

HANA FILIP

ON ACCUMULATING AND HAVING IT ALL

Perfectivity, Prefixes and Bare Arguments

Abstract. The main hypothesis to be investigated is that the distinction between grammatical aspect and the semantic classification of verbal predicates into eventuality types (events, processes and states) is encoded by distinct parts of verbal morphology in Slavic languages. The key empirical evidence is drawn from the influence of verbal morphology on the interpretation of certain bare plural and mass arguments.

Keywords. Grammatical aspect, eventuality types, bare nominal arguments, event semantics.

1. INTRODUCTION

Eventuality types (in the sense of Bach 1981, 1986), or Aktionsarten, cover the telic-atelic distinction and its subcategories (events, processes and states). They are lexicalized by verbs, encoded by derivational morphology, or by a variety of elements at the syntactic level. The categories of ‘perfective’ and ‘imperfective’ aspect are here understood in the standard sense, namely with reference to the main formal categories of the grammatical aspect, which may be expressed by inflectional verbal morphology (as in Romance languages). In Slavic languages, the majority of verb forms, finite and non-finite (i.e., imperative, infinitive and certain participial forms), are either perfective or imperfective. Perfective and imperfective verb forms are related by a variety of derivational processes, many of which are formally and semantically idiosyncratic. The perfective and imperfective status of a verb cannot often be determined by its form, but is manifested in its syntactic behavior. Given that a single verb form can encode both the grammatical aspect and the eventuality type, the question arises whether these two categories can be distinguished from each other, and if so, how exactly the distinction should be drawn. Some dispute that the distinction is necessary, and propose to characterize Slavic perfectives as expressing telic predicates, and imperfectives atelic predicates. This is the view I will reject in this paper and argue that the grammatical aspect and eventuality types are formally and semantically distinct categories.

In order to establish this point I will show that the semantics of a verbal prefix is clearly set apart from the aspectual semantics of a whole prefixed verb, because the two have distinct semantic effects on the interpretation of bare mass and bare plural nominal arguments linked to the Incremental Theme relation (Krifka 1986, 1992a and Dowty 1991). Verbal prefixes have uses in which they impart weak quantificational force to such arguments. In contrast, bare mass and bare plural

arguments of a subclass of perfective (prefixed) verbs systematically refer to totalities of specific portions of stuff and totalities of specific plural individuals, i.e., they behave like referential definites. While the first type of data has remained largely unexplored, the second type of data belongs to some of the best known in Slavic linguistics, although it is still not well understood.

I propose that the two different modes of interpretation of bare arguments are each governed by different types of compositional and interpretive mechanism, which can be motivated by the independent proposal of Carlson (2003a, b) for the interpretation of nominal arguments, Diesing's (1992) Mapping Hypothesis, and cross-linguistic research in quantification (Partee et al. 1987, Bach et al. 1995). This proposal in turn is understandable, if we also assume that verbal prefixes (with indefinite effects on bare arguments) have their domain of application restricted to a level which is 'below' the level of context-sensitive propositional operators like aspectual operators. That is, such verbal prefixes are modifiers of eventuality types at the level of context-free event semantics (in the narrow sense of Carlson 2003 a, b), and they *cannot* be exponents of a function (or functions) posited for the interpretation of the perfective aspect. A basic eventuality description (event, process or state) is expressed by a verbal predicate whose morphological exponent is an aspectless verb stem. It serves as a base to which eventuality type modifiers (like prefixes) as well as aspectual, genericity and temporal operators can be applied. On this approach, the categories of the grammatical aspect are interpreted by higher level compositional operators that take eventuality descriptions as their input. In Slavic languages, the grammatical aspect, perfective and imperfective, is a property of the sum total of the morphological parts of a fully formed verb, excluding its generic and temporal suffixes.

2. BASIC DATA AND OBSERVATIONS

2.1. *Perfectivity and definiteness*

Polish examples in (1) and (2), taken from Wierzbicka (1967), illustrate the influence of the aspect of a verb on the interpretation of bare mass and plural arguments:

- (1) On **z**.jadł^P kaszę / oliwki. Polish
 he.NOM **PREF**.ate porridge.SG.ACC / olives.PL.ACC
 'He ate (up) (all) the porridge / olives.'
 (i.e., the whole quantity of porridge/olives)
- (2) On jadł^I kaszę / oliwki.
 he.NOM ate porridge.SG.ACC / olives.PL.ACC
 (i) 'He was eating (sm/Ø/the) porridge / olives.'
 'He was eating some of the porridge / olives.'
 (ii) 'He ate (sm/Ø/the) porridge / olives.'

(The superscripts ‘I’ and ‘P’ stand for the imperfective and perfective aspect of a verb.) Formally, (1) and (2) only differ in the presence of the prefix *z-* in the perfective verb in (1). Semantically, it only differs from the simple imperfective verb in (2) in aspectual semantics, because the prefix *z-* does not contribute any distinct idiosyncratic meaning of its own to the perfective verb. (Therefore, it is glossed with ‘PREF’.) The perfective verb *zjadł* is interpreted as ‘he ate up’, ‘he finished eating’, that is, it has completed events in its denotation. In contrast, the imperfective verb *jadł* in (2) entails nothing about the event completion. This aspectual difference is correlated with a clear difference in the referential properties of bare direct object arguments in (1) and (2).

In (1), the reference is to “one object (a certain, definite, group of objects – the olives)” (Wierzbicka 1967, p.2238), and it is also entailed that the totality of this object was subjected to the event of eating (see also Wierzbicka 1967). Hence, the interpretation of ‘olives’ and ‘porridge’ here comes close to the interpretation of English NPs with the definite article *the* understood as referential definites, in combination with the universal quantifier *all* or some totality expression like *whole*, *entire* or *total*. Continuing (1) with something like “... and he did not finish eating them (= olives) all”, or “... there are still some olives left” would result in a contradiction. That bare direct objects in (1) behave like prototypical referential definites can be shown with respect to anaphora, for example: (1) can be felicitously continued with “... they [= ‘olives’] had a bitter taste” and “... it [= ‘porridge’] was very sweet”, whereby the referential identity is required between the pronoun and the bare direct object serving as its antecedent.

In the corresponding imperfective sentence (2), neither the definite nor the totality interpretation of bare nominals is enforced. Setting iterative and generic interpretations aside, ‘porridge’ and ‘olives’ may have the weak existential (*sm* or zero article), the definite referential or the partitive interpretation approximately amounting to *some of the porridge/olives*. Which interpretation will be chosen will depend on the linguistic and extra-linguistic context as well as the contextually determined interpretation of the imperfective sentence.

Examples like (1) and (2) are well-known, but what is often not accounted for is the fact that the perfective aspect does not always require that bare nominal arguments in its scope refer to one whole and specific individual (a single atomic individual, or an individual made up of some stuff or a plurality of individuals). First, the contrast between (1) and (3) shows that bare singular count nouns (here ‘pear’) and quantified DP’s (here ‘two olives’) need not have a specific referent, although they do necessarily refer to totalities of individuals in question: i.e., two whole olives, a whole pear. Second, the contrast between (1) and (4) shows that the lexical semantics of the perfective verb matters. Specifically what matters is the thematic relation in which the direct object argument stands to the perfective verb. Intuitively, while the extent of a consumed object is directly related to the extent of an eating event, and vice versa (see (1)), the extent of a moved object does not (on its own) define what it means to complete the event of moving it to some location

(see (4)). Rather, the completion of the motion event in (4) is correlated with Jan's having covered the whole implicit path. Hence, the bare direct objects in (4) have no totality entailment and are not enforced to have a referentially specific interpretation.

