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[take 2]

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## Aspect and the interpretation of internal arguments

### *Section 0 Introduction*

A number of perfective prefixes in Russian require that the theme be completely affected by the verb. These prefixes apply mainly to the Incremental Theme<sup>1</sup> verbs such as “eat”, “drink”, etc. For example, if the prefix “s-” applies to the verb “eat”, the resulting aspect-marked verb “s-eat” entails that the object (whatever it is) is eaten completely. Other prefixes of this sort are “vy-”, “pro-”, “na-”. I will refer to these prefixes as “completive”. When a completive prefix applies to a verb whose object is a bare plural, the requirement on the bare plural (also mass NP) is stronger – “s- eat apples” entails that (a) more than one apple is eaten completely; (b) there are no uneaten apples left. In other words, the bare plural in the scope of the verb marked with a completive prefix is interpreted as “all apples” not “some apples”. This phenomenon is referred to as the maximality requirement (also known as the definiteness requirement<sup>2</sup>) and is argued to hold for Slavic languages in Wierzbicka (1956), Forsyth(1960), Chvany(1983); more recent accounts of this are given in Krifka(1992), Verkuyl 1993, 1999, Filip(1999), inter alia. The maximality requirement is not present with bare singulars, however. The combination of a completive prefix and a bare singular entails only that one individual is completely V-ed. In this bare singulars pattern with NumP’s like “one apple”.

The purpose of this paper is to explore the interaction between aspectual operators in Russian and bare nominals that appear as incremental themes. It is argued that the maximality requirement is a product of the meaning of the completive perfective prefix and the meaning of the bare plural. If one of the ingredients is missing – there is no completive prefix or the theme is not a bare plural<sup>3</sup>, maximality will not arise. The paper is organized as follows. Section 1 presents the central data concerning aspectual operators and internal arguments. The primary contrast presented in the data is that between bare plurals and non-bare plural arguments. Section 2 presents an overview of previous accounts of the maximality requirement. Section 3, presents the analysis of the maximality requirement. Building on the account presented in Filip 1999, I show how the maximality requirement is derived from the semantics of the completive prefix and the semantics of the bare plural. Section 4 is dedicated to bare singulars. It

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<sup>1</sup> Verbs with Incremental Themes or Gradual Patients in terms of Dowty 1979, Krifka 1989, 1992, 1998 also Filip 1999 are verbs that involve a gradual consumption or creation of the theme. Whether or not a verb has an Incremental Theme is an inherent property of the event the verb describes. For example, an event like “eat bread / an apple” involves a gradual consumption of the theme. It is possible to say: “john first ate 1/3 of the apple, then another 3<sup>rd</sup> and finally the apple was gone”. Other verbs do not involve a partial consumption/creation of the theme, e.g. “see bread/an apple” does not, in general, mean that john first saw 1/3 of an apple, then 2/3rds and finally the entire apple was seen. The non-Incremental Theme verbs such as “see” do not impose a maximality/definiteness requirement on the bare plural theme. In this paper, these verbs will not be addressed.

<sup>2</sup> The link between maximality and definiteness is that maximal entities are unique in the context and hence are “definite”. However, because Russian has no definite article and the term “definiteness” has also been related to contextual salience and familiarity in addition to maximality, I choose to use “maximality” instead. This way, I limit the discussion only to explaining why bare plurals must denote the maximal plurality in the context and say nothing about context salience and familiarity.

<sup>3</sup> While I mainly explore the contrast between the NumPs and the plural, the requirement also holds for mass nouns. They can be treated on a par with bare plurals. Chierchia 1998 presents a number of arguments in favor of treating mass nouns as inherently plural

addresses the question why bare singulars unlike bare plurals do not have the maximality requirement when they appear in the object of a verb marked with a completive perfective prefix. Section 5 addresses the distinctions between perfective and imperfective aspect. It is argued that while imperfective and a non-completive perfective prefix *po-* are similar in that they do not impose the maximality requirement on the theme, there are important distinctions between them nonetheless. These distinctions become relevant when we consider the interaction between perfective and imperfective verbs and temporal adverbials. Section 6 is the conclusion.

