telicity’ characterized in terms of ‘atomicity’ covers ‘telicity’ understood in the sense of temporal boundedness (see Declerck 1989,

Depraetere 1995), or as a property of predicates that entail a result state, and event endings of other types, the other two common uses of ‘telicity’¹⁰.

The main assumption of (14) can be illustrated by the Czech example in (15). (Note: The superscripts ‘I’ and ‘P’ here stand for the imperfective and perfective aspect of a verb.)

- (15) *plavat*^I (přes řeku) → *pře-plavat*^P (přes) řeku
 swim.INF (across river.SG.ACC) **across-swim**.INF (across) river.SG.ACC
 ‘to (be) swim(ming) (across the/a river)’ ‘to cross the/a river by swimming’

In (15), we see that the prefix *pře-* ‘across’, ‘over’ is attached to the simple imperfective verb *plavat* ‘to (be) swim(ming)’ and derives the perfective verb *přeplavat* ‘to cross X by swimming.’ Intuitively, the prefix takes an imperfective verb that describes some swimming without limits, and derives a new perfective verb that carves out a bounded chunk or portion of swimming. The relevant portion is measured by the path covered in space, here obligatorily expressed by the DO (‘river’) or the PP argument (‘across the/a river’) of the perfective verb¹¹. In addition, the perfective verb entails that the crossing of the river was completed. Semantically, the prefix *pře-* ‘across’, ‘over’ can be characterized in terms of a function that maps a homogeneous predicate expressed by an imperfective verb onto a telic predicate expressed by a perfective verb. In fact, many current accounts of Slavic verbal prefixes presuppose that most, if not all, Slavic prefixes make a semantic contribution to a verb that essentially amounts to this function.

At first blush, the *common view* in (14) appears quite compelling, and it can be found in many studies of Slavic perfective and imperfective verbs. Let me give just a few illustrative examples. The main assumption (i) is formulated in Piñón’s (1994) analysis of Polish prefixes as follows: “The perfectivization of imperfective verbs is achieved via prefixation. Analogously, such prefixes denote the value of ε [the *event function*, HF] as applied to the processes in the denotation of the imperfective verb” (p. 502). The main assumption (i) is also presupposed in Slabakova’s (1997) account of prefixes in Bulgarian and other Slavic languages, according to which all prefixes entail the feature ‘[+complete]’ (p.104), apart from possible other idiosyncratic lexical semantic components. This may be interpreted as meaning that Slavic prefixes entail the feature ‘[+quantized]’, given the following general knowledge inference mechanism: Asserting that a given predicate entails that the event described by it is viewed in its entirety

¹⁰The telic-atelic distinction was coined by Garey (1957) who derived it from the Greek word *télos* meaning ‘goal’ or ‘purpose’. Garey characterizes telic verbs as “... a category of verbs expressing an action tending towards a goal envisaged as realized in a perfective tense, but as contingent in an imperfective tense” (Garey 1957, p.6). Although this suggests that telic verbs describe goal-oriented actions with human agents, this is not necessarily always so, given that Garey also includes French verbs like *mourir* ‘to die’ and *noyer* ‘to drown’ among his telic verbs: cp. *il mourait* ‘he was dying’ - *il mourut* ‘he died’. Hence, Vendler’s (1957) notion of a ‘set terminal point’ (beyond which the described event cannot continue), which Vendler uses to characterize accomplishments, is more appropriate for characterizing what is really meant by telic verbs. Atelic verbs, on the other hand, do not involve any such set terminal point in their semantic structure. They are characterized as verbs denoting actions that “are realized as soon as they begin” (Garey 1957, p.6). A basic distinction of this type was already made by Aristotle (*Metaphysics* 6, 1048b, 18-35, see Dowty 1979, p.52ff.) who draws a line between *kineseis* (‘movements’) and *energiái* (‘actualities’).

¹¹Verbal prefixation in Slavic languages, and also in other Indo-European languages (e.g., German), is an argument-structure changing operation which often induces an increase in the number of arguments, commonly yielding a new perfective verb that is transitive.

presupposes that the event is delimited. Hence, the verbal predicate describing it must be telic. Van Hout (2003) assumes that ('perfective') prefixes deriving perfective verbs in Russian and Polish make the verbal predicates expressed by them telic.

The assumption (i) of the *common view* given in (14) is closely tied to (ii), according to which all perfective verbs are semantically telic. (ii) seems plausible, given that perfective verbs are often derived from imperfective verbs by prefixation, and given that simple perfective verbs are also telic. Some Czech and Russian examples of simple perfective verbs are given in (16).

- | | | | |
|----------------------|------------------------------------|---------------------|---------------|
| (16) a. <i>Czech</i> | | b. <i>Russian</i> | |
| dát ^P | 'to give' | zabyt' ^P | 'to forget' |
| skočit ^P | 'to jump (once)', 'to take a leap' | sest' ^P | 'to sit down' |
| říci ^P | 'to say' | leč' ^P | 'to lie down' |

Taking all perfective verbs to be semantically telic (and some quantized) is in compliance with the long tradition of characterizing the semantics of perfectivity in terms of the notion of 'totality of action' (or *celostnost' dejstvija*, Russian). The notion of 'totality' is understood in the *wide sense* of "a situation as a single whole without distinction of the various phases that make up that situation," as Comrie (1976, p.16) puts it. (See also Černý 1877, Saussure 1916 [1978], Maslov 1959, Sørensen 1949, Dostál 1954, Isačenko 1962, Depraetere 1995, and others.) 'Totality' is also understood in the *narrow sense* of completion, or the attainment of a final limit entailed by the verb. (See Jakobson 1932, Růžička 1952, Bondarko and Bulanin 1967, Bondarko 1971, Avilova 1976, among others.)

Now, if we accept (i) and (ii) given in (14), then (iii) follows: If all perfective verbs are taken to be telic (regardless of their internal complexity), and if prefixes are restricted to apply to homogeneous predicates, then Slavic verbal prefixes can *only* be attached to imperfective verbs. (iii) is explicitly argued for in Piñón's (1994) work on Polish prefixes, for example.

Finally, prefixes and perfective aspect are often interpreted in terms of the same semantic function: For example, the *event* function in Piñón (1994) and Parsons' *culmination* function in Zucchi (1999). This then leads to the assumption (iv) in (14), namely that prefixes are overt morphological exponents of the perfective operator, or grammatical markers of perfective aspect. On Zucchi's (1999) analysis of Russian, "[t]he derivation of a perfective form by prefixing a verb stem (...) instantiates the function [*Culmination*, HF] posited by Parsons [1980, 1985, 1990, HF] to interpret perfective aspect: the perfective prefix *na-* takes as input a predicate of complete/incomplete events and yields a predicate of complete events" (p.197). Parsons' culmination predicate *Cul* relates eventualities to the time *t* at which the described eventuality culminates: $\lambda e \lambda t [P(e) \wedge Cul(e,t)]$, where *P* is a variable over predicates (i.e., description of eventualities), *e* is a variable that ranges over eventualities. According to Kozłowska-Macgregor (2002), the perfective aspect in Polish acts as a telicity marker and carries a [+TELIC] feature.

The *common view* of Slavic verbal prefixes is also compatible with aligning the category of 'perfective aspect' semantically with telicity (or quantization) and that of 'imperfective aspect' mostly with atelicity (or homogeneity). (See Pereltsvaig (2002), among many others, for example.) This strategy is also common in cross-linguistic

comparisons of aspectual systems. Some examples are Krifka (1986, 1992) who compares English, German, Finnish, Czech and Hindi, and van Hout's (2003) first-language acquisition studies based on Dutch, English, Russian, Polish and Finnish.

Although the *common view* of Slavic verbal prefixes given in (14) appears to be plausible and internally consistent, I will argue that it must be rejected, because it makes wrong predictions about the distributional and semantic behavior of prefixes. In the next Section, I will show that prefixes do not function in all of their uses as telicity modifiers, consequently, not all the perfective verbs are telic. In discussing these points, I will take as a point of departure prefixes that are applied to perfective verbs, and then show that the assumptions (i)-(iii) of the *common view* given in (14) are invalid.

3 Prefixation of perfective verbs

In (17a-c), we see that verbal prefixes in Czech, Polish and Russian can be applied to simple perfective verbs. The derived prefixed perfective verb in turn serves as an input into further prefixation. Hence, we get derived prefixed perfective verbs, the structure of which can be schematically represented as in (17d). All the verbs in (17) are perfective, whereby 'perfectivity' is here understood as a formal category, and the perfective status of a verb is determined by the standard distributional tests used in reference grammars and textbooks: for example, perfective verbs cannot function as complements of a future auxiliary, a phasal verb, and they cannot be modified with a durative adverbial or a time-point adverbial like 'right now'. (Since such tests are well-known, I will not dwell on them here.)