- (3) On **z.jadł^P** dwie oliwki / gruszkę. Polish
 he.NOM **PREF.ate** two olives.PL.ACC / pear.SG.ACC
 'He ate (up) two whole olives / a/the whole pear.'
- (4) Jan **przy.niósł^P** kaszę / oliwki.
 John **DIR.carried** porridge.SG.ACC / olives.PL.ACC
 'John brought (some/the) porridge / olives.'

Third, the contrast between (1) and (4) also indicates that the totality entailment constitutes a necessary condition for the definite referential interpretation of bare nominal arguments. However, it is not a sufficient condition, given the possibility of the indefinite interpretation of the bare singular count argument in (3).

To summarize, there is a systematic variability in the referential properties of bare nominal arguments that depends on their count/mass properties and morphologically encoded number as well as on the aspectual and lexical properties of their governing verb.

2.2. Prefixes and weak indefinite interpretations

Each verbal prefix in Slavic languages is associated with a range of contextually determined meanings, or Aktionsarten. (The German term 'Aktionsart', which was coined by Agrell 1908, literally means 'mode/manner of action'. In Russian linguistics, the corresponding term 'sposoby dejstvija' is used. For an overview of Russian Aktionsarten, see Forsyth 1970, Comrie 1976 and reference therein, for example.) Slavic verbal prefixes are famously homonymous and polysemous. One prefix can be applied to different (im)perfective classes of verbs with different semantic effects. Most prefixes have at least one use in which they express some weak indefinite quantificational notion, and closely related measurement notions. In Czech, such uses are attributed to sixteen verbal prefixes, out of the total nineteen listed in Petr et al. (1986, p.395ff.), a reference grammar published by the Czech Academy of Sciences. They concern some quantifiable dimension of the described eventuality, a dimension related to participants, time, and/or space, and also affective connotations regarding intensity, persistency, conation, and the like. Paradigm examples are the prefix *po-* and its converse *na-* in Czech, Polish and Russian. *Po-* in its attenuative use may be used with an effect close to a vague downward entailing cardinal quantifier like *a few* or *a little (of)* or a vague measure expression like *a (sufficiently/exceedingly) small quantity (of)*. In contrast, the prefix *na-* in its accumulative use has effects that are similar to a vague upward entailing cardinal quantifier like *a lot (of)*, or a vague measure expression like *a (sufficiently/exceedingly) large quantity (of)*. Which eventuality dimension is

quantified by a given use of a prefix depends on the lexical semantics of a verb to which the prefix is attached, and on the linguistic and extra-linguistic context.

To illustrate the referential and quantificational effects of verbal prefixes on bare nominal arguments, let us consider the Czech prefix *na-* in (5b):

- (5) a. *Dělal^l* chyby. Czech
do.PAST mistake.PL.ACC
‘He made / was making mistakes.’
b. *Na.dělal^P* chyby.
ACM.do.PAST mistake.PL.ACC
‘He made a lot of mistakes.’

The prefix *na-* is here glossed with ‘ACM’ following the traditional ‘accumulative’ Aktionsart classification. (5b) minimally differs from (5a) in the presence of the prefix *na-*, and only (5b), but not (5a), is semantically close to (5b’), which contains the weak determiner quantifier *mnoho* ‘a lot (of)’.

- (5) b’. *U.dělal^P* mnoho chyby. Czech
PREF.do.PAST a.lot.of mistake.PL.GEN
‘He made a lot of mistakes.’

Given that the prefix *u-* in (5b’) contributes no (clearly detectable) idiosyncratic meaning of its own to the perfective verb *udělal*, we may conclude that there is a semantic similarity between *na-* in (5b) and *mnoho* ‘a lot (of)’ in (5b’). However, unlike *mnoho* ‘a lot (of)’, *na-* is also associated with an adverbial, temporal, meaning of ‘graduality’. (5b) strongly suggests that the mistakes were ‘accumulated’ in a gradual manner.

Although (1) and (5b) are superficially alike in so far as both contain a perfective verb formed with a prefix and a bare argument, there are substantial differences between them that stem from the difference in the semantic contribution of their prefixes. The prefix *z-* in (1) has no (clearly detectable) idiosyncratic meaning of its own, and the interpretation of bare nominal arguments is here determined by the lexical and perfective semantics of the prefixed verb. In contrast, in (5b), it is just the semantics of the prefix *na-* that crucially determines the interpretation of the bare nominal argument. Neither does (5b) entail that the described event reached some necessary end, beyond which it could not continue. Instead, (5b) is most naturally understood as meaning that the event simply terminated, and when it did, there were a lot of mistakes ‘accumulated’.

The accumulative use of the prefix *na-* enforces an existential (weak indefinite) interpretation of a nominal argument introducing the individual variable that it targets. This is clearly manifested in the observation that *na-* (and its restrictive argument) cannot take scope over any other scope taking elements in a sentence. This is shown with negation in the Czech example (6):

- (6) Ne.**na**.sbíral^P vzácné známky, ale jen laciné kopie.
 NEG.ACM.collect.PAST valuable stamps but only cheap copies
 ‘He did *not* collect *a (large) quantity of* valuable stamps, but only cheap copies.’
 NOT: ‘There was *a (relatively large) quantity of* valuable stamps that he did *not* collect, ...’

This behavior is similar to that of incorporated nouns, which also take narrow scope with respect to other scope taking operators. For example, with respect to West Greenlandic, Bittner (1994) observes that “neither the incorporated noun nor its instrumental residue can take scope over any operator which c-commands the host verb at S-structure” (p. 118). Moreover, the restrictive argument of the prefix *na*-that functions as the subject can freely occur post-verbally in the inversion construction, but it is odd in the pre-verbal position, as the Czech example (7) shows.

- (7) a. **Na**.přijížděli^P tam anarchisté z Prahy.
 ACM.arrive.PAST.3PL there anarchist.PL.NOM from Prague
 ‘There arrived a lot of anarchists from Prague.’
 b. #Anarchisté z Prahy tam **na**.přijížděli^P.
 anarchist.PL.NOM from Prague there ACM.arrive.PAST.3PL
 ‘A lot of anarchists from Prague arrived there.’

In *pro*-drop languages like Slavic languages, this behavior of post-verbal subjects is somewhat similar to the behavior of NPs in *there*-sentences (*there be NP (XP)*) in English, where the subject inversion often has the effect of detopicalizing the subject. The postposed NP is taken to be associated with the novelty condition, which Prince (1992) characterizes in terms of the ‘Hearer-new’ informational status.

2.3. Main questions

The data and observations in Sections 2.1 and 2.2 raise the following questions, which will be addressed in the rest of this paper:

- i. How do bare nominal arguments compose with perfective verbs?
- ii. What are the constraints for assigning the definite referential interpretation to bare mass and bare plural nominal arguments in the scope of the perfective aspect?
- iii. What are the constraints for associating a prefix with a given argument of a verb and its semantic effect on that argument?