### *Section 1 The data*

Let us consider the data that illustrates the interaction between bare plurals and incremental theme verbs marked with a completive prefix. In this section I concentrate mainly on the contrast between bare plurals and NumP's. The status of bare singulars in these constructions is addressed in Section 4 because the data concerning the bare singulars is more complex. The examples mainly come from Russian although other Slavic languages exhibit the same patterns. Bulgarian is particularly telling here because in addition to having the perfective/imperfective distinction, it is the only Slavic language that has the definite article. The Bulgarian examples with the plural/mass terms in the object position are possible only with the definite article which can be taken to be the overt morphological manifestation of maximality. This step is warranted because speakers of Bulgarian agree that the definite plural in the object of the perfective in (4) must denote the entire plurality in a given context, not a subset of it. In Russian examples below, the (b) sentences in (1), (2) and (3) show the maximality requirement while the (a) sentences do not.

- |  |   |
|--|---|
| (1) a. Ja s'jel odno jabloko<br>I ate(perf) one apple<br>I ate one apple | b. Ja s'jel jabloki [#no 2 ostalos']<br>I perf-ate apples [# but 2 left-sja]<br>I ate up the apples [but 2 were left] |
|--|---|

In (1a), is true in a situation where there are 5 apples and only 1 of them are eaten. In contrast, (1b) is not. The utterance in (1b) is not even felicitous.

- |  |   |
|--|---|
| (2) a. Dima postroil 2 doma<br>Dima perf-built 2 houses<br>Dima built 2 houses | b. Dima postroil doma<br>Dima perf-built houses<br>Dima built the houses (a maximal set of houses in a situation s) |
|--|---|

There is a similar difference between (2a) and (2b). Suppose we are in a class where children are required to build little houses from Lego. Suppose Dima built two houses, and Misha built 3. In this case, (2a) is true and felicitous. However, (2b) is not felicitous in the situation where we have 3 Lego houses of which Dima has built only 2; he has to have built all of them.

- |  |  |
|--|--|
| (3) a. Yasha prochital 3 knigi o perevode<br>Yasha perf-read 3 books about translation<br>Yasha read 3 books about translation | b. Yasha prochital knigi o perevode<br>Yasha perf-read books about translation<br>Yasha read the books about translation |
|--|--|

Finally, (3a) is true and felicitous if among many books about translation Yasha has only read three. (3b), however, requires that he read all the books there are in a given context/situation.

BULGARIAN [from Filip 1999: 228; Verkuyl 1999: 129]

- |  |  |
|--|--|
| (4) a. Toj izpi *kafe / kafeto<br>He Perf-drink coffee/coffee-the<br>He drank the coffee | b. Dima izjado jabkato/ *jabka<br>Dima perf-eat apples-the/ apples<br>Dima ate up the apples |
|--|--|

- c. Dima izjado 2 jabka  
Dima perf-eat 2 apple

In Bulgarian, bare plurals and mass terms are impossible in the object position of perfective verbs with completive prefixes. The object NP requires a definite article while NumP's do not need one. Also bare singulars are possible without one.

As was mentioned before, all of the above perfective prefixes require that the theme be completely affected by the verb. In other words, it is not possible to continue (1) – (3) as follows:

- (5) a. # Dima s'jel jabloko/ 2 jabloka, no nemnogo ostavil.  
Dima ate apple/ 2 apples, but some left  
Dima ate an/the apple/ 2 apples but he left some of it/ them
- b.# Yasha prochital knigu o perevode no ne do konca / no ne vse  
Yasha perf-read book about translation but not till end / but not all  
Yasha read a/the book about translation but not till the end / but not all .

This concerns bare singulars, NumP's and bare plurals alike. If Dima is eating 2 apples or 1 apple [s-eat] entails that all of the apples he is eating are consumed. Similarly, in (5b), Yasha must read 3 books about translation from beginning to end. To sum up, the above perfectives require two things: first, they require that the theme be completely consumed as seen in (5). Second, bare plurals but not necessarily NumP's must denote the maximal set of individuals in a situation cf (1 – 4). (For simplicity, I will refer to the perfectives with completive prefixes as s-perfectives since s- is one of the prefixes that induce this requirement. The term “s-perf” is only a mnemonic since there are other completive prefixes.)