(17) a. Czech

skočit ^P	→	od- skočit ^P	→	po- od- skočit ^P
jump.INF		PREF-jump .INF		PREF-PREF-jump .INF
'to jump (once)'		'to jump (once) away from'		'to jump (once) a small distance away from'

b. Polish: Kipka (1990, p.33)¹²

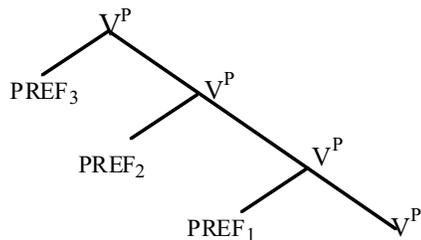
dać ^P	→	sprze- dać ^P	→	wy-sprze- dać ^P
give.INF		PREF-give .INF		PREF-PREF-give .INF
'to give'		'to sell'		'to clear via selling'

c. Russian: Polinsky (p.c.)

¹²According to Kipka (1990, p.34), such cases of multiple prefixation on a perfective verb stem are rare and exceptional, one reason being is that the meaning of the complex verb is not entirely predictable and compositional. However, the meaning of verbs with a single prefix is also often not compositional and not transparent, and yet verbs with a single prefix are very common. Hence, semantic non-compositionality cannot motivate the observation that verbs with two or more prefixes are less common than verbs with a single prefix. Non-compositionality of prefixed verbs is to be expected, given that verbal prefixes in Slavic are best viewed as derivational morphemes (see also Dahl 1985, Spencer 1991, and further below). Even though cases of multiple prefixation manifest substantially more formal and semantic idiosyncracies than cases of prefixation with a single prefix, the former cannot be discarded from consideration when trying to formulate general constraints on the distributional properties of prefixes.

dat' ^P give.INF 'to give'	→	po-dat' ^P PREF-give.INF 'to pass (sports) 'to display'	→	pere-po-dat' ^P PREF-PREF-give.INF 'to pass again / too far'
skazat' ^P say.INF 'to say'	→	pere-skazat' ^P PREF-say.INF 'to retell'	→	ne-do-pere-skazat' ^P NEG-PREF-PREF-say.INF 'stop short of (re)telling the whole story'

d.



The above examples are sufficient for the conclusion that we cannot restrict the input of prefixes to imperfective verbs, contrary to the constraint (iii) of the *common view* in (17). From the synchronic point of view, what the vast majority (of uses) of prefixes share is their formal output condition: namely, they derive perfective verbs (see also Comrie 1976, p. 91, and for Czech see Petr et al. 1986, p.389, for example). Hence, the actual input-output constraints on prefixation in Slavic languages can be stated as in (18):

- (18) Formal input-output constraints on prefixation in Slavic languages:
- i. The input of prefixation is a perfective or an imperfective verb.
 - ii. The output of prefixation is a perfective verb (strong tendency).

One type of an example in which prefixation does not yield a perfective verb concerns the denominal verbs like *ponocovat* 'to stay up late at night, the whole night long' in Czech. It is imperfective, according to the standard distributional tests like the compatibility with the time point adverbial 'right now' and the future auxiliary. However, it is derived from the imperfective verb *nocovat* 'to spend the night somewhere' with the prefix *po-*.

The perfective verbs in (17) also speak against the main semantic constraint on the application of prefixes in (i) and the telicity constraint in (ii) of the *common view* (17). Take the Czech perfective verb *skočit* 'to jump (once)' in (17a), for example: We see that the prefix *od-* 'away from' can be freely applied to it, and the prefix *po-* on top of it. If all perfective verbs were semantically telic and all prefixes were telicity modifiers, then the application of *od-* 'away from' to *skočit* 'to jump (once)' in (17a) ought to be excluded. Put differently, *od-skočit* 'to jump (once) away from' ought to be excluded on the same grounds on which the general *telicity constraint* given in (9) excludes English examples like (8e) *?I found a penny for an hour*. However, *od-skočit* 'to jump (once) away from' in (17a) is fully acceptable.

We have also seen that (9a) **John ran a mile for ten minutes* is ungrammatical, because it contains two telicity modifiers, each of which expresses a separate delimitation of the same event. However, the Czech *po-od-sednout si* ‘to sit down a small distance away from’ in (17a) and other parallel examples in Russian and Polish are fully acceptable, even though they contain two prefixes. If each prefix were to function as a telicity modifier, following the *common view*, assumption (i), then such a recursive application of prefixes on the same verb ought to be clearly excluded on semantic grounds: namely, by both the intuitive ‘one delimitation per event’ constraint, and the telicity constraint given here in (9).

The application of prefixes to simple perfective verbs and their recursive application on the same perfective verb raises the following questions:

- (19) a. What are the semantic input-output constraints on prefixes that are applied to perfective verbs? What are the semantic properties of the relevant derived prefixed perfective verbs?
- b. What is the nature of the constraints that govern the admissible combinations of two or more prefixes on one and the same verb? Are they structural, semantic or pragmatic (related to performance factors)?

I will turn to these questions in the next two Sections, 4 and 5.

4 Arguments against the *common view* of Slavic prefixes: Atelic uses of prefixes

In this section, I will show that Slavic verbal prefixes do not uniformly function in all of their uses as telicity modifiers, i.e., they do not uniformly derive either telic predicates or quantized predicates from homogeneous (atelic) ones, contrary to the *common view* of Slavic prefixes given in (14). As a case in point, I will describe in detail certain uses of the prefix *u-* in Czech, and show that it derives perfective verbs that are atelic (homogeneous). It also has other uses, and those discussed in this section, in (21), can be summarized in terms of the following inputs and outputs:

- (20) Prefix *u-* in examples in (21)

INPUT		OUTPUT	
FORM	MEANING	FORM	MEANING
simple ipf V	atelic	prefixed pf V	telic
simple ipf V	atelic	prefixed pf V	atelic
simple pf V	telic	prefixed pf V	telic
simple pf V	telic	prefixed pf V	atelic

Examples in (21) illustrate several uses of the prefix *u-*. We see that it can be applied to different verbs, or classes of verbs, with different semantic effects.

- (21) a. vidět^I → **u-**vidět^P

see.INF 'to (be) see(ing)'		TEL-see.INF 'to catch sight of'	
b. řeknout ^P say.SML.INF 'to say (once)'	→	u-řeknout ^P MANNER-say.SML.INF 'to say unintentionally, inadvertently, by mistake (once),'	se REFL 'to misspeak (once)'
c. zvednout ^P lift.SML.INF 'to lift (once)'	→	u-zvednout ^P MODAL-lift.SML.INF 'to be able to lift'	
d. nést ^I carry.INF 'to (be) carry(ing)'	→	u-nést ^P MODAL-carry.INF 'to be able to carry'	

In (21a), the prefix *u-* derives the perfective verb *uvidět*, which is here translated in its dominant meaning of 'to catch sight of', that is, it describes punctual events, and hence it can be reasonably assumed to be telic in the sense of (7). It is applied to the imperfective verb *vidět* 'to see', which is atelic (homogeneous). In contrast, in (21b), *u-* is applied to a perfective verb and derives another perfective verb. The input verb is *řeknout* 'to say (once)', a semelfactive verb. Semelfactive verbs are traditionally characterized as verbs that describe single events. They may be overtly marked with the suffix *-nou-* in Czech and *-nu-* in Russian, for example. Now, the derived perfective verb *uřeknout se* can be translated as 'to say unintentionally (once)', 'to misspeak (once)', which means that the prefix *u-* here only adds the *manner* component of approximately 'unintentionally', 'inadvertently', 'by mistake' to the perfective verb¹³. Clearly, the prefix *u-* does not here function as a telicity modifier in the sense of (i) of the *common view* (14).

In (21c), the prefix *u-* is also applied to a perfective verb that is semelfactive, namely, *zvednout* 'to lift (once)' and it derives another perfective verb *uzvednout* meaning 'to be able to lift.' Hence, the prefix here contributes the component of *root modality* to the verb. But this means that the prefix *u-* here derives a perfective verb that is atelic (homogeneous). This follows given that verbs expressing abilities, propensities or dispositions are generally lexically stative, and stative verbs are atelic (homogeneous). Stative verbs are atelic (homogeneous), because they hold atemporally of their arguments, or put differently, the property they express holds at any one moment during the whole interval of their truth as much as at any other moment. For example, if I am able to lift a six-pack of beer, then I have this ability or potential during most of my existence, and I do not even have to lift a six-pack of beer ever to prove it to you. Even though the prefix *u-* is the only prefix with a clear modal use in Czech, it is very productive in this use.

In (21d), the prefix *u-* derives the perfective modal verb *unést* 'to be able to carry' from the imperfective verb *nést* 'to (be) carry(ing)', which is atelic (homogeneous). In this case, the prefix *u-* preserves the homogeneity of a verb.