3. INTERPRETATIONS OF BARE NOMINAL ARGUMENTS

3.1. Background assumptions

I assume a semantic framework of event semantics that presupposes an ontology with individuals, times and eventualities as basic entities ('eventualities' in the sense of Bach 1981, 1986). All the three ontological domains have a semi-lattice structure that is (partially) ordered by the part relation ' \leq ': ' \leq ': $\forall x, y \in U [x \leq y \leftrightarrow x \oplus y = y]$. (For more details, see also Krifka this volume.) Following Bach (1981, 1986) and Parsons (1990), the domain of eventualities \mathcal{E} is a union of the set S of states, the set P of processes and the set E of events: $\mathcal{E} = S \cup P \cup E$. Examples of event predicates are *recover*, *grow up*, process predicates are *run*, *sleep*, and state predicates are *know*, *love*.

The lattice-theoretic framework allows us to capture direct structural analogies and interactions between the denotations of verbal and nominal predicates (see Taylor 1977, Mourelatos 1978/81, Bach 1981, 1986, Krifka 1986, 1992a and others). Bare mass and bare plural nominal predicates pattern with state and process predicates in so far as they are homogeneous, i.e., cumulative and divisive. Singular count nominal predicates pattern with (singular) event predicates in so far as they are quantized. The properties 'homogeneity' and 'quantization' are defined in (8a) and (8b). For the purposes of this paper, they can be taken as overlapping with the traditional distinction between atelic and telic predicates (which goes back to Garey 1957).

- (8) a. $\text{HOM}(P) \leftrightarrow \text{DIV}(P) \wedge \text{CM}(P)$
 $\text{CM}(P) \leftrightarrow \forall x, y [P(x) \wedge P(y) \rightarrow P(x \oplus y)] \wedge \exists x, y [P(x) \wedge P(y) \wedge \neg x = y]$
 $\text{DIV}(P) \leftrightarrow \forall x, y [P(x) \wedge y < x \rightarrow P(y)]$
 b. $\text{QUA}(P) \leftrightarrow \forall x, y [P(x) \wedge P(y) \rightarrow \neg y < x]$
 ' $<$ ': proper part relation: $\forall x, y \in U [x < y \leftrightarrow x \leq y \wedge x \neq y]$
 ' \oplus ': binary sum operation, a function from $U \times U$ to U .

(8a) is based on proposals in Krifka (1992a), Moltmann (1991) and Kiparsky (1998), (8b) on Krifka (1998). P is a variable over nominal predicates x and y are variables that range over individuals. With small modifications, (8a-b) are straightforwardly applicable to verbal predicates, with P standing for a variable over verbal predicates, and using e and e' for variables ranging over eventualities. The properties of 'quantization' and 'homogeneity' are thus properties of predicates of eventualities, i.e., properties of second order.

Given that bare nominal arguments in Slavic languages can function as definites or indefinites, as we have seen in Sections 2.1 and 2.2, it might be proposed that they are ambiguous or indeterminate with respect to (in)definiteness. Following arguments made for Czech by Filip (1993/99, 1997) and for Russian by Dayal

(2004), I reject both the ambiguity and indeterminacy proposals. Instead, I adopt a version of the Neo-Carlsonian kinds approach in Chierchia (1998) and assume that common nouns in Slavic languages uniformly denote properties in their basic lexical meaning: namely, they are of the predicative type $\langle e, t \rangle$ (and $\langle s, \langle e, t \rangle \rangle$). Their phrasal projections can shift through available type shifting operators, although not (entirely) freely despite the fact that there are no overt articles (as proposed by Dayal 2004 for Russian and Hindi, contrary to Chierchia's 1998 original claim). There is one type shift to the generalized quantifier by \exists , and three type shifts to the argumental type e : namely, the nominalization *nom* (Chierchia 1998), the iota operator ι , and the sigma operator σ . The four type-shifters can be introduced as a lexical operation on predicates (cf. Carlson (1977)) or they can apply on demand as a local adjustment triggered by an argument type mismatch.

Nom differs from ι and σ in intensionality. *Nom* derives kind terms from (predicative) common nouns: $\langle s, \langle e, t \rangle \rangle \Rightarrow \langle s, e \rangle$, whereby $P \Rightarrow \lambda w \iota P(w)$. *Nom* is a function from properties to functions from situations to the maximal entity that satisfies that property in a given situation. The value of *nom* thus varies from situation to situation. In contrast, ι and σ are constant functions to a contextually anchored maximal entity: $\langle e, t \rangle \Rightarrow e$. Traditionally, ι is used for singular count definite descriptions, hence $\iota x \phi[x]$, if $\phi[x]$ is true of exactly one x . The operator σ is here used for plural definite descriptions, as in Link (1998), and also for mass definite descriptions, so that $\sigma x \phi[x]$ translates 'the individuals that ϕ ' and 'the stuff that ϕ ', where x is true of pluralities and masses, respectively. Proper plural predicates are defined in (9a) and mass terms in (9b), following Link (1998, p.135ff. and 345ff.):

- (9) a. $*Pa \leftrightarrow *Pa \wedge \neg Ata$ (proper plural predicate of P)
 b. ${}^m Pa \leftrightarrow \exists y (*Py \wedge a \mathbf{T} \iota z (z \triangleright y))$ (mass term correspondent to P)

In (9a-b), a stands for an individual term, y and z for variables, $*P$ for a plural predicate, Ata for 'a is an atom', \mathbf{T} for 'is a material part of', and ' \triangleright ' for 'constitutes or makes up'. The sigma operator is insensitive to atomicity and the sigma term refers to the maximal or largest individual in the extension of a given predicate, which is unique in the domain of universe. Hence, the sigma term is of the individual type e . The sigma operator is taken to interpret the definite article like *the* in English, for example, which implies that *the* is not an expression of quantification. This is motivated by the observation that *the* does not entail universality or anything about a particular quantity, as Krifka (1992b) and Partee (1995, p.581, and 1999) propose.

3.2. The missing link: ‘Incremental Theme’ thematic property

3.2.1. Perfectivity and definiteness

In Slavic languages, interactions between verbal predicates and nominal arguments are tied to only a certain class of predicate-argument relations. The same holds for Germanic languages. For example, the quantized nominal argument *an apple* determines the quantized (or telic) interpretation of the VP in *John ate an apple*, but not in *John carried an apple*. For Germanic languages, there have been a number of proposals to characterize the nature of the relevant class of predicate-argument relations. Verkuyl (1972) was the first to identify it as the ‘ADD-TO’ relation (see also Verkuyl 1993, 1999 for further elaborations and new proposals). Tenny (1987, 1994) describes it as the ‘measuring out’ relation, and Jackendoff (1996) refers to it as the ‘structure-preserving’ relation, for example. Here, I build on Krifka’s (1986, 1992a) and Dowty’s (1991) lattice-theoretic proposal, which locates the source of the interactions in the lexical semantics of verbs that have meanings involving a homomorphism between (the part structure of) their Incremental Theme argument and (the part structure of) their event argument. (The term ‘Incremental Theme’ was coined by Dowty (ibid.) and its mereological underpinnings defined by Krifka (ibid.). Krifka also provides an account of the definite interpretation of bare Incremental Theme arguments in the scope of the perfective aspect in Czech.) For example, in *ate an apple*, every part of eating of an apple corresponds to a part of an apple, and vice versa. Since *an apple* is quantized, *ate an apple* will be quantized (or telic). Such a one-to-one mapping does not obtain between the denotation of *an apple* and *carried an apple*, and consequently the quantized argument *an apple* does not enforce the quantized (or telic) interpretation of *carried an apple*.