Perfectives that don't show this contrast:

As was already mentioned, not all perfectives of verbs with incremental themes show the maximality requirement. Notably, the perfective prefix “po-” does not require maximality on the bare plural, thus presenting a minimal contrast to the completive perfectives above<sup>4</sup>.

- |   |   |
|---|---|
| (6) Dima pojel jabloka/jablok<br>Dima perf-ate apple(Gen)/apples(Gen)<br>Dima ate some apple/apples | (7) Dima pochital knigu/ knigi<br>Dima read book/ books<br>Dima read a book / books |
|---|---|

Unlike the perfective *s'jel* given in (1)- (3), the perfective *pojel* does not entail that the entire set of apples was consumed. Also, the po-perfectives, unlike the s-perfectives, only require that some of the theme be V-ed, not necessarily the entire theme. For example, the sentences in (8) unlike the ones in (5) are not contradictory:

- |  |   |
|--|---|
| (8) a. Dima pojel jabloka no nemnogo ostavil.<br>Dima po-eat apple-gen but some left<br>Dima ate some apple and left some of it. | b. Dima pojel jablok no nemnogo ostavil.<br>Dima po-eat apples-gen but little left<br>Dima ate some apples, but left some |
|--|---|

The imperfectives are like po-perfectives in that they do not show the maximality requirement and do not require a complete V-ing of the theme.

<sup>4</sup> This prefix is also different from the completive prefixes in that it does not require the accusative case. It is classified as a perfective prefix because verbs with this prefix pattern with other perfective verbs in the way they interact with time and quantificational adverbials. This is addressed in more detail in section 5.

Imperfectives:

- (9) a. Ja jel jabloko  
I ate-imp. apple  
I was eating an/the apple
- b. Ja jel jabloki  
I ate-imp. apples  
I was eating (the) apples
- (10) a. Dima stroit dom  
Dima builds-imp house  
Dima is building/builds a/the house
- b. Dima stroit doma  
Dima builds-imp houses  
Dima is building/builds (the) houses
- (11) a. Yasha chitaet knigu  
Yasha reads-imp book  
Yasha is reading/reads a /the book
- b. Yasha chitaet knigi  
Yasha reads-imp books  
Yasha is reading/reads (the) books

The imperfectives are also compatible with a part of the object being V-ed:

- (12) a. Dima stroil dom, no ne zakonchil ego  
Dima built-imp house, but not finished it  
Dima was building a house, but didn't finish it.
- b. Dima jel jabloko no ostavil polovinu  
Dima ate-imp apple but left half  
Dima was eating an apple but left half of it.

Thus, in contrast to s-perfectives, both po- perfectives and imperfectives have no maximality requirement on the bare plural and are compatible with partial V-ings of the theme.

## Section 2. Previous accounts

### Krifka 1992

One account of the maximality requirement comes from Krifka(1992). He focuses on how maximality leads to deniteness. The argument is as follows. Perfective predicates require the incremental theme to be quantized where P is quantized iff  $\forall x, y [P(x) \& P(y)] \rightarrow \neg y < x$ . If P applies to x and y, y cannot be a proper part of x. In other words, a nominal such as 'an apple' is quantized since Apple(x) & Apple(y) entail that y is not a proper part of x(Krifka 1992, quoted in Filip 1999). For the singular nominals this requirement is met as long as the NP is a count noun, e.g. *s'jel jabloko* = ate an apple. Singular count nouns have quantized reference regardless of whether they are maximal or not. According to Krifka, bare plurals are different in that they can only have quantized reference when they are definite/maximal (definiteness is viewed in his proposal as maximality). "The definite interpretation is the only quantized interpretation"(Krifka, 1992: 50). Krifka defines definite and quantized plurals as follows:

Jabloki = apples :  $\lambda(x)[x = \text{FU}(\text{apples}) \& \text{apples}(x)]$  (quoted in Filip 1999)

Here 'FU' is the fusion / sum of all apples, yielding the maximal set of apples. However, the conclusion that in order for a plural to be quantized it has to be definite is premature. Suppose we had a sentence such as (13):

- (13) Dima s'jel dva jabloka i popal v bol'nicu  
Dima ate two apples and got in hospital  
Dima ate two apples and got into a hospital