¹³Cp. also: *přeřeknout^P se / přeřici^P se* 'to say unintentionally (once)', 'to misspeak (once)'; *prořeknout^P se / prořici^P se* 'to blab out (once)'.

The prefix *u-* may also give rise to an ambiguity of a single prefixed verb. For example, the perfective verb *uvidět* in (21a) can also have a modal meaning of ‘to be able to see’, apart from the dominant telic meaning of ‘to catch sight of’.

Most importantly, all the verbs derived with the prefix *u-* in (21) are formally perfective, according to standard reference grammars and dictionaries, that is, they are perfective according to the relevant distributional tests¹⁴. (22) lists five among those that are the most frequently used:

(22) Criterion	<u>u</u> -verbs in (21)	Vperfective	Vimperfective
1. complement of a future auxiliary	*	*	√
2. complement of a phasal verb	*	*	√
3. occurs with a durative adverbial (e.g., <i>hodinu</i> ‘for an hour’)	*	*	√
4. occurs with a time-span adverbial (e.g., <i>za hodinu</i> ‘in an hour’)	√/*	√	*
5. occurs with the time point adverbial (e.g., ‘right now’)	*	*	√

Perfective verbs with the modal use of the prefix *u-* differ from non-modal perfective verbs in so far as they are stative, rather than describing particular single episodes. However, modal perfectives clearly pattern with other perfective verbs in so far as they can never function as complements of a future auxiliary or a phasal verb, unlike imperfective statives.

Although modal perfectives are like the majority of episodic perfective verbs in so far as they cannot occur with durative adverbials like *hodinu* ‘for an hour’, they do so for very different reasons. Episodic non-modal perfectives are quantized, and hence of the wrong semantic type to serve as inputs of the temporal measure like *hodinu* ‘for an hour’. Modal perfectives are atelic (homogeneous), but they do not freely occur with any specifications that temporally restrict the validity of dispositions, abilities and propensities they describe. This is understandable if we assume that they are ‘tendentially stable’ (to borrow Chierchia’s 1995 formulation), which is a distinguishing characteristics of ILP’s in general. ILP’s are tendentially stable in the sense that they typically hold during *one* significantly large portion of an individual’s lifespan, and they hold at any one moment during the whole interval of their truth as much as at any other moment. The property of ‘tendential stability’ may also motivate the observation that modal perfective verbs lack a future time reference in the present tense form, unlike non-modal perfective verbs that are episodic.

To summarize, since there are prefixes like *u-* in Czech that derive verbs that are formally perfective and semantically atelic (homogeneous), the semantics of perfectivity cannot be captured in a uniform way in terms of quantization in the sense of (1), nor telicity in the sense of (7), nor other closely related notions: e.g., ‘accomplishment/achievement’, ‘completion’, ‘result’ and the like.

¹⁴Standard reference grammars and dictionaries classify such verbs as perfective. For example, *Česko-německý slovník* - ‘Czech-German Dictionary’, Siebenschein et al. 1983, p.666, lists the perfective verb *uzvednout* ‘to be able to lift’ as being perfective.

Most importantly, the behavior of the prefix *u-* is not quirky, but rather typical of the way in which verbal prefixes in Slavic languages behave. Therefore, the existence of perfective verbs that fail to be telic, cannot be dismissed as peripheral, and I will discuss other examples in the next section. Given the data and observations made here, we may conclude (23):

- (23) (i) Prefixes do not uniformly function in all of their uses as telicity modifiers.
- (ii) Prefixes may derive perfective verbs that fail to be telic (and hence quantized). Consequently, not all perfective verbs are telic (or quantized).

The conclusions in (23) amount to the rejection of the first two assumptions of the *common view* of prefixes given in (14). They should not be surprising from the point of view of the behavior of verbal prefixes in other Indo-European languages. For example, Kratzer (1994, pp.41-3) observes that German prefixes do not invariably express quantized properties of events, and “the class of perfective predicates in our sense does not coincide with the class of predicates that express quantized properties of events” (p.42). Kratzer’s application of the notion ‘quantized’ seems to cover both ‘quantized’ and ‘telic’ in the terminology here. Although it may be questioned whether prefixed verbs in Slavic languages and German prefixed verbs have the same status as far as their classification into the formal perfective category is concerned (see also Comrie 1976, Chapter 5.1.1), the general point still holds: namely, verbal prefixes in Slavic languages and German do not uniformly derive either quantized or telic predicates.

Given that the assumption (iii) of the *common view* of Slavic prefixes given in (14) was rejected in the previous section, this leaves us only with the assumption (iv) that verbal prefixes in Slavic languages are markers of the perfective aspect. However, this assumption is highly problematic and should be best rejected, as well. There are a number of reasons for this (see also Filip 2000). Let me here briefly mention just a few. It is reasonable to take as a point of departure Spencer’s (1991) observation: Verbal aspect in Slavic languages is standardly taken to be a grammatical category, and if this also implies that it is an inflectional category, then prefixes cannot be *perfective* morphemes, because such morphemes ought to have inflectional characteristics. However, verbal prefixes do not have (clear) inflectional characteristics, but rather behave like derivational morphemes. Building on Spencer (1991), I propose (see also Filip 2000) that a prefixed perfective verb in Slavic languages is best seen as a new verb that stands in a derivational relation to its base, rather than being an aspectually different form of one and the same lexeme. Unlike typical inflectional morphemes that occur on verbs in Indo-European languages, prefixes have morphological, syntactic, and semantic effects on the argument structure of verbs. Unlike other uncontroversial devices for the expression of grammatical aspect (i.e., the English progressive, for example), verbal prefixes in Slavic languages are recursively applicable, and their presence on a verb is neither a sufficient nor a necessary formal indicator of the perfective status of a verb. There is *no* single prefix solely dedicated to the expression of the ‘perfective’ meaning (characterized in terms of ‘quantization’, ‘telicity’, or some other notion) and *no* other meaning in *all* of its occurrences. Prefixes have no constant aspectual, or other, meaning in all of their occurrences. Prefixes cannot be divided once and for all into those that derive telic properties of events (or quantized properties of events) and

atelic/homogeneous properties of events. Neither is it possible to predict when exactly a given *use* of a prefix will derive a telic predicate, regardless of whether it also induces other lexical modifications of the verb related to time, manner, space, quantity, affective connotations, and the like. Different prefixes can be attached to one verb stem so that to one and the same simple imperfective verb we typically get a cluster of prefixed perfective verbs, rather than just one prefixed perfective verb. All prefixes manifest homonymy and polysemy, and the meaning of the combination [V^0 prefix+ V^0] is not always transparently compositional, but it is often partially or fully lexicalized. The input and output constraints on the application of prefixes can only partially be specified in terms of coherent lexical semantic classes of verbs.

I will turn to the specification of some of these constraints in the next section and argue that the constraints that sanction the application of one or more prefixes on a verb can be to a large extent motivated by semantic factors.

5 Recursivity of prefixes: Semantic motivation for admissible combinations

In Section 3, a derivational pattern was introduced in which a prefix is applied to a simple perfective verb and derives a prefixed perfective verb to which another prefix can be attached. Do prefixed perfective verbs of this type constitute a counterexample to the intuitive constraint against ‘one delimitation per event’? On the *common view* of perfective verbs and prefixation given in (14), they would constitute a blatant counterexample to this constraint as well as to the *telicity constraint* given in (9). In this section, I will show that we may successfully account for a variety of such apparent counterexamples if we rely on certain general principles in the structuring of eventualities that are independently, and also cross-linguistically, motivated. –Semantically, prefixes are here taken to be predicate modifiers, and characterized in terms of functions that map sets of eventualities of any type (states, processes or events) onto eventualities of some (possibly) other type. Application of a single prefix to a perfective verb as well as combinations of prefixes on the same verb are limited by semantic constraints related to the eventuality change potential of prefixes.

I will illustrate this point with interactions between directional and measurement uses of verbal prefixes in Czech. The choice of the directional and measurement uses is not accidental. These are some of the most frequent uses of prefixes in Slavic languages. Directional uses reflect the historical connection of prefixes to prepositions and adverbials that express direction and location in the concrete spatial domain. In Czech, all nineteen prefixes listed in Petr et al. (1986, pp. 395ff.) have directional meanings. In addition, sixteen prefixes have vague measure uses, which are pronounced to different degrees and may be related to spatial and directional meanings of prefixes. (The exceptions are *v(e)*- ‘into’, *vz*- ‘upwards’, *z(e)*- ‘out of’.) Although the generalizations established here are based on Czech data, they are directly related to basic principles in the structuring of events, and hence are transferable to other Slavic languages.