Assuming the Incremental Theme property, the following pattern emerges in our initial Polish examples (1)-(4): (i) *All and only* the direct object arguments that are linked to the Incremental Theme of a perfective verb denote totalities of individuals or stuff (see (1) and (3) vs. (2) and (4)); (ii) *all and only* bare mass and bare plural Incremental Theme arguments must *also* receive the definite interpretation (see (1) vs. (3)): they refer to *totalities* of *specific* portions of stuff and *totalities* of *specific* plural individuals. Neither the totality nor the definite interpretation is enforced for the bare direct object argument of the perfective verb that is not linked to the Incremental Theme in (4).

I propose to represent the semantics of perfective verbs (simple or prefixed) by means of the *TOT* predicate modifier, standing for ‘totality of the event’, or *celostnost’ dejstvija* in traditional Russian linguistics: $PERF: (P)(e) \rightarrow TOT(P)(e)$. The mereologically based definition, based on Krifka’s (1997) notion of a ‘maximally separated entity’, is given in (10):

- (10) $TOT(P)(e)$, e is a total (atomic) event of type P if $P(e)$, and for all e' with $P(e')$ and $e < e'$, it holds that every e'' with $e'' < e'$ and $\neg e @ e''$ is not adjacent to e .

- a. $TOT\#(P)(e) = 1$ if $TOT(P)(e)$,
 where ‘#’ is the atomic number function:
 If $At(e)$, then $\#(e) = 1$; if $\neg e \otimes e'$, then $\#(e \oplus e') = \#(e) + \#(e')$
- b. $\forall e, e' [\neg e \otimes e' \rightarrow TOT\#(P)(e \oplus e') = TOT\#(P)(e) + TOT\#(P)(e')]$

In (10), P is a variable over predicates of eventualities and TOT is a second order property of predicates of eventualities. The effect of $TOT(P)$ is to individuate atomic events in the denotation of a perfective verb, given that it is required that no two events in the denotation set of a given predicate P overlap. Intuitively, $TOT(P)$ denotes events each of which is conceived as “a single whole without distinction of the various phases that make up that situation” (Comrie 1976, p.16). Thus, (10) is related to traditional characterizations of the semantics of perfectivity going back to Černý (1877), Razmusen (1891), Saussure (1916 [1978]), Maslov (1959), Sørensen (1949), Dostál (1954), Isačenko (1962), among others. This also means that perfective verbs that denote completed, culminated events, or events with result states and goals of various kinds are just a special case in the class of perfective verbs as a whole. The same holds for perfective verbs that take the Incremental Theme argument (see also Filip 1993/99). Of course, $TOT(P)$ is also a part of the logical structure of perfective verbs denoting transitions into and out of processes and states. Take, for example, the Czech perfective verb *zamilovat se* ‘to fall in love’, derived from the imperfective individual-level verb *milovat* ‘to love’. The perfective verb has an inchoative meaning and asserts that the transition into the state of loving is viewed in its entirety. Generally, if a given state of affairs is represented by a verbal predicate in its entirety, there must be some limits imposed on its (temporal or spatial) extent, and consequently, it must be quantized. The perfective verb *zamilovat se* ‘to fall in love’, for example, is quantized, since no proper part of the transition into the state of loving can count as that (whole) transition: If it took Bill two weeks to fall in love with Mary, he did not fall in love with her in the first two days. *Zamilovat se* ‘to fall in love’ is not cumulative, since two distinct events of falling in love amount to a sum event of falling in love twice. TOT is taken to be the property of predicates expressed by perfective verbs, i.e., by fully formed perfective verbs (finite and non-finite). As was argued elsewhere (see Filip 2000 and 2004, for example), the formal category of ‘perfectivity’ in Slavic languages cannot be consistently associated with a clearly identifiable set of aspectual affixes, *solely* dedicated to marking of the perfectivity of a verb in *all* of their occurrences.

As has been observed, the totality entailment is a necessary condition for the referentially definite interpretation of bare mass and plural Incremental Theme arguments of perfective verbs, as in our initial examples (1) and (3). The totality entailment associated with the Incremental Theme argument here straightforwardly follows from the TOT modifier in the logical structure of the main perfective verb and the object-event homomorphic mappings that define the Incremental Theme relation. Given that the perfective verb has total events in its denotation, the mappings dictate that the Incremental Theme argument must refer to totalities of

objects falling under its description. Crucially, the interpretation of the bare Incremental Theme argument is here just affected by the *TOT* modifier, given that the morphological structure of the perfective verb contains no morphemes contributing quantificational or modal components that could also have effects on its interpretation. Hence, I propose that bare mass and bare plural nominal argument can serve as Incremental Theme arguments of a perfective verb of this type only after a type-shift by means of the sigma operator. Totalities of stuff or pluralities in the denotation of nominal predicates are standardly represented by means of the σ -operator, introduced in Section 3.1. It shifts a common noun like the Polish *oliwki* ‘olives’ from its basic meaning **olives**’, which is of the predicative type $\langle e, t \rangle$, to the maximal, and hence definite, interpretation $\sigma^*x.\mathbf{olives}'(x)$ ‘(all) the olives’ of the individual type e , the appropriate argumental type. (1) with the bare plural noun ‘olives’ will contain (11) as part of its logical representation:

$$(11) \quad \llbracket \text{On zjadł oliwki} \rrbracket = \\ \exists e \exists y [y = \sigma^*x(\mathbf{olives}'(x)) \wedge \text{IncTheme}(e) = x \wedge \text{Agent}(e) = \mathbf{he}' \wedge \\ \text{TOT}(\mathbf{eat}')(e)]$$

The σ -operator is here directly introduced into a logical representation of the perfective predicate *zjadł* as a local operator over the variable introduced by an Incremental Theme argument. This makes sense given that the maximal, and hence definite, interpretation of the Incremental Theme argument directly follows from the lexical and aspectual properties of its governing perfective predicate, and nothing else.

Now, in (3), we have seen that bare singular count predicates may have an indefinite interpretation, even when they serve as Incremental Theme arguments of perfective verbs that require that they have a totality entailment. However, the definite interpretation is here also possible. How do we derive the right argument interpretation for singular count predicates of perfective verbs, as in (3)? The σ -operator is excluded as a possible covert type-shifter, because it is here undefined for singular count predicates (see also Bittner and Hale 1995 and Filip 1996), *nom* is also excluded, because it derives kind terms, but the perfective sentences discussed here express episodic statements about *instances* of a kind, and their Incremental Theme argument is object-level. This means that we have two covert type-shifts available, \exists and t .

Ignoring details that are not relevant for the current purposes, (3) may be interpreted as in (12b), where the singular count noun ‘pear’ has a definite interpretation, or as in (12c), where it has an indefinite interpretation:

$$(12) \quad \begin{array}{l} \text{a. } \text{On zjadł}^P \text{ gruszkę. - 'He ate (up) a/the whole pear.' [= 3]} \\ \text{b. } \exists e \exists y [y = t_x(\mathbf{pear}'(x)) \wedge \text{IncTheme}(e) = x \wedge \text{Agent}(e) = \mathbf{he}' \wedge \\ \quad \text{TOT}(\mathbf{pear}')(x) \wedge \text{TOT}(\mathbf{eat}')(e)] \\ \text{c. } \exists e \exists x [\text{IncTheme}(e) = x \wedge \text{Agent}(e) = \mathbf{he}' \wedge \text{TOT}(\mathbf{pear}')(x) \wedge \\ \quad \text{TOT}(\mathbf{eat}')(e)] \end{array}$$

In (12b,c), $TOT(pear')(x)$ is defined, because $TOT(eat')(e)$ is, and because 'pear' stands in the Incremental Theme relation to the verb 'eat'. This also presupposes that we define the total atomic individual $TOT(P)(x)$, in analogy to the total atomic event in (10).