Here, the theme is quantized by the definition of quantization given above, yet it is non-maximal. The question is why can't a bare plural be interpreted as referring to a subset of apples? why does it require that the maximal set of apples be consumed? Krifka does not explain why a bare plural cannot be interpreted as 'two apples' in the case above. At this point, the sentence in (6) becomes relevant. In (6), the perfective verbal complex 'pojel jablok' = 'ate (some ) apples' does not entail that the entire set of apples is consumed. This leads to the question why aren't s-perfectives like po-perfectives in this respect? Or conversely, why shouldn't the po-perfective require a maximal theme? It too should be a quantized predicate since it is perfective.

### Filip's account of the maximal interpretation of the bare plural

Filip presents an alternative explanation for the fact that at least some perfective verbs require the maximal interpretation of the bare plural. She proposes the Incremental Theme Hypothesis that states that:

“Aspectual operators and morphological V-operators function as quantifiers over episodic predicates and their arguments. They bind the variable introduced by the incremental theme argument. If there is no incremental theme, the quantification is directed at the event variable alone; if there is neither, quantification is undefined”(Filip 1999: 12).

In other words, aspectual operators can influence the interpretation of the incremental theme because they act as quantifiers for the object NP not just as event operators. Further, she defines perfective aspect as follows: “[Perfective  $\phi$  ] denotes events represented as integral wholes. The perfective aspect maps any kind of eventuality to a total event“(Filip : 184, 247).” By the Incremental Theme hypothesis, the aspectual operator takes scope over event predicates and their arguments. The perfective operator quantifies simultaneously over all the temporal parts of an event and all the parts of an individual denoted by the Incremental Theme argument. This means that the incremental theme in the scope of the perfective operator will be interpreted as “all the z,” “the whole of z”(247). If the incremental theme is a bare plural, it will be interpreted as the maximal individual. The imperfective operator functions as a partitive quantifier over the incremental theme argument. As such, it does not require that all the theme be consumed. Hence, the imperfective does not cause the bare plural to have a maximal interpretation.(253)

Filip's argument while intuitive faces several problems. First, she does not provide an independent definition of “total” or “integral”. In what sense is an event denoted by the perfective verb 's'jel' a total event as opposed to the imperfective “jel”? Second, there does not seem to be a clear link between perfectives viewed as total events and universal quantification over the incremental theme. Third, there is a question of how the universal quantifier is built into the semantics of the perfective aspect. Finally, Filip does not explain why po-perfectives act like imperfectives and unlike the s-perfective with respect to the maximality requirement if they are also 'total' events. Since Filip does not provide a definition of 'total events' and their connection to universal quantification, her treatment of the maximality requirement lacks adequate explanatory force.

All that being said, Filip's proposal is still both intuitive and empirically supported. I would like to adopt and implement the central idea behind it: namely, aspectual operators quantify over parts of the incremental theme. However, Filip collapses this claim with a second claim, namely, that perfectives are “total events or integral wholes”. It seems that Filip wants to make the quantification over the theme follow from atomicity. I believe that the second claim is also empirically supported and can be made more precise (as will be shown in Section 5). However, it is distinct from the first. The two need to be kept apart because they relate to two different dimensions of aspect: the first concerns the interaction between events and its participants; the second concerns the interaction between events and temporality. Both are important in understanding the dual nature of aspect: on the one hand, aspect expresses a relation between an event and its arguments; on the other hand, it relates events to times. Building on Filip's

work, I will incorporate both of her claims while keeping them apart. In the next section I formally implement the idea that aspect involves quantification over the internal argument. I depart from Filip's 1999 proposal in that I do not treat all perfective prefixes as introducing a universal quantifier over the theme. In section 5, I present evidence in support of the claim that perfectives are atomic (like singular individuals) while imperfectives are non-atomic (like plural individuals) and show how the semantics of perfective and imperfective aspect can incorporate this distinction. I will also show that this distinction is orthogonal to the kind of quantification introduced by an aspectual operator over the theme.