5.1 Asymmetry of Goal and Source modifiers

In Slavic languages, directed motion predicates are expressed by a combination of a manner of motion verb with Source and/or Goal modifiers. These are prepositions,

prefixes, and adverbs, that is, ‘satellites’ in Talmy’s (1985) sense. In what follows I will argue that only Goal modifiers induce a telic interpretation of a directed motion predicate, but not Source modifiers on their own. Let me start with Czech examples in (24). Here, we see that both the main verbs are perfective, according to the standard distributional tests for perfectivity (see also (22) above), and both are formed with a directional prefix from the simple perfective verb *skočil* ‘he (once) jumped (once)’, ‘he made a single jump’.

- (24) a. *Od-skočil^P* *metr* *od okna.*
 AWAY-jump.PAST.3SG about meter from window
 ‘He jumped a meter away from the window.’
- b. *Při-skočil^P* ??*metr* *k oknu.*
 TO-jump.PAST.3SG ??about meter to window
 ‘He jumped a meter to the window.’

In what follows I will use the labels ‘Goal-prefix’ and ‘Source-prefix’ for the sake of brevity. However, strictly speaking, we here have Goal and Source *uses* of prefixes, and the prefixes discussed here also have other uses than directional ones. In (24a), the prefix *od-* ‘away (from)’ encodes the orientation away from the entity specified in the Source-PP. In the absence of an overt Source-PP, it encodes the orientation away from the location of the speaker/addressee at the speech act time, or from some other salient entity (i.e., participant, location) of the discourse at the reference time. In contrast, the Goal-prefix *při-* ‘to’ encodes the orientation towards the relevant point of reference, in (24b) it is the entity specified in the Goal-PP.

Most importantly, *od-skočil* ‘he (once) jumped away (from)’ with the Source-prefix *od-* ‘away (from)’ is acceptable with the measure phrase *metr* ‘a meter’. In contrast, *při-skočil* ‘he (once) jumped to’, ‘he made a single jump to’ with the Goal-prefix *při-* ‘to’ is odd in this context. Since (24a) and (24b) only differ in the directional prefixes on the verbs, we may conclude that the spatial orientation encoded in the prefixes interacts with the semantics of the measure expression.

It is crucial to establish that the acceptability judgments in (24) are determined by the interaction between prefixes and the measure expression *metr* ‘a meter’. If either the directional prefixes are omitted, as in (25), or the measure expression *metr* ‘a meter’ is left out, as in (26), we get perfectly well-formed sentences. In (25), the additional context provided by the subordinate clauses makes the main clauses sound more natural.

- (25) a. *Skočil^P* *metr* *od branky, aby chytil^P míč.*
 jump.PAST.3SG about meter from goal in.order.to catch.PAST.3SG ball
 ‘He jumped a meter away from the goal so that he could catch the ball.’
- b. *Skočil^P* *metr* *k brance, aby do ní vstřelil^P míč.*
 jump.PAST.3SG about meter to goal in.order.to into it kick.PAST.3SG ball
 ‘He jumped a meter to the goal so that he could kick the ball into it.’

- (26) a. *Od-skočil^P* *od okna.*

AWAY-jump.PAST.3SG from window
'He jumped away from the window.'

- b. Při-skočil^P k oknu.
TO-jump.PAST.3SG to window
'He jumped to the window.'

It is reasonable to assume that PPs that have a directional use, both Goal and Source, form a single syntactic and semantic constituent with spatial measure phrases, as Rothstein (2003) argues for English examples like (10)-(12). Hence, the spatial measure expression *metr* 'a meter' constitutes a single telicity modifier with the Goal-PP and Source-PP in (25) and (26).

In contrast, prefixes that have a directional use, both Goal and Source, as in (24a-b), *cannot* form a single syntactic and semantic constituent with the spatial measure phrases, but instead the measure phrase and the directional prefixes are formally and semantically fully independent of each other. This follows from the Lexical Integrity Hypothesis, one of the widely accepted generalizations about the separation of syntax and morphology, according to which syntactic processes should be blind to the internal structures of words, which are created by the morphology. Crucially, in (24a-b), we see that the spatial measure phrase is only compatible with perfective verbs that contain the Source-prefix, but not the Goal-prefix.

We can use this behavior as an important piece of evidence for the telicity status of the perfective verbs. First, the input-output constraints on expressions of extensive measure functions that apply to verbal predicates can be stated as in (27):

- (27) For verbal predicates, the domain of application of extensive measure functions is restricted to atelic (homogeneous) predicates. Their outputs are telic predicates.
Examples: *a mile, for an hour.*

Expressions of extensive measure functions that apply to verbal predicates are paradigm examples of telicity modifiers in the sense of the general *telicity constraint* in (9). (The homogeneity input requirement of measure adverbials is discussed in detail in Moltmann 1991, for example.)

Second, since the perfective verb *od-skočil* 'he (once) jumped away (from)' with the Source-prefix *od-* 'away' in (24a) is compatible with the measure expression *metr* 'a meter', we can conclude that it is atelic (homogeneous). In contrast, in (24b) the perfective verb *při-skočil* 'he (once) jumped to' with the Goal-prefix *při-* 'to' is incompatible with this measure expression, which indicates that it is not atelic (homogeneous). Therefore, we may conclude that the telicity status of perfective verbs that are formed with directional prefixes depends on the spatial orientation encoded in their directional prefixes.

An additional independent piece of supporting evidence for (27) can be seen in the interaction between temporal measure phrases and directed-motion predicates that are formed with Goal- and Source-PPs. This is shown in English examples in (28):

- (28) a. John ran away from the car for ten minutes / (*) in ten minutes.

- b. John ran to the car *for ten minutes / in ten minutes.

In (28a), the predicate *ran away from the car* contains a Source PP, and it is compatible with the temporal measure adverbial *for ten minutes*. Since it satisfies the input constraint of a measure expression, we can conclude that it is atelic (homogeneous). In general, temporal *for*-PPs express that for all the relevant parts of an interval with the length indicated by them, the verbal predicate is true (see Dowty 1979, p.60, 79, 81). Hence, the domain of application of temporal *for*-PPs is taken to be restricted to homogeneous (atelic) predicates. (‘(*)’ indicates that the sentence is acceptable in the inchoative reading, i.e., ‘after ten minutes, he started to run away from the car’.) In contrast, the predicate *ran to the car* with the Goal-PP in (28b) cannot be modified with the temporal measure adverbial *for ten minutes*, only with the *in*-PPs time-span adverbial. In general, predicates with Goal-PPs behave like telic predicates in this respect.

Based on the above Czech and English examples, we may suggest that Goal-modifiers, prefixes or PPs, differ from Source-modifiers in their telicity inducing properties. This may be stated as in (29):

(29) **Goal-Source telicity asymmetry**

The spatial orientation of directional modifiers determines the telicity status of derived predicates. Source-modifiers form atelic (homogeneous) predicates. Goal-modifiers form telic predicates.

Before turning to our Slavic examples, let me first illustrate the semantic constraint in (29) with well-known English examples, and then address a few representational issues. It has been observed by many that the overt expression of a Goal-PP does not suffice to guarantee that ‘V + Goal-PP’ expresses a quantized predicate. This follows given that the implicit Path argument is not guaranteed to be quantized, because two paths with the same Goal but different starting points can stand in the ‘proper part’ relation. In the diagram below (30a), we see that an event of a running to the car that starts at the location LOC1 and ends at the Goal (the car), will have a proper part, namely an event of a running to the car that starts at the location LOC2, that also falls under *ran to the car*. Therefore, the predicate *ran to the car* is not quantized, according to (1). At the same time, *ran to the car* behaves like a telic predicate; for example, with respect to temporal adverbials, as we have just seen. To account for their telic behavior, Hinrichs (1985) and Krifka (1998) propose that sentences like (30a) involve an implicit starting point in their semantic representation. This idea is implemented in the formula (30b), which is a part of the semantic representation of (30a): the LOC argument of the implicit SOURCE predicate stands for a specific starting location that must be recoverable from the context in which (30a) is used. (To simplify the representation, it is here treated as a constant.)

- (30) a. John ran to the car *for ten minutes.



$$b. \exists x, e, t[\mathbf{run}'(\mathbf{j}', x, e) \wedge |e| <_{t, \forall x, e} [\mathbf{run}'(\mathbf{j}', x, e) \wedge [\mathbf{SOURCE}(x, \mathbf{LOC}, e) \wedge \mathbf{GOAL}(x, \mathbf{the-car}', e)]] = 1 \rightarrow |e|=1] > = 1 \wedge \mathbf{SOURCE}(x, \mathbf{LOC}, e) \wedge \mathbf{GOAL}(x, \mathbf{the-car}', e) \wedge \mathbf{AT}(e, t)]$$

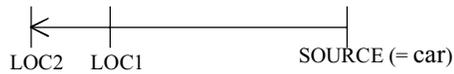
By assuming that the LOC argument of the abstract SOURCE predicate is contextually fixed, and the Goal is expressed by the Goal PP, the implicit Path argument is atomic, and provides the criterion for atomicity of the verbal predicate *ran to the car*. In a given context (30a) can be understood as *John ran [from the store] to the car*, if the LOC is understood to be some specific store location. Assuming that any motion verb establishes a relation between a moving entity (x), a path (y) and an event (e), as in $\lambda x \lambda e \exists y[\mathbf{run}'(x, y, e)]$ in (30b), the telicity of *ran to the car* follows from the parts of a path being related to the parts of an event. However, this is not a matter of homomorphism, because there are also circular and backward movements, as Krifka (1998) argues.