Why must bare mass/plural nouns, but not bare singular count nouns, have the definite referential interpretation when they function as Incremental Themes of perfective verbs that impose the totality interpretive requirement on them? Making an assertion about some individual in its entirety presupposes that the individual is well-demarcated. However, bare plurals and bare mass terms take their denotation from a non-atomic lattice structure. An assertion about their totality is felicitous to the extent that a suitable maximal individual can be identified in the domain of discourse: the maximal individual sum in the extension of a bare plural predicate and the maximal fusion of all quantities that fall under the bare mass predicate. Such maximal objects are unique, therefore, anchoring bare plurals and bare mass terms to such maximal objects in the domain of discourse amounts to their having the definite referential interpretation. In the case of singular count nouns, the totality interpretation can be directly assigned with respect to the canonical boundaries inherent in their atomic unit-structure (at least if we disregard singular count nouns like *sequence* or *ribbon*, whose unit-structure is contextually determined). Since no contextual anchoring is required, the definite interpretation is not mandatory either.

3.2.2. Prefixes as expressions of vague measure functions

We have seen that Slavic verbal prefixes have uses in which they function as verb-internal operators that have direct effects on the phrasal syntax and semantics of nominal arguments. In so far as they have meanings that are related to measure and cardinality, but also to quantification and distributivity, they belong to a subtype of A(dverbial)-quantifiers, namely, lexical A-quantifiers in the sense of Partee (1991, 1995). As the most general hypothesis, Filip (2001) proposes (13):

- (13) Slavic verb-internal operators do *not* express *essentially quantificational* notions, i.e., notions that *require* tripartite structures corresponding to generalized quantifiers at any level of representation.

Slavic verbal prefixes share four properties with lexical A-quantifiers. First, they are directly applied to a predicate at a lexical level, and they often have no compositional semantics.

Second, they have morphological, syntactic, and semantic effects on the argument structure of a derived predicate. (Such effects can be characterized by lexical rules in the sense of Dowty 1979.)

Third, their semantic value typically combines some quantificational force with adverbial meanings: namely, temporal, spatial, and manner, for example.

Fourth, their effects are strictly local, limited to a verb and its arguments, excluding optional adjuncts, and they exhibit striking preferences with regard to the selection of the predicate's argument they target for their semantic effect. We can illustrate this point with the Czech example (5b): Here, the prefix *na-* selectively targets only the individual variable introduced by the bare plural nominal argument 'mistakes', that is, 'He made *a lot of mistakes*' is the only meaning that (5b) can have. Other logically possible meanings are impossible or not enforced here. For example, (5b) would not seem to be necessarily/readily understood as 'There were *many/frequent occasions* on which he made mistakes', which means that *na-* does not here function as an adverb of quantification that would bind the event variable introduced by the main episodic predicate to which it is attached. Neither does (5b) necessarily mean 'He made mistakes *for a long time*', 'He spent *a lot of time* making mistakes', etc., hence *na-* does not necessarily function as a vague temporal measure over the temporal variable associated with the temporal trace of the described eventuality.

These four properties of the relevant uses of Slavic prefixes can be taken as motivating their analysis in the general context of the cross-linguistic research on quantification and closely related notions like measure and distributivity in natural languages. In the research framework proposed by Partee et al. (1987) and Bach et al. (1995, and references therein) two main types are distinguished: D-quantification expressed by determiner quantifiers and A-quantification which subsumes a large and heterogeneous class of expressions that are external to a DP. A-quantifiers syntactically form a constituent with some projection of the lexical category Verb and include adverbs of quantification, such as *usually*, *always* (see Lewis 1975), auxiliaries, various argument-structure adjusters and verbal affixes.

Let us now turn to the measurement uses of Slavic prefixes, as exemplified by the Czech accumulative prefix *-na* in (5b), (6) and (7). First, measure prefixes derive nominal meanings that are weak indefinite, as was illustrated with the Czech *na-* in (7).

Second, just as other measure expressions, measure prefixes welcome homogeneous predicates as their input: i.e., the nominal argument they target for their semantic effects is a bare mass or a bare plural predicate, at least in the default case. (See also below for further constraints.) They exclude bare singular count nouns as well as most quantified nominal arguments. For example, the Czech prefix *na-* excludes singular count NPs/DPs as ungrammatical: cp. **nadělal^P chybu* (mistake.SG.ACC) – *'he made a lot of a mistake'. It also excludes arguments that are quantified with the universal determiner quantifiers *všechen* 'all' and *každý* 'each'.

Third, the constraints for associating a verbal prefix (used with a vague measure or cardinality meaning) and the appropriate nominal argument can be stated over the thematic argument structure of a verb to which the prefix is attached: namely, the prefix is 'linked' (in the sense of Aissen 1984, p.5) to the variable introduced by the (Incremental) Theme argument. Given the length limits on this paper, the Czech

examples in (5b) and (7) will have to suffice to illustrate the (Incremental) Theme restriction here.

One way of capturing the input-output constraints of verbal prefixes used as lexical A-quantifiers is to treat them as expressing non-standard extensive measure functions. That is, their contribution is on a par with measure expressions like *a large/small quantity of, a large/small piece of*. (See also Filip 1992 and 2000 for a previous related analysis, and a similar proposal by Piñón 1994 for the accumulative Polish prefix *na-*.) The general definition of an extensive measure function is given in (14), following suggestions in Krifka (1998). (15) represents the measurement part of the meaning of the prefix *na-*, as used in (5b). (16) illustrates the application of *na-* to *chyby* ‘mistakes’, given here in the nominative citation form:

- (14) MEAS is an extensive measure function iff:
 (i) MEAS is additive:
 if $\neg x \otimes y$, then $\text{MEAS}(x \oplus y) = \text{MEAS}(x) + \text{MEAS}(y)$;
 (ii) MEAS has the property of commensurability:
 if $\text{MEAS}(x) > 0$ and $y < x$, then $\text{MEAS}(y) > 0$.
- (15) $\llbracket na- \rrbracket = \lambda P \lambda x [P(x) \wedge \text{MEAS}(x) = n_c \wedge n_c \geq r_c]$
- (16) $\llbracket na \rrbracket (\llbracket chyby \rrbracket) = \lambda P \lambda x [P(x) \wedge \text{MEAS}(x) = n_c \wedge n_c \geq r_c] (\lambda x [\text{mistakes}'(x)])$
 $= \lambda x [\text{mistakes}'(x) \wedge \text{MEAS}(x) = n_c \wedge n_c \geq r_c]$