### Section 3. Events and themes

#### 3.0 Preliminaries

##### 1) The verb.

A verb like “eat” denotes a relation between an individual that is eaten (the theme), the eater (the agent) and the eating event (e). For simplicity, I am assuming that all arguments are of type e. Whether eating is partial or complete gets determined after the aspectual operator attaches to the verb. Completive perfective prefixes induce a total V-ing of the theme, while the po-perf and the imperfective allow for partial V-ings. Clearly, for the denotation of the verb “eat” to be non-empty, at least one part of the theme has to be completely consumed. (The idea that eating events can be partial or complete is similar to a proposal made in Zucchi 1999 about the denotation of the VP).

$V \sim \lambda x \lambda z \lambda e [ \text{Eat} (e, z, x) ] \langle e, \langle e, \langle st \rangle \rangle \rangle$

##### 2) Aspect.

The aspectual operator specifies whether the theme is V-ed completely or partially by introducing quantification over parts of the theme. (This is essentially similar to what Filip 1999 proposes). For quantification over parts of the theme to be possible, the theme has to be available, which means that aspect applies to the verb before the verb is merged with its theme argument. Building on Filip 1999, I treat completive prefixes as introducing the universal quantifier over parts of the ground-up theme<sup>5</sup>. The imperfective and the po-perfective introduce existential quantification over parts of the ground-up theme.

$\text{Asp0}(\text{perf-s}) \sim \lambda P \lambda x \lambda z \lambda e \forall y [ y \leq g(x) \rightarrow \exists e' [ e' \leq e \ \& \ P(e', z, y) ] ]$

$\text{Asp0}(\text{perf-po/ imperf}) \sim \lambda P \lambda x \lambda z \lambda e \exists y [ y \leq g(x) \ \& \ \exists e' [ e' \leq e \ \& \ P(e', z, y) ] ]$

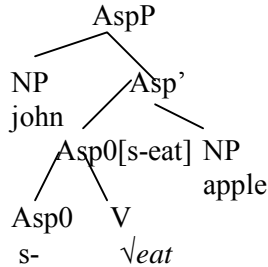
The above translation of the aspectual nodes is essentially the same as what Filip 1999 has. However, since she is working within a different framework, the actual formalism is different. (For details see Filip 1999).

3) Once the verb is aspect-marked, it is ready to take arguments. The claim that the verb takes its arguments after it has been marked with aspect is supported by the fact that in Russian (and in other Slavic languages) the aspect of the verb is determined prior to the introduction of the internal argument – the verb is either perfective or imperfective regardless of its theme. A native speaker can judge a verb as perfective or imperfective even if the verb is given in by itself, e.g. ‘s-jest’ = ‘s-eat’ is judged as perfective, while ‘jest’ = ‘eat’ is judged as imperfective. ( This contrasts with the telicity judgments for English where *eat the apple* is telic while *eat apples* is atelic, but the bare verb “eat” is indeterminate between the two. ) After the internal and external arguments are fed into the derivation, the denotation of the AspP [john perf-s-eat apple] is:

<sup>5</sup> Grinding is needed to preclude partial eatings of a part of the theme. In other words, we want to prevent a scenario where for every part of the theme there is a partial eating of this part of the theme.

AspP  $\sim \lambda e \forall y [ y \leq g(\iota \text{apple}) \rightarrow \exists e' [e' \leq e \ \& \ P(e', \text{john}, y)] ]$  (suppose there is a unique apple represented via the iota operator)

Note that in this theory there is no VP – just perfective and imperfective aspectual phrases. The syntactic structure of AspP is



### 3) Tense.

Tense is a function from a set of events P provided by AspP to truth-values. Tense introduces the temporal trace function  $\tau$  which maps events to their run times. It assigns to an event e in a world w the interval  $t(e,w)$  at which e goes on at w (Link 1987, Landman 1992, also Krifka 1998). I do not represent the world variable since in this paper I am only concerned with extensional contexts. Tense also introduces an interval of time t in which the run-time of event e is located.

$T \sim \lambda P \exists e \exists t [ P(e) \ \& \ \tau(e) \subseteq t \ \& \ t < n ]$  (this is an example for the translation of a past tense, but other tenses are similar, e.g. present:  $t = n$  and future  $t > n$ ).

Let us now put things together by first deriving a construction with a completive prefix s-.