Apart from Goal modifiers (and their associated implicit SOURCE predicates), the criterion for atomicity of motion predicates, and hence their telicity, can be indicated by an overt extensive measure applied to their Path argument, as in *John ran three miles*: $\exists x, e, t[\mathbf{run}'(\mathbf{j}', x, e) \wedge |e| <_{t, \forall x, e} [\mathbf{run}'(\mathbf{j}', x, e) \wedge \mathbf{MILE}(x)=3 \rightarrow |x|=1] > = 1 \wedge \mathbf{MILE}(x)=3 \wedge \mathbf{AT}(e, t)]$. In general, the telicity of directed motion predicates is constrained by (31), which can be understood as a meaning postulate on one type of admissible telic predicates:

- (31) Motion predicates are telic iff their Path argument denotes a set of single atomic individuals, or a plural set of atomic individuals of definite cardinality. The criterion of atomicity for a Path argument is provided by (i) an extensive measure function, or (ii) its SOURCE and GOAL predicate, whereby the GOAL predicate must be overtly expressed, and the SOURCE predicate must be either expressed or contextually determined. Otherwise, motion predicates are atelic.

In general, I assume that any motion verb introduces a Path argument into its semantic representation. (In this respect, I depart from Talmy (1985), according to whom simple manner of motion verbs like RUN in Germanic and Slavic languages do not lexicalize a path at all.) A path is a one-dimensional axis that is non-branching and non-directed (a special case of an adjacency structure, in Krifka's (1998) sense). In $\lambda x \lambda e \exists y[\mathbf{run}'(x, y, e)]$ the Path argument x is not associated with any SOURCE or GOAL predicate delimiting its endpoints. This effectively amounts to the Path argument being homogeneous. Some paths have an additional property of being directed, such as those implied in predicates with Goal-modifiers. However, a path that is directed is not necessarily atomic. A case in point are paths implicit in predicates with Source modifiers. They add directionality, but they cannot induce telicity of a predicate they derive. Take *ran away from the car* in (32a), for example. It applies to any eventuality in which the moving individual changes its location to any degree whatsoever from the Source (provided it is not too small to count as being away), and it will simultaneously apply to any of its proper parts. In the diagram below (32a), a running from the car to LOC1, and a running from the car to LOC2 both count as eventualities of running away from the car.

- (32) a. John ran away from the car for ten minutes.



- b. $\exists x, e, t[\text{run}'(\mathbf{j}', x, e) \wedge \text{SOURCE}(x, \mathbf{the-car}', e) \wedge \text{AT}(e, t)]$

This also means that a predicate like *ran away from the car* is divisive, according to (2a), and cumulative, according to (2b), given in Section 2.1. Hence, it is homogeneous (atelic), which is also confirmed by its compatibility with the measure phrase *for ten minutes*. Sentences with Source-modifiers like (32a) can be represented as in (32b).

One piece of evidence for the claim that predicates with Goal-PPs involve an implicit Path argument that is atomic, but predicates with Source-PPs do not, can be seen in the behavior of *all the way*. As (33) shows, it can only be used with Goal-PPs, but not with Source-PPs:

- (33) a. John ran all the way to the car.
 b. ??John ran all the way away from the car.

It could be proposed that *all the way* is restricted to apply to an atomic Path predicate. Intuitively, it highlights the entire length of the path. Consequently, if a verbal predicate does not involve an atomic Path argument in its semantic representation, as I here argue for predicates with Source-modifiers, the occurrence of *all the way* is not sanctioned.

This idea can be supported by examples in which *all the way* selects the atomic interpretation of an overt Path argument, if either the atomic or homogeneous interpretation of a Path argument is available. Examples in (34), taken from Declerck (1979, p.768ff.) and Jackendoff (1996, p.309), illustrate this point:

- (34) a. The insect crawled *through / down the tube* for an hour / in an hour.
 b. The insect crawled all the way through the tube *for an hour / in an hour.
all the way down the tube

In (34a), *the tube* introduces a Path argument into the semantic representation. The NP *the tube* on its own can be understood as atomic (and hence quantized) or homogeneous¹⁵. Since *down-PP* and *through-PP* only provide a direction, but do not enforce an atomicity of the path, the sentences in (34a) are ambiguous between a telic and an atelic interpretation. In contrast, (34b) is telic, because *all the way* here selects the

¹⁵In English, definite NPs do not necessarily denote quantized predicates and consequently, they do not always induce a telic reading of a complex verbal predicate. Some of the best examples illustrating this point are given in Jackendoff (1990, p.101-2):

- (i) a. The water was rushing out of the faucet.
 b. The people were streaming into the room.
 (ii) a. The water rushed out of the faucet.
 b. The people streamed into the room.

According to Jackendoff (1990, p.101), the sense of cumulativity (his 'unboundedness') is in (ia-b) heightened by the use of progressive aspect, "which in a sense takes a snapshot of an event in progress" (p.101). The definite article "performs only a deictic function; in these cases it designates a previously known medium instead of a previously known object" (p.101). If the progressive is replaced by simple past, the event is viewed as temporally bounded and consequently, "the amount of water and the number of people is also bounded" (p.101).

atomic meaning of *the tube*. Notice also that *all the way* on its own cannot induce telicity of predicates that are inherently atelic (homogeneous): cp. *John ran all the way* (**in ten minutes* / ??*for ten minutes*).

The different representations proposed for verbal predicates with Source-PPs and Goal-PPs may appear to be ad hoc, even though these two types of verbal predicates clearly manifest differential behavior with respect to telicity tests like the compatibility with temporal adverbials. In particular, the representations may raise the following question: Why do we require that verbal predicates with Goal-PPs have a determinate starting point, but those with Source-PPs have no determinate end point in their semantic representation? The answer to this question is ultimately related to the general motivation for the *Goal-Source telicity asymmetry*, given here in (29). Why do expressions of final parts of events, ‘Goals’ in a variety of event dimensions (including spatial Goals, results, and end delimitations of various types), necessarily induce telicity of predicates, but expressions of Sources do not seem to? A related question is posed by Rothstein (2000): Why do we find resultative secondary predicates (along with depictives), but no inceptive secondary predicates? In this connection, we may also explore the plausibility of an analysis that reduces final parts of events, ‘Goals’ in a variety of event dimensions to one abstract representation involving a (relevant) property scale and its endpoint. Attempting to answer such questions would go beyond the scope of this paper, so I will leave them open here.

Now, in (24a-b) we have seen that the verb with the Goal-prefix *při-* ‘to’ does not satisfy the atelicity (homogeneity) requirement of the measure phrase, but the verb with the Source-prefix *od-* ‘away (from)’ does. Therefore, only the verb with the Source-prefix *od-* ‘away (from)’, but not with the Goal-prefix *při-* ‘to’ is atelic. If it is correct that Source-modifiers derive new predicates that are homogeneous, then they do not function as telicity modifiers in the sense of the *telicity constraint* given in (9). Consequently, Source-prefixes can be applied to any predicate without violating the *telicity constraint* in (9), and the intuitive constraint against more than one ‘measurement’ or delimitation of a single event expressed by a single verb. Perfective verbs with Source-prefixes thus constitute another coherent class of perfective verbs that are not telic, apart from Czech modal perfective verbs discussed in Section 4. The existence of such verbs thus contradicts the *common view* of Slavic perfective verbs given in (14), on which all perfective verbs are telic.