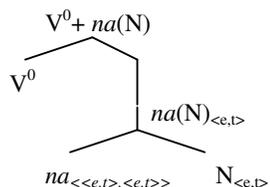
In (15), MEAS is some indeterminate measure function, x is the object measured, P is true of x , whereby P is homogeneous (a plural or a mass property, see also (8a) above). What counts as ‘a (relatively) large quantity’ or ‘a lot’ differs from context to context, hence n_c (a positive integer) is the contextually determined amount of x , and r_c stands for a contextually determined expectation value related to the quantity measured. The amount n_c of x is equal or greater than the contextually determined expectation value r_c . Given that (15) presupposes that the intended amount of measured objects is fully recoverable from a given context, and specifiable in terms of some natural number, the prefix will yield nominal arguments that behave like quantized arguments, in compliance with the definition of quantization given in (8b). (For discussions of the quantization property in connection with NP’s formed with non-standard measure expressions like *a quantity (of)* and vague cardinal quantifiers like *a lot (of)* see Zucchi and White 1996, Krifka 1998, Filip 2000 and Rothstein 2004.) While in the default case, measure prefixes select for homogeneous nominal arguments, they can also be combined with measured and quantified nominal arguments, just in case the quantity specification of the prefix and the nominal argument match. For example, the accumulative *na-* in Slavic languages is compatible with any expression of quantity or measure that ‘matches’ its meaning of a relatively large measure or quantity: e.g., in Czech, weak adverbial quantifiers like *mnoho* ‘a lot of’, *hodně* ‘a lot of’, nominal quantifiers like *hromada* (fem. sg. nom) ‘a pile of, a heap of’. It is also compatible with cardinal numerals that indicate a

quantity that is considered to be large in a given context, as in the Russian example: *Za étot sezón Ivan nabégal^p trechsót kilométrov* ‘During this season he ran up three hundred kilometers’ (cf. Isačenko 1960, p.248). (For more examples see Filip 1992 and Filip 1993/1999, Chapter 5.)

In (16), $\llbracket na \rrbracket$ ($\llbracket chyby \rrbracket$) identifies all those quantities that are mistakes that have a (relatively) large quantity of members, which amounts to *na-* being treated as an intersective modifier of nominal meanings (= a predicate of the intersection of sets). In this respect, the accumulative *na-*, and other verb-internal operators with uses that fall under lexical A-quantification in Slavic languages, behaves like weak indefinite quantifiers, such as *a lot (of), some, several, five, many* (in its cardinal reading). They are of the type $\langle\langle e,t \rangle, \langle e,t \rangle\rangle$, i.e., functions mapping nominal predicates (type $\langle e,t \rangle$) that have plural individuals or stuff in their denotation into nominal predicates (type $\langle e,t \rangle$) that identify quantities of individuals or stuff of a certain size.

After the prefix has been composed with a bare homogeneous argument, the result is merged with (the meaning and argument structure of) an aspectless verb base, as is schematically shown in (17):

(17) semantic composition



We get a complex verbal predicate with a denotation that is within the denotation type of a verb, which implies that the bare nominal argument together with *na-* restricts the denotation of the aspectless verb base. In this respect their joint semantic effect on the meaning of the aspectless verb base resembles the predicate restricting function of incorporated nominals. The individual variable introduced by the nominal argument is subject to the obligatory existential closure in the nuclear scope of a DRT-type tripartite structure. Independently, Carlson (2003a, b) argues that all weak indefinites can be treated as nominals in incorporation(-like) structures (see below). Hence, the weak indefinite (existential) interpretation of bare nominal arguments linked to verbal prefixes used as vague measures over their denotations falls out from the semantic mode of composition by which a prefix, nominal argument and an aspectless verb stem are put together. The contribution of the prefix *na-* is represented by means of the measure function *MEAS* as defined in (15), whereby its measure value exceeds a certain threshold. The ‘perfectivizing’ or quantizing effect of the perfective verb it forms does not come from the threshold value entailed by the prefix, because we would still have problems with cumulativity or divisivity, following the definitions in (8a). (The problems are described in detail

and dubbed ‘the quantization puzzle’ in Filip 2000.) Rather, it is due to the fact that we refer to non-overlapping atomic and hence clearly separated events, following the definition of the perfective operator *TOT* in (10). Consequently, via the homomorphic object-event mappings, the Incremental Theme argument must also refer to some clearly separated totality of a relatively large quantity of mistakes. Given the above observations, (5b) will have a logical structure including (18):

$$(18) \quad \exists e \exists x [\text{IncTheme}(e)=x \wedge \text{TOT}(\mathbf{mistakes}')(x) \wedge \text{MEAS}(x)=n_C \wedge n_C \geq r_C \\ \wedge \text{TOT}(\mathbf{do}')(e) \wedge \text{Agent}(e)=\mathbf{he}']$$

Implicit in the semantic mode of composition proposed here is the claim that the semantics of a prefix is clearly set apart from the aspectual semantics of a whole prefixed verb. The perfective semantics of a prefixed verb does not enter into the computation of the meaning of a bare (Incremental) Theme argument at the level at which it is composed with the prefix and the verb stem. At the level of semantic composition, the prefix, such as *na-* in (5b), is first composed with the nominal argument, such as *mistakes* in (5b), and the result is then composed with the aspectless verb stem following the same rules of standard aspectual composition that apply to familiar English examples like *make a large quantity of mistakes* (see Krifka 1989, 1992a and Dowty 1991). This is best supported by additional data in which the idiosyncratic semantics of a prefix and the aspectual semantics of a prefixed verb are clearly distinct: namely, when a measure prefix occurs within an imperfective verb as in (19).

$$(19) \quad \text{U.p}^{\text{ijel}} \quad \text{v}^{\text{ino}} \quad \text{z} \quad \text{m}^{\text{e}} \text{sklenice.} \quad \text{Czech} \\ \text{ATN.drink.IPF.PAST} \quad \text{wine.SG.ACC} \quad \text{from} \quad \text{my glass.SG.ACC} \\ \text{(i) 'He was taking a sip of wine from my glass.' (progressive)} \\ \text{(ii) 'He took / was taking sips of wine from my glass.' (iterative)}$$

In (19), the prefixed verb *u.píjel* is imperfective. The measure prefix *u-* here approximately contributes *a small quantity of* with respect to the bare Incremental Theme ‘wine’. Hence, it is glossed ‘ATN’ standing for the traditional *attenuative* Aktionsart classification. The measure prefix *u-* is directly applied to the imperfective verb *pít* ‘to (be) drink(ing)’ yielding the perfective verb *u.pít* ‘to drink (up) a small quantity (of *x* from *y*)’. The denotation of this perfective verb serves as an input to the imperfective operator, which results in the derivation of the secondary imperfective *u.píjet*, realized in the past tense form in (19). The imperfective operator is morphologically instantiated by a variety of allomorphs in Slavic languages, here it is realized by a stem extension. The imperfective operator takes perfective verbs that express total event predicates, *TOT(P)(e)*, and generates imperfective verbs that express predicates that lack the *TOT* operator in their logical representation, i.e., they are unmarked with respect to *TOT*: *IMP: TOT(P)(e) → (P)(e)*. The unmarked nature of imperfectives is motivated by the observation that

imperfectives have a variety of contextually determined interpretations: namely, they may express total events just like perfectives, but also they may have the progressive, generic or iterative interpretation (see also Comrie 1976). The most natural readings of (19) are (i) a single event ongoing at some reference point ('progressive' interpretation) involving a single small quantity of wine, or (ii) a multiplicity of events, each of which involves some small quantity of wine (generic or iterative interpretation), depending on the context. In either case, the logical structure of (19) will contain the predicate [DRINK(SMALL-QUANTITY(WINE))]. That is, in the logical representation of examples like (19), the prefix *u-* is first combined with the bare Incremental Theme argument 'wine', and the result is composed with an aspectless verb stem 'drink', following the standard rules of aspectual composition (see Krifka 1989, 1992a and Dowty 1991). The imperfective (*IMP*) operator is a higher level compositional operator that operates over predicates of eventualities $(P)(e)$, telic as in (19) or atelic.