#### 3.1. The derivation and semantics for the perfective-s prefix.

Consider the following sentence.

*'Dima s-jel jabloko'*

*Dima s-eat apple*

Let's assume for simplicity that the bare singular in this example denotes a unique apple and is of type  $\langle e \rangle$ .

Derivation:

V [eat]  $\sim \lambda x \lambda z \lambda e [ \text{Eat}(e, z, x) ] \langle e, \langle e \langle st \rangle \rangle$

Asp0 [s-]  $\sim \lambda P \lambda x \lambda z \lambda e \forall y [ y \leq g(x) \rightarrow \exists e' [e' \leq e \ \& \ P(e', z, y)] ]$  (V)

Asp0 [s-eat]  $\sim \lambda x \lambda z \lambda e \forall y [ y \leq g(x) \rightarrow \exists e' [e' \leq e \ \& \ \text{Eat}(e', z, y)] ]$  (V+Asp form one complex head)

NP [apple]  $\sim \iota \text{apple}$

Asp' [s-eat apple]  $\sim \lambda z \lambda e \forall y [ y \leq g(\iota \text{apple}) \rightarrow \exists e' [e' \leq e \ \& \ \text{Eat}(e', z, y)] ]$

NP [john]  $\sim j$

AspP [john s-eat apple]  $\sim \lambda e \forall y [ y \leq g(\iota \text{apple}) \rightarrow \exists e' [e' \leq e \ \& \ \text{Eat}(e', j, y)] ]$

T [past]  $\sim \lambda P \exists e \exists t [ P(e) \ \& \ \tau(e) \subseteq t \ \& \ t < n ]$

TP [john s-eat-past apple] ~ >

$\exists e \exists t \forall y [ y \leq g(\text{tapple}) \rightarrow \exists e' [e' \leq e \ \& \ \text{Eat}(e', j, y) ] ] \ \& \ \tau(e) \subseteq t \ \& \ t < n ]$

In sum, a completive prefix attaches to the verb and requires that for every  $y$  part of the theme, there be a part of the event  $e'$  such that  $y$  is V-ed during  $e'$ . Whether the requirement imposed by the completive prefix is satisfied or not, depends on the model we are in. If this requirement is not satisfied, i.e. there is at least one part of the theme left un-V-ed, the sentence is false.

The data explained by the proposal (repeated from section 1):

- (14) a. Dima s-jel jabloko # (no nemnogo ostavil)      b. Dima pročitala knigu, #(no ne do konca)  
Dima s-eat apple # but some left                      Dima perf-read book, but not to end  
Dima ate the apple # but left some of it.              Dima read the book, but not till the end

Given the meaning of a completive prefix, it is not possible to have any part of the theme left un-V-ed.

Now let us consider how perf-s interacts with bare plurals. Recall that “s-eat apples” cannot mean that just some part of the plurality is consumed – it has to be the entire set in a given situation. To derive the maximal reading, the semantics given for the completive prefix is not enough – something has to be said about the bare plural. This is so because if “apples” in the object of “eat” is allowed to denote any number of apples, then nothing would block the interpretation on which only a part of the apples is completely eaten.

### 3.2 Perfective-s and the bare plural.

I follow arguments presented in Carlson 1978, Chierchia 1998, Dayal 2000, 2002 that bare plurals denote kinds. According to the neo-Carlsonian tradition of Chierchia 1998, Dayal 2000, 2002 inter alia, bare plurals start out as denoting properties of type  $\langle\langle i, \langle et \rangle \rangle\rangle$ . However, when they appear in argument positions they are type-shifted into kind-terms of type  $\langle i, e \rangle$  via the NOM operator ‘ $\cap$ ’ defined as  $\cap P = \lambda s \iota P(s)$ . So [[apples]] denotes apple-property and is of type  $\langle i, \langle et \rangle \rangle$ , but [[ $\cap$ apples]] (also written as APPLES) is of type  $\langle i, e \rangle$  - a function from situations  $s$  to the maximal individual realizations of the apple-property of in  $s$ .<sup>6</sup>