What about the application of the Goal-prefix *při-* ‘to’ to the perfective verb *skočit* ‘to jump (once)’, ‘to make a single jump’ in (24b)? If all perfective verbs were uniformly telic, as the *common view* of Slavic perfective verbs in (14) assumes, then the application of the Goal-prefix *při-* ‘to’ to the perfective verb *skočit* ‘to jump (once)’, ‘to make a single jump’ ought to be excluded. It would also contradict the *telicity constraint* given in (9), and violate the intuitive ‘one delimitation per event’ constraint. Perfective verbs like *skočit* ‘to jump (once)’, ‘to make a single jump’ are traditionally characterized as semelfactive, i.e., verbs that describe singular events. They are often taken to be the prime examples of verbs that exhibit what is considered to be the prototypical meaning of perfectivity: namely, ‘totality of action’ (or *celostnost’ dejstvija*, Russian). (See also Section 2 above.) Perfective semelfactives can also be overtly marked with the suffix *-nou-* in Czech (and its cognate *-nu-* in Russian, for example). An example is *kývnout* ‘to nod (once)’. Now, I would like to propose a different view of Slavic perfective

semelfactives on which perfective semelfactives are close to simple imperfective verbs with respect to their eventuality structure and to derivational prefixes, which have an eventuality structure modifying function. The application of Goal-prefixes, and other prefixes that derive perfective verbs that are telic, to semelfactive perfectives is a part of a regular derivational pattern. Some examples are given in (35):

- (35) a. *při-sednout^P* *si*
 TO-sit.down.SML.INF PART
 ‘to sit down to (somebody or something)’
- b. *do-křiknout^P*
 TO-shout.out.SML.INF
 ‘to shout/call out all the way to (somebody)’
- c. *pře-křiknout^P*
 OVER-shout.out.SML.INF
 ‘to shout over (somebody else’s speech)’, ‘to interrupt by shouting’

In (35a), we see that the prefix *při-* used with the Goal, and hence telicity inducing, function is attached to the semelfactive perfective verb *sednout si* ‘to sit down’. In (36), the same prefix with the same Goal function is attached to the simple imperfective verb *jet* ‘(to be) go(ing)’, which describes a manner of motion and is atelic, and derives the perfective verb *přijet* ‘to arrive’, which is telic.

- (36) *jet^I* → *při-jet^P* (k nám)
 go.INF TO-go.INF (to us)
 ‘to (be) go(ing)’ ‘to arrive (to us)’
 [by some means of transportation]

Given that simple perfective semelfactives can serve as inputs of Goal modifiers, just like simple imperfective verbs of manner of motion do, it is plausible to propose that simple perfective semelfactives are atelic (homogeneous) just like simple imperfective verbs of manner of motion. Goal modifiers are the paradigm examples of telicity modifiers in the sense of the *telicity constraint* given in (9): they express functions that map atelic (homogeneous) predicates onto telic predicates.

Some independent cross-linguistic evidence for the similarities between semelfactives and verbs describing a manner of motion can be drawn from Levin’s (2000) work, who argues that English semelfactives like *jump* and processes expressed by manner of motion verbs like *run* are alike, because they have simple eventuality structures, can be found in reflexive resultatives and with *out*-prefixation.

Although semelfactive perfective verbs in Slavic languages do denote sets of singular events, I propose that they do not inherently denote sets of singular *atomic* events. Hence, they do not qualify as telic verbs, according to (7). In so far as they are not telic, perfective semelfactives semantically pattern with simple imperfective verbs, which are clearly atelic (homogeneous). If this is correct, then the application of Goal-

prefixes, and of other telicity modifiers in the sense of (9), to perfective semelfactives is expected, rather than prohibited.

In order to understand why perfective semelfactives are not atomic, and hence not telic in the sense of (7), it helps comparing them to certain count nominal predicates that also fail to be atomic. Examples are count predicates like *sequence*, *twig*, *fence*, *quantity*, *piece*, which I already mentioned as being problematic for Krifka's notion of 'quantization' (see Section 2). They are count, according to standard tests for mass vs. count predicates: they can occur with a singular indefinite article *a*, with cardinal numerals like *three*, with strong quantifiers like *every* and *each*, and they can be pluralized. Nevertheless, in isolation they are homogeneous and cumulative, according to (2a-b). Rothstein (2003) argues that they may denote a set of atomic entities, provided they are embedded in a context which supplies the criterion for the atomicity of entities in their denotation. What counts as an atomic sequence-unit, twig-unit, or fence-unit, for example, differs from context to context. Take, for example, the sequence of numbers *1, 2, 3, 4*. The same sequence of numbers can be taken to constitute a single atomic unit in one context, or, two atomic units *1, 2* and *3, 4*, in a different context. In each case, the criterion for the identification of such atomic units must be fully recoverable from the given context.

Semelfactive verbs like *skočit* 'to jump (once)', 'to make a single jump' and *kývnout* 'to nod (once)', are formally classified as perfective, because they behave more like perfective verbs than imperfective ones, according to standard syntactic tests, some of which are given in (22). One notable exception is their behavior with temporal adverbials, illustrated by examples in (37). Although they are incompatible with durative adverbials like 'vteřinu' 'for a second' like most perfective verbs, they are also odd with time-span adverbials like *za*-PP ('in'-PP), in the *not* inchoative reading.

(37) a. *Skočil^P* *vteřinu / (?) za vteřinu.
 jump.PAST.3SG *second.SG.ACC / (?) in second.SG.ACC
 'He jumped for a second / in a second.'

b. *Kývl^P* *vteřinu / (?) za vteřinu.
 nod.PAST.3SG *second.SG.ACC / (?) in second.SG.ACC
 'He nodded [i.e., lowered and then raised his head] for a second / in a second.'

Just like *sequence*, *twig*, *fence*, *quantity*, *piece*, semelfactive perfective verbs denote sets of singular entities, but entail no inherent criteria for determining what constitutes singular *atomic* entities in their denotation. In isolation, *bare* semelfactive verbs are weakly homogeneous, and hence atelic. Take, *kývnout* 'to nod', for example. It is weakly homogeneous, because we may have a proper part which also falls under *kývnout* 'to nod', but not every proper part of nodding will necessarily count as nodding. In addition, it has a different unit structure in different contexts. Therefore, we cannot make any absolute statement for *kývnout* 'to nod' about what counts as an atomic event in its denotation. In this respect, it certainly differs from telic predicates like *run a mile* or *reach the summit*, which entail the criterion for the individuation of their atomic events, and this criterion remains constant, regardless of their context of use.

In the light of the above observations, it is plausible to assume that semelfactive verbs like *skočit* ‘to jump (once)’, ‘to make a single jump’ have a semantic representation that is essentially the same as that of imperfective verbs denoting motion processes like *run*:

(38) $\llbracket skočit \rrbracket \Rightarrow \lambda x \lambda e \exists y [\mathbf{jump}'(x, y, e)]$

A representation of the Goal-prefix like *při-* ‘to’ is given in (39a) and that of the Source-prefix *od-* ‘away (from)’ in (39b). One of the simplifications in (39) concerns the endpoints of the path, LOC, LOC1 and LOC2, which are treated as constants, and not as variables.

(39) a. $\llbracket při- \rrbracket \Rightarrow \lambda P \lambda x \lambda e \lambda y [P(x, y, e) \wedge |e|_{\langle t, M \rangle} = 1 \text{ SOURCE}(x, \text{LOC}_1, e) \wedge \text{GOAL}(x, \text{LOC}_2, e) \wedge \text{LOC}_1 \neq \text{LOC}_2]$

b. $\llbracket od- \rrbracket \Rightarrow \lambda P \lambda x \lambda e \exists y [P(x, y, e) \wedge \text{SOURCE}(y, \text{LOC}, e)]$

The representations in (39a-b) are intended to capture the directional uses of prefixes in the concrete physical domain, and they require that their input predicates establish a relation between a moving entity (x), a path (y) and an event (e). With a few exceptions¹⁶, directional uses of prefixes, both Goal and Source ones, are restricted to combinations with verbs of motion, i.e., with verbs that supply the requisite Path argument. If we apply the same prefixal form *při-* and *od-* to a verb that is not an inherent verb of motion, we do not get a directed motion verb. This is shown in (40), where the prefix *při-* is applied to the imperfective verb *spát* ‘to (be) sleep(ing)’. We get the perfective verb *přispat si* (the particle *si* can be ignored for our purposes), which approximately means ‘to sleep late’, ‘to sleep longer or more than usual’. Here, the prefix *při-* is used in its ‘additive’ sense of approximately ‘more’.

(40) Hodilo^l se mi, že jsme trénovali^l až odpoledne,
 suited.3SG PART me that AUX practiced.1PL until afternoon
 protože jsem si potřeboval^l přispat^p.
 because AUX PART needed.1SG sleep.INF (Gol, 2001, September issue)
 ‘It was fine with me that we did not practice until afternoon, because I could sleep late (or longer than usual).’

(Apart from the directional Goal and additive uses, the prefix *při-* also has other uses, some of which are related to measure like *při-zabít* (pf.) ‘to almost kill’.) In general, if a combination ‘prefix+base’ is transparently compositional, the sense a given prefix will assume depends on the lexical semantic properties of the base to which it is added.

In contrast to prefixes, PPs in their directional uses can be combined with verbs that are not inherent verbs of motion, and can induce a meaning shift of a verb that is not an inherent motion verb into a motion verb. In (41), we see that the directional PP ‘to

¹⁶Example of some exceptions are: *rachotit* (ipf.) ‘to rattle’, ‘to be rattling’ → *při-rachotit se* (pf.) ‘to rattle in(to)’, *supět* (ipf.) ‘to (be) puff(ing) and huff(ing)’ (appr.) → *při-supět* (pf.) ‘to arrive puffing and huffing’ (appr.).