If the (Incremental) Theme argument is not present in the thematic structure of a prefixed verb used as a lexical A-quantifier, the prefix may target some other quantifiable dimension associated with the described event, such as frequency, temporal extent, as well as a variety of affective connotations regarding intensity, persistency, and the like. In some cases, the domain of quantification may remain indeterminate, because it may be impossible or irrelevant to determine which dimension of the described event is quantified. A good example is the Russian verb *naplákat'sja^P* 'to cry a lot'. Does the prefix *na-* measure the temporal trace ('to cry for a long time'), the amount of tears ('to shed a lot of tears', to give a somewhat poetic translation), or simultaneously both? The considerable flexibility and indeterminacy with respect to their domains of quantification is one important characteristic that Slavic verbal prefixes used as verb-internal operators with weak quantificational and measurement effects share with vague weak quantifiers like *a lot*, *a little*, *more*, *most* and *much*, for example (Partee p.c.).

4. GRAMMATICAL ASPECT VS. EVENTUALITY TYPES: NEW EVIDENCE

The two different modes of interpretation of bare Incremental Theme arguments, which I propose in Sections 3.2.1 and 3.2.2, can be independently and in general terms motivated within Carlson's (2000) framework. This in turn will allow me to provide new compelling evidence in support of the claim (also made elsewhere) that the category of grammatical aspect and the classification of verbal predicates into eventuality types (or Aktionsarten) are two independent dimensions in the general domain of 'event structure'.

Carlson's (2003a) main goal is to provide a semantic motivation for Diesing's (1992) Mapping Hypothesis. It states that the material from the VP is mapped into the nuclear scope of a DRT-type tripartite structure and the material from the IP into a restrictive clause. The restrictive clause is presuppositional, and consequently any NP/DP that is presuppositional in nature must be in the IP to be interpretable: definite descriptions, demonstratives, proper names, specific indefinites, partitives,

quantified DPs (with strong quantifiers). In contrast, the nuclear scope is the scope of the obligatory existential closure, which unselectively binds all free variables within the VP. What is striking is that only weak indefinites *must* stay in the VP, which follows given that they assert the existence of their range, rather than presuppose it.

Carlson's (2003a) framework relies on two levels of semantic description: namely, propositional semantics and event semantics. The level of event semantics, which is associated with the VP level, specifies denotations of verbs, including their eventuality types (or Aktionsarten). The ontology associated with event semantics contains no individuals, only properties. Given that nominal arguments added at the VP level are property-denoting (predicative type), verbs are not semantically functional, and instead they compose with nominal arguments by type restriction. Most importantly, a combination of a verb with a noun here yields a denotation that is within the denotation type of a verb. This proposal finds some support in the behavior of paradigm examples of weak indefinites: namely, incorporated nominals, as well as closely related bare singular count and bare plural direct objects (as in Hindi, for example, see Dayal 2004). In general, nominals in incorporation and incorporation-like structures are taken to be property-denoting (see also McNally 1998).

Event semantics is context-free and serves as input into a standard context-sensitive propositional semantics with possible worlds and a domain of individuals. Propositional semantics corresponds to the IP level. Arguments, which are added at this level, are individual-denoting, and compose with verbs by function application, as is standard in most versions of Montague Semantics. Assuming that all linguistic expressions that depend on contextual factors for their interpretation invoke possible worlds (see Stalnaker 1978, among others), all contextually-dependent elements must be located at the IP level to be interpretable. They include operators that require a restrictor clause in the DRT-type tripartite structure, which is 'filled in' by propositional information from the context: namely, tense, modality, genericity as well as perfective and imperfective operators, which correspond to the categories of the grammatical aspect.

Given the above assumptions, weak indefinites must stay within the VP for two main reasons: (i) they conform to the structure of VP denotations, and (ii) they can be interpreted without reference to context. For example, an eventuality describable by *John fed dogs* is automatically redescribable by *John fed animals*, hence, in mereological terms, we get $\llbracket \text{feed dogs} \rrbracket \leq \llbracket \text{feed animals} \rrbracket$. In this respect, bare plural arguments behave like arguments with weak quantifiers such as *a lot of*: $\llbracket \text{John fed a lot of dogs} \rrbracket \leq \llbracket \text{John fed a lot of animals} \rrbracket$. In contrast, arguments with strong quantifiers do not preserve the structure of VP denotations: For example, an eventuality properly described by *John fed every dog*, which contains the strong quantifier *every dog*, is not describable by *John fed every animal*.

We may align the two different modes of interpretation of bare mass and plural arguments in Slavic languages with the two different modes of composition between a verb and its arguments in Carlson's framework. We have seen that the complete,

or ‘totality’, aspectual semantics of perfective verbs, which contain no verb-internal operators with weak quantificational or measurement meanings, induces the definite referential interpretation of their bare mass and plural Incremental Theme arguments (see Section 3.2.1.). I account for this behavior by assuming that bare mass and plural nouns can serve as Incremental Theme arguments of such perfective verbs after a type shift by means of σ from their inherent predicative type $\langle e, t \rangle$ to the argumental individual type e . Consequently, bare mass and plural nouns interpreted as referential definites combine with the relevant perfective verbs by the standard function application at the level of propositional semantics. This also presupposes that the predicate modifier *TOT* posited here for the interpretation of the aspectual semantics of perfective verbs denoting total (or completed) events must be interpreted at the level of propositional semantics, and have a functional correspondent at the syntactic IP level. This is also the syntactic level at which definite noun phrases must be located to be interpretable, on Diesing’s (1992) Mapping Hypothesis.

Weak indefinite effects of measure prefixes on bare mass and plural (Incremental) Theme arguments (see Section 3.2.2 above) can be predicted, if we assume that such prefixes have their domain of operation limited to the level of event semantics, the level at which denotations of verbs, including their eventuality types are specified, and the corresponding syntactic VP level. A prefix used in this way is taken to be an intersective modifier of nominal meanings, type $\langle \langle e, t \rangle, \langle e, t \rangle \rangle$. It is combined with a nominal predicate introduced by an (Incremental) Theme argument, and the result, which is also a property-denoting nominal predicate, is composed by type restriction with the meaning of an aspectless verb stem/root. Event semantics only has properties as ontological entities, as Carlson proposes, and the mode of composition between verbs and property-denoting nominal arguments is here motivated by incorporation(-like) phenomena, among others. I also propose that a prefix used as a weak quantifier can only be applied to the (Incremental) Theme argument. In languages that manifest typical cases of incorporation, incorporation is limited to one argument, which is often taken to stand in the Theme relation to the verb (see Miner 1986 and Woodbury 1975, for example). However, it is not clear why exactly this type of thematic relation should be prominent in incorporation(-like) phenomena across typologically diverse languages. (For a discussion of this point see Farkas and de Swart 2003.)

This proposal relies on the requirement that the nominal argument, which is first modified by a prefix, is ‘consumed’ by the aspectless verb stem and subject to the existential closure at the semantic level of composition that is below the propositional level of aspectual operators: namely, at the level of event semantics and its corresponding syntactic VP level. Implicit in this mode of composition is the claim that prefixes cannot be exponents of a function (or functions) posited for the interpretation of the perfective aspect (pace Piñón 1995, Slabakova 1997 and Zucchi 1999, for example, to give just a few among the most recent references). If prefixes were viewed in this way, they would uniformly correspond to functional projections at the IP level and their weak indefinite effects on bare nominal arguments would

not necessarily follow from assumptions that are independently made in Diesing and Carlson.