#### 3.2.1 Why do we believe that bare plurals denote kinds?

There are three types of arguments (going back to Carlson 1978) in favor of treating bare plurals as kind-denoting. First, bare plurals unlike indefinites can appear with kind-level predicates such as “extinct” or “widespread”. Second, bare plurals are scopeless with respect to negation and intensional verbs such as “want” while indefinites can scope out. Third, bare plurals show differentiated scope when they appear under adverbials such as “for an hour” again, unlike indefinites. These facts hold for Russian as shown below:

Bare plurals with kind-level predicates:

- (15) a. Mamonty vymerli  
Mammoths perf-died  
Mammoths died out (became extinct)

<sup>6</sup> The type of situations is “ $i$ ”. Since APPLES denotes a kind and is of type  $\langle i, e \rangle$  the verb has to be type shifted to apply to an individual of the type  $\langle i, e \rangle$ . I do not represent this type-shift here. For much discussion about the application of the verb to a kind see Chierchia 1998, Dayal 2000, 2002.

- b. Sobaki rasprostronennye zivotnyje  
 Dogs spread animals  
 Dogs are common

- (16) a. # Nekotoryje mamonty vymerli (ok only on the taxonomic reading)  
 Some mammoths perf-died  
 Some mammoths died out (became extinct)

Unlike bare plurals, DPs with an overt quantifier “some” cannot appear with kind-level predicates.

Bare plurals under the scope of negation, universal quantifier, and intensional verbs:

- (17) a. Kazhdyi student poznamilsja s izvestnymi akterami  $\forall \exists / \# \exists \forall$   
 Every student met-REFL with famous actors-instr.  
 Every student met famous actors

- b. Dima ne zametil pjaten na polu  $\text{Neg } \exists / \# \exists \text{ Neg}$   
 Dima not noticed stains on floor  
 Dima did not notice stains on the floor

- c. Dima xochet poznamitsja s izvestnymi akterami  $\text{Want } \exists / \# \exists \text{ Want}$   
 Dima wants meet-pres-REFL with famous actors  
 Dima wants to meet famous actors

In (17)a, the bare plural does not have a reading where there is a specific group of actors such that every student wants to meet them. Similarly, in (b) and (c) there is no reading where the bare plural has wide scope yielding the specific indefinite reading. In contrast, DP’s with an overt quantifier “some” in Russian can scope out:

- (18) a. Dima ne zametil kakie-to pjatna na polu  $\text{Neg } \exists / \exists \text{ Neg}$   
 Dima not noticed some stains on floor  
 Dima didn’t notice some spots on the floor

- b. Dima xochet poznamitsja s kakimi-to izvestnymi akterami  $\text{Want } \exists / \exists \text{ Want}$   
 Dima wants meet-pres-REFL with some famous actors  
 Dima wants to meet some famous actors

The same holds for DP’s under the scope of a quantifier: the wide scope reading is available for “kakie-to aktery” = “some actors”.

Bare plurals and differentiated scope:

These examples are related to the ones given in (17) but they reveal a slightly different aspect of the scope facts (mentioned in Dayal 2002). The bare plural yields a plausible interpretation when it appears in the following construction, while a quantified NP does not:

- (19) a. Dima lovil krolikov v techenii chasa  
 Dima caught rabbits in duration hour-gen  
 Dima caught rabbits for an hour

- b. #Dima lovil kakix-to krolikov v techenii chasa [must be the same rabbits]  
 Dima caught some rabbits in duration hour-gen  
 Dima caught some rabbits for an hour

The sentence in (19a) allows for a differentiated scope interpretation, while (19b) does not. In other words, (19a) is compatible with the plausible scenario on which Dima catches different rabbits during one hour. (19b), on the other hand, requires that the rabbits he catches be the same. Unlike the bare plural, which again takes narrow scope with respect to “for an hour”, an indefinite obligatorily takes a wide scope resulting in a “fixed-set” reading. The above evidence suggests that bare plurals do not pattern with indefinites. Treating bare plurals as kinds explains the data in the following way. First, if bare plurals are names of kinds, they are naturally compatible with kind-level predicates. Second, kind terms, like proper names, are expected to be scopeless with respect to negation, quantifiers, and intensional verbs. In the neo-Carlsonian theory of kinds due to Chierchia 1998, the narrow scope reading is derived by first applying the verb such as “see” to the kind which is of type  $\langle e \rangle$ , and then applying the Derived Kind Predication (DKP) operation that extensionalizes the kind and introduces an existential quantifier over the members of the kind.