San Francisco’ can be combined with the imperfective verb *spát* ‘to (be) sleep(ing)’ in a directed motion sentence, which parallels its English translation.

- (41) Bill spal¹ celou cestu do San Franciska.
Bill slept.3SG whole trip to San Francisco
‘Bill slept all the way to San Francisco.’

A verb like *sleep*, which entails no motion, is often taken to undergo a shift into a motion verb when it occurs in combination with a directional PP, as in (41)¹⁷.

To summarize, we have seen that only Goal modifiers, but not Source modifiers, yield telic predicates, regardless whether they are expressed by prefixes or PPs. Goal modifiers are telicity modifiers: They denote functions from denotations of atelic (homogeneous) predicates onto sets of contextually restricted atomic events, expressed by telic predicates. Goal-prefixes can be attached to simple perfective semelfactive verbs. This behavior is taken as evidence for the claim that simple perfective semelfactives constitute another class of perfective verbs that fail to be telic, in addition to modal perfective verbs (see Section 4) and perfective verbs with Source-prefixes. The existence of perfective verbs that are atelic ((weakly) homogeneous) contradicts the *common view* of Slavic perfective verbs, on which all perfective verbs are telic.

5.2 Multiple prefixation on a single perfective verb

Combinations of multiple prefixes on the same verb are restricted to a finite small number. Two prefixes can be easily found, three prefixes are much rarer, and four, if they can be found attested in a written or spoken language at all, are certainly quite exceptional. In this respect, prefixation in Slavic languages is more constrained than combinations of prepositional phrases and verbal particles in English, for example. Although combinations like those in (42) may not be frequently found, they are certainly acceptable. The individual prepositional phrases and verb particles are here construed as implying a single path with a single goal, whereby their surface syntactic order iconically reflects the spatial order of the described path segments.

- (42) a. to fall off over a cliff into the water Talmy 1985
b. You come right back down out from up in there!

Although some standard reference grammars simply list admissible prefixal combinations (see Petr et al. 1986, for example), such combinations are not arbitrary and need not be simply listed in a lexicon. A number of these combinations can be motivated, if we assume that prefixes can iterate on the same verb as long as their input-output constraints are satisfied, and comply with the general *telicity constraint* given in (9). In this general respect, they behave just like modifiers of eventuality descriptions

¹⁷In English, this shift is taken to be characteristic for the class of simple process verbs (i.e. *run*, *sleep*) and for verbs of sound emission: *rattle*, *croak*, *rustle*, *rumble*, *wheeze*, etc. For example, Levin and Rappaport Hovav (1995, p.182 and 208) propose that a verb like *rumble* has a basic sound of emission sense (as in *The truck rumbled*), and it is systematically related by a lexical rule to the derived directed motion sense (as in *The truck rumbled into the yard*).

- ii. additivity: $\forall x, y \in U_P [\neg x \otimes_P y \rightarrow m(x \oplus_P y) = m(x) + m(y)]$
 iii. commensurability: $\forall x, y \in U_P [m(x) > 0 \wedge \exists z \in U [x = y \oplus_P z] \rightarrow m(y) > 0]$

‘ \oplus_P ’: binary sum operation.

‘ \otimes_P ’: overlap relation: $\forall x, y, z \in U_P [x \otimes_P y \leftrightarrow \exists z \in U_P [z \leq_P x \wedge z \leq_P y]]$

In (44a), ‘ m_c ’ is a free variable over (extensive) measure functions, where the subscript c indicates that the relevant function is linguistically or contextually specified. The measure function m_c applied to an eventuality of type P yields as a value some positive real number. In the case of the attenuative prefix *po-* it meets or falls short of some contextually determined (standard or subjective) expectation value r_c , where ‘ \leq ’ is a relation between numeral values. Following proposals in Higginbotham (1995) and Krifka (1998), the extensive measure function can be defined for a part structure P as in (44b), where x and y are variables that range over individuals or eventualities. Krifka’s (1998) definition of a part structure P is given in the Appendix.

The attenuative prefix *po-* in Czech (and also its cognate in Russian, for example) is most frequently used as a temporal measure, contributing roughly the meaning of a durative adverbial like ‘for a (short) while’ (cf. Isačenko 1960, p.238-240, Pulkina 1964, p.247, for example). Much less frequently, *po-* is used as a path measure with verbs of motion, as in (43a). Occasionally, the attenuative sense of *po-* is manifested as quantification over events contributing approximately the meaning of ‘[action of short duration repeated] a few times, sporadically’, ‘on and off a few times’. With some verbs, the meaning of a small measure shades into ‘partly, incompletely’, as in *poobrátit se* (pf.) ‘to turn a bit, partly’. The attenuative *po-* can also function as a quantifier over individuals.

Another salient example of a measure prefix is the prefix *na-* in its ‘accumulative’ use: It adds to the verb the meaning of a sufficient or large measure, quantity or a high degree with respect to some contextually determined expectation value, and in a variety of domains. In (45b), the prefix *na-* expresses a measure function over the individual variable introduced by the direct object argument.

- (45) a. $D\check{e}lal^I$ chyby.
 do.PAST mistake.PL.ACC
 ‘He made / was making mistakes.’
- b. $Nad\check{e}lal^P$ chyby.
 MEAS.do.PAST mistake.PL.ACC
 ‘He made a lot of mistakes.’
- c. $Ud\check{e}lal^P$ mnoho chyb.
 PREF.do.PAST a.lot.of mistake.PL.GEN
 ‘He made a lot of mistakes.’
- d. $\llbracket na- \rrbracket \Rightarrow \lambda P \lambda e [P(x) \wedge m_c(x) = n \wedge n \geq r_c]$

(45a) and (45b) formally differ only in the presence of the prefix *na-* in (45b), glossed with ‘ACM’ for the traditional ‘accumulative’ Aktionsart classification. It derives the perfective verb *nad\check{e}lal* from the imperfective *d\check{e}lal*. (45b) is best and most naturally understood as meaning that he made a lot of mistakes. Hence, (45b) can be paraphrased

with (45c) which contains the overt weak (adverbial) quantifier *mnoho* ‘a lot of’, and the prefix *u-*, which has no measurement or weak quantificational force. The contribution of the prefix *na-* in sentences like (45a) can be represented as in (45d).

In the simplest terms, the measure semantics of *po-* and *na-* is comparable to the English nominal expressions that encode vague non-standard measure functions like *a (relatively) large/small quantity*, *a (relatively) large/small piece*, *a (relatively) long/short distance* and also to vague determiner quantifiers like *a lot (of)*, *a few*. In order to evaluate a sentence with prefixes expressing measure functions, a choice has to be made as to what is the relevant measure function (i.e, which measure units are to be counted), what is its value and how it compares to the expectation value related to it in a particular context. Making these contextually determined choices effectively amounts to fixing the atomic unit structure of the entities, events or individuals, measured by the prefixes. Proposing that perfective verbs with measure prefixes denote sets of atomic events whose unit-structure is contextually fixed amounts to the claim such perfective verbs are telic, according to the characterization of telicity given here in (7). This proposal is also compatible with Krifka’s (1998) claim that extensive measure functions can be used to define quantized predicates, and Rothstein’s (2003) solution to the problems posed by nominal predicates like *fence*, *sequence*, *yard* for Krifka’s notion of ‘quantization’ and aspectual compositionality (see above Sections 2.1 and 5.1).

If prefixes like *po-* and *na-* in the examples are taken to express an extensive measure function, then they require a homogeneous (atelic) input verb, according to the general characterization in (27). This would then motivate the observation that *po-* can be applied to the perfective verb with the Source-prefix in (43a), because the Source-prefix derives homogeneous verbs, according to the *Goal-Source telicity asymmetry* in (29). In contrast, the perfective verb with the Goal-prefix *přiskočit* ‘to jump to(wards)’ is not homogeneous (atelic), according to the *Goal-Source telicity asymmetry*. Since it does not satisfy the homogeneity input requirement of the measure prefix *po-*, (43b) is systematically excluded as ungrammatical.

The semantic account of admissible prefixal combinations proposed here also makes the right predictions for combinations in which the order of prefixes is reversed: namely, if we apply a measure prefix first to a given verb stem and then a directional prefix, as in (45):

- (45) a. skočit^P → **po-** skočit^P → ***při-po-**skočit^P
 jump.INF MEAS -jump.INF MEAS- TO -jump.INF
 ‘to jump (once)’ ‘to hop’, ‘to make a small jump’
- b. skočit^P → **po-** skočit^P → **od- po-** skočit^P
 jump.INF MEAS- jump.INF AWAY-MEAS-jump.INF
 ‘to jump (once)’ ‘to hop’, ‘to make a small jump’ ‘to jump a small distance away from’

In (45a-b) the measure prefix *po-* is added to a simple semelfactive perfective verb *skočit* ‘to jump (once)’. The fact that semelfactive perfectives can serve as inputs into a measure prefix can be taken as another piece of evidence for their homogeneous (atelic)

status. The measure prefix *po-* can also be added to semelfactive perfective verbs that are explicitly marked with the suffix *-nou-*: cp. *po-vzdechnout si* ‘to sigh a little’.