There are also other independent considerations that speak against viewing prefixes as morphological exponents of the perfective aspect. Verbal prefixes are neither necessary nor sufficient markers of the aspectual category of ‘perfectivity’, as Filip (1993/99, 2000 and 2004) argues. There are unprefixated verbs that are perfective, such as the Russian *dat* ‘to give’, and prefixed verbs that are imperfective, such as the Russian *otdavai* ‘to give, place, put, i.e., hand over for a certain purpose’. Although some uses of prefixes make no (distinct) idiosyncratic lexical contribution to the meaning of verbs, and thus appear to be ‘perfectivizing’ prefixes pure and simple (see the Polish prefix *z-* in *zjadł* in ‘he ate (up)’ in (1), for example), such uses are not systematic, and there is no single prefix dedicated solely and in all of its occurrences to only such a perfectivizing function. Slavic verbal prefixes constitute a semantically heterogeneous class, and there is no (strong) correlation between verbal prefixes and telicity (or quantization), which is often equated with the semantics of perfectivity. (The same point is made with respect to verbal prefixation and telicity in German by Kratzer 2004.)

I propose that verbal prefixes belong to the general class of modifiers of eventuality types, rather than being morphological exponents of the perfective aspectual operator. They are semantically characterized as functions that map sets of eventualities of a certain type and onto sets of eventualities of some (possibly) other type. That is, their semantic contribution (qua eventuality type modifiers) to the core event predication is on a par with modifiers of eventuality types expressed by a variety of syntactic devices, such as adverbial phrases (*John ran from the bus stop to the post office*) or secondary predicates (*John scrubbed the floor clean*) in English, for example. Spencer and Zaretskaya (1998), for instance, argue that a large class of Russian prefixed verbs has essentially the same semantic structure as the resultative predication in English. In the most general terms, the presence versus absence of modifiers of eventuality descriptions affects the homogeneity and quantization entailments, in the sense of (8a-b). In contrast, semantic operators that interpret the categories of the grammatical aspect, perfective, imperfective and progressive, are higher level compositional operators that take eventuality descriptions (basic or derived) as their input. As in Carlson’s (2000) framework, aspectual operators, and also genericity and tense operators, are taken to be propositional operators with functional correspondents at the syntactic IP level. Given the above observations, we arrive at the following schematic logical representation:

- (20) a. [TENSE [GEN* [ASP [EVENTUALITY-MOD* [eventuality
description]]]]]
 b. pře-piso-vá-va-l¹ Czech
 over-write-IMP.ASP-GEN-PAST.3SG
 ‘he used to write over / rewrite’

(20a) is compatible with an independently proposed structure in de Swart (1998), and it also closely reflects the order of markers in the surface morphology of Slavic verbs. This is illustrated with the Czech example in (20b), which contains overt morphological exponents of all the semantic operators in (20a). Here we see that a basic eventuality description is expressed by a verbal predicate whose morphological exponent is an aspectless verb stem ‘write’. It serves as a base to which first eventuality (type) modifiers like prefixes can be applied. In (20a), *EVENTUALITY-MOD** captures the recursivity of eventuality modifiers. In English, combinations of several modifiers are common: cp. *come out from under the bed*. In West and East Slavic languages, we may find two or even three verbal prefixes functioning as eventuality type modifiers within a single verb, while South Slavic languages like Bulgarian allow for more than three. Recursivity is one of the hallmark characteristics of derivational morphology, and in so far as Slavic prefixes are recursively applicable to one and the same verb they behave like derivational rather than inflectional morphemes, at least in Indo-European languages. This, in turn, can be taken as an additional piece of evidence in support of the argument made here that Slavic verbal prefixes cannot be viewed as overt markers of the perfective operator. That is, verbal aspect in Slavic languages is standardly taken to be a grammatical category, and if this also implies that it is an inflectional category (see also Spencer, 1991), then prefixes cannot be *aspectual* morphemes, because such morphemes ought to have inflectional characteristics. In contrast, overt morphological and syntactic exponents of temporal and grammatical aspect operators prohibit recursion (cp. **John talkeded*, **John was being running*).

As far as the realization of *ASP* in (20a) is concerned, it is clearly instantiated only by the allomorphic variations of the imperfective suffix in Slavic languages. In the Czech example (20b), it is realized by the suffix *-va-*. As Filip (2000) argues, the imperfective suffix is a piece of inflectional (aspectual) morphology, because it has a *constant and only* aspectual meaning in *all* of its occurrences. There is also the semelfactive suffix (*-nu-* in Russian, for example) which only occurs in a limited subclass of perfectives. However, apart from these two morphemes, there is no one-to-one correspondence between the *ASP* operators, perfective (*PERF*) and imperfective (*IMP*), and verbal morphology in Slavic languages. Apart from these two morphemes, there are no other morphemes or formal properties that would unambiguously and in all of their occurrences mark verb forms as either perfective or imperfective. Therefore, in general, the grammatical aspect in Slavic languages, perfective and imperfective, is best viewed as a property of a fully formed verb, excluding its generic and temporal suffixes.

Finally, in the schema (20a), *GEN** capture the recursivity of the generic operator. In Czech, for example, the generic suffix can be iterated for emphasis (see Filip and Carlson 1997). Notice that in the schema *GEN** and *ASP* are separate. This is motivated by the arguments made in Filip and Carlson (1997) that genericity is a category *sui generis*, formally and semantically independent of the category of aspect. They invalidate any proposals that subsume genericity under imperfectivity (see Dahl 1985 and Comrie 1976, among others).

Temporal operators take the widest scope and introduce an existential closure over the eventuality variable introduced by a base eventuality description. A temporal operator maps the eventuality described by a given predicate onto the time axis via its temporal location in relation to the utterance time.

5. CONCLUSION

In this paper I propose that specific parts of verbal morphology in Slavic languages manifest a clear division of labor in the way in which they contribute to the expression of grammatical aspect (perfective, imperfective) and to the eventuality type (aka ‘Aktionsart’) of a verb, which are manifested in their differential effects on the interpretation of bare mass and plural arguments linked to the (Incremental) Theme relation.

There are several issues whose discussion would have been a part of this paper, had the space limits not prevented it. Let me just briefly mention three. The first concerns non-compositional properties of prefixal combinations as well as the polysemy of prefixes and their impact on the perfective semantics of a whole prefixed verb. Why does a Russian perfective verb with the prefix *na-* like *napisat’* ‘to write up’ entail nothing about the quantity of the ‘created object’, while a perfective verb like *navarit’* ‘to cook (up) a lot (of x)’ requires that there was a large quantity of the ‘created object’ as a result of cooking? The second issue regards compositional semantic analysis and the nature of the mapping between syntax and semantics. The problem is that data involving word-internal lexical operators, such as Slavic measure prefixes discussed here, appear to be of non-compositional nature (cf. also Bittner 1995 with respect to West Greenlandic Eskimo). The third issue regards bare NPs, incorporation and anaphora. What is the anaphoric behavior of bare nominal arguments that are linked to prefixes used as lexical A-quantifiers and that are here claimed to have weak indefinite meanings similar to that of incorporated nominals? Farkas and de Swart (2003) discuss the cross-linguistic variation in which languages differ with respect to whether their incorporated nominals introduce discourse referents.

6. REFERENCES

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