A verb with the measure prefix *po-* is necessarily telic, given what we independently know about the behavior of expressions of extensive measure functions (see (27)). Consequently, a Goal-prefix, whose input is restricted to atelic (homogeneous) predicates, according to the *telicity constraint* given in (9), cannot be applied to it, as we see in (45a): **při-po-skočit* is systematically excluded as ungrammatical.

In contrast, the Source-prefix *od-* is felicitously applied to the telic perfective verb *po-skočit* ‘to jump a small distance away from’ in (45b). A Source-prefix derives an atelic (homogeneous) verb, according to the *Goal-Source telicity asymmetry* in (29). Since a Source-prefix does not behave like a telicity modifier in the sense of the telicity constraint given in (9), its input need not be restricted to an atelic (homogeneous) predicate. Put differently, since a Source-prefix does not add a delimitation to the eventuality expressed by the base verb to which it is applied, we can expect that it may be applied to verbs that entail a limit, that are telic. It is important to mention that *od-po-skočit* ‘to jump a small distance away from’ in isolation may seem odd to native speakers. However, it sounds quite natural in a sentence like *Králík, co mi seděl u nohy, se najednou lekl a odposkočil* – ‘A rabbit that sat next to my foot suddenly got frightened and hopped away (i.e., made a small hop away)’, and evaluated in a world in which pet rabbits are common, for example.

Other examples of perfective verbs in which the measure prefix *po-* is combined with Source- and Goal-prefixes are easy to find, and some are given in (46-47).

- (46) a. $\text{sednout}^{\text{P}} \text{ si} \rightarrow \text{od- sednout}^{\text{P}} \text{ si} \rightarrow \text{po- od- sednout}^{\text{P}} \text{ si}$
 sit.INF PART AWAY-sit.INF PART MEAS-AWAY-sit.INF PART
 ‘to sit down’ ‘to sit down away from [the place where one sat]’ ‘to sit down a small distance away from’
- b. $\text{sednout}^{\text{P}} \text{ si} \rightarrow \text{při- sednout}^{\text{P}} \text{ si} \rightarrow \text{*po- při- sednout}^{\text{P}} \text{ si}$
 sit.down.INF PART TO-sit.down.INF PART MEAS-TO-sit.down.INF PART
 ‘to sit down’ ‘to sit down next to’ ‘to sit down right next to’
- (47) a. $\text{sednout}^{\text{P}} \text{ si} \rightarrow \text{po-sednout}^{\text{P}} \text{ si} \rightarrow \text{od- po- sednout}^{\text{P}} \text{ si}$
 sit.INF PART MEAS-sit.INF PART AWAY-MEAS-sit.INF PART
 ‘to sit down’ ‘to sit down away from [the place where one sat]’ ‘to sit down a small distance away from’
- b. $\text{sednout}^{\text{P}} \text{ si} \rightarrow \text{po- sednout}^{\text{P}} \text{ si} \rightarrow \text{*při- po- sednout}^{\text{P}} \text{ si}$
 sit.down.INF PART MEAS-sit.down.INF PART TO-MEAS-sit.down.INF PART
 ‘to sit down’ ‘to sit down next to’ ‘to sit down right next to’

Here, too, the behavior of prefixes is fully predicted along the lines described in the above paragraphs. This is not to say that all the prefixal combinations that are grammatical are also equally acceptable. We may find differences in acceptability, which are largely related to the conventions of usage and embedding of the prefixed verbs in

question in an appropriate context. Although the account proposed here predicts that a measure prefix may other precede or follow a Source-prefix in a given verb, it is much more common to find a measure prefix preceding a Source-prefix than following it. For example, we get *po-od-skočit* ‘to jump a small distance away from’, as in (43a), *po-od-sednout si* ‘to sit down a small distance away from’, as in (46a), *po-od-stoupit* ‘to make a small step away from’, *po-od-strčit* ‘to push a small distance away from’, *po-ode-jít* ‘to take a few steps away from’, *po-od-běhnout* ‘to run a small distance away from’, *po-od-sunout* ‘to shove/push a small distance away from’, among others. In contrast, *od-po-sednout si* ‘to sit down a small distance away from’, as in (47a), is less frequent and may seem odd in isolation; however, in the following sentence it sounds natural and it is fully accepted by native speakers: *Cestující vedle mě začal kouřit a proto jsem si odposedla* – ‘The passenger next to me started to smoke, and therefore I sat down a bit away from him.’

Other examples that illustrate the behavior of the attenuative measure prefix *po-* with the Source-prefix *vy-* ‘out (of)’ and the Goal-prefix *do-* ‘into’ are given in (49-50). The Source-prefix *vy-* ‘out (of)’ in (49a) forms a perfective verb that is homogeneous, as predicted by the *Goal-Source asymmetry* in (29), and hence it satisfies the input requirement of the measure prefix *po-* in (49b). However, (50b) is systematically excluded, because the perfective verb *dotáhl* contains the Goal-prefix *do-* ‘into,’ which makes it telic and clash with the measure prefix.

(48) Táhl^I káru z příkopu.

‘He pulled / was pulling the cart out of the/a ditch.’

(49) a. Vy-táhl^P káru z příkopu.

‘He pulled the cart out of the/a ditch.’

b. **Po-vy-táhl^P** káru z příkopu.

‘He pulled the cart partly/incompletely out of the/a ditch.’

(50) a. **Do-táhl^P** káru do příkopu.

‘He pulled the cart into the/a ditch.’

b. ***Po-do-táhl^P** káru do příkopu.

*‘He pulled the cart partly/incompletely into the/a ditch.’

6 Conclusion

In this paper I argued that neither verbal prefixes nor perfective verbs in Slavic languages constitute a homogeneous class of linguistic expressions. Not all the verbal prefixes derive perfective verbs that are telic, and not all the perfective verbs are telic. This result contradicts what can be taken to be the standard view of the Slavic perfective aspect and prefixes. What emerges are two constants: First, prefixes uniformly derive verbs that are formally perfective. Second, regardless whether one or more prefixes appear in a single verb, the application of prefixes is governed by semantic constraints that conspire to preserve the intuitive ‘one delimitation per event’ constraint, and the telicity constraint

formulated in (9). We essentially find three main cases: (i) prefixes form perfective verbs whose (a)telicity properties are the same as those of their bases, (ii) prefixes derive telic perfective verbs from atelic (im)perfective verbs, or (iii) prefixes derive atelic perfective verbs from telic (im)perfective verbs.

This result points to questions that regard the ontological and referential nature of eventualities, and their representation in the logical structure of sentences. What does it mean for a given eventuality to be delimited at most once? Or, to take concrete examples, ‘Why is **run a mile for ten minutes?* Why should natural languages have such a constraint in the first place?

One of the semantic constraints that contributes to the compliance of complex verbal predicates with the intuitive ‘one delimitation per event’ constraint is the *Goal-Source telicity asymmetry* given in (29). One of the questions it poses, and which must be left for future research, concerns the motivation for the privileged role played by the final boundary of eventualities in the event structure. Truly insightful answers to such questions will have to be sought at the intersection of event structure and general cognitive principles in the perception of space. This is an important topic, given that the structure of events and spatial relations are clearly central to our understanding of categories encoded in linguistic expressions and to our understanding of human cognition.

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Appendix

Definition of a part structure P (Krifka, 1998, p.199):

$P = \langle U_P, \oplus_P, \leq_P, <_P, \otimes_P \rangle$ is a part structure, iff

- a. ' U_P ' is a set of entities, individuals, eventualities and times: $I_P \cup E_P \cup T_P \subset U_P$
- b. ' \oplus_P ' is a binary **sum operation**, it is a function from $U_P \times U_P$ to U_P .

(It is idempotent, commutative, associative.)

- c. ' \leq_P ' is the **part relation**: $\forall x, y \in U_P [x \leq_P y \leftrightarrow x \oplus_P y = y]$
- d. ' $<_P$ ' is the **proper part relation**: $\forall x, y \in U_P [x <_P y \leftrightarrow x \leq_P y \wedge x \neq y]$
- e. ' \otimes_P ' is the **overlap relation**: $\forall x, y, z \in U_P [x \otimes_P y \leftrightarrow \exists z \in U_P [z \leq_P x \wedge z \leq_P y]]$
- f. **remainder principle**: $\forall x, y, z \in U_P [x <_P y \rightarrow \exists! z [\neg [z \otimes_P x] \wedge z \oplus_P x = y]]$