DKP = If P applies to objects and k denotes a kind, then  $P(k) = \exists x [ \cup k(x) \ \& \ P(x) ]$ ;  
 Pred (  $\cup$  ) is defined as :  $\lambda k \langle i, e \rangle \lambda x [ x \leq k(s) ]$ .

(More will be said about DKP below, but for now consider the illustration of how it works taken from Dayal 2000):

Dima did not see spots =  $\neg \text{see}(\text{dima}, \cap \text{spots})$  apply DKP to get to the members of the kind  
 $\implies \neg \exists x [ \cup \cap \text{spots}(x) \ \& \ \text{see}(\text{dima}, x) ]$

Because the existential is introduced locally, the bare plural has only the narrow scope. Finally, differentiated scope is a result of having different instantiations (or ‘realizations’ to use Carlson’s original term) of the kind per every sub-interval of an hour. Paraphrasing Carlson 1978 p. 455, the abstract individual denoted by “rabbits” has different realizations / instantiations that keep popping-up for an hour and Dima keeps catching them. In contrast, a quantified phrase such as “some rabbits” requires that there be a fixed set of rabbits such that Dima catches the members of this set.

The three types of arguments given above present evidence in favor of treating bare plurals as names of kinds as opposed to indefinites. With this in mind, I now proceed to the derivation of the s-perfective verb with a bare plural object.

John s-eat apples

V [eat]  $\sim \lambda x \lambda z \lambda e [ \text{Eat}(e, z, x) ] \langle e, \langle e \rangle \langle st \rangle$

Asp0 [s- ]  $\sim \lambda P \lambda x \lambda z \lambda e \forall y [ y \leq g(x) \ \rightarrow \exists e' [ e' \leq e \ \& \ P(e', z, y) ] ]$

Asp0 [s-eat]  $\sim \lambda x \lambda z \lambda e \forall y [ y \leq g(x) \ \rightarrow \exists e' [ e' \leq e \ \& \ \text{Eat}(e', z, y) ] ]$

AP [apples]  $\sim \cap \text{apples}$

Asp' [s-eat apples]  $\sim \lambda z \lambda e \forall y [ y \leq g(\cap \text{apples}) \ \rightarrow \exists e' [ e' \leq e \ \& \ \text{Eat}(e', z, y) ] ]$

NP [john]  $\sim j$

AspP [john s-eat apples]  $\sim \lambda e \forall y [ y \leq g(\cap \text{apples}) \ \rightarrow \exists e' [ e' \leq e \ \& \ \text{Eat}(e', j, y) ] ]$

T [past]  $\sim \lambda P \exists e \exists t [ P(e) \ \& \ \tau(e) \subseteq t \ \& \ t < n ]$

TP [john s-eat-past apples]  $\sim \lambda$

$\exists e \exists t [ \forall y [ y \leq g(\cap \text{apples}) \ \rightarrow \exists e' [ e' \leq e \ \& \ \text{Eat}(e', j, y) ] ] \ \& \ \tau(e) \subseteq t \ \& \ t < n ]$

One may still wonder how the kind  $\cap$ apples which is an intensional entity gets extensionalized in this case. To this end, we can say the following. As already mentioned above, Chierchia 1998 introduces an operation of Derived Kind Predication (DKP) which fixes the sortal mismatch between the object-level predicate and its argument by extensionalizing the kind. The definition of DKP repeated from above is:

DKP = If P applies to objects and k denotes a kind, then  $P(k) = \exists x [ \cup k(x) \ \& \ P(x) ]$ ;  
 Pred (  $\cup$  ) is defined as :  $\lambda k \langle i, e \rangle \lambda x [ x \leq k(s) ]$ .

Crucially,  $\cup k$  is a set that contains all the instantiations of the kind in s. If we have a predicate such as  $eat(j, \cap$ apples ) where “eat” is object level and  $\cap$ apples denotes a kind, then DKP extensionalizes the kind and introduces existential closure to the closest predicate. In this case, it is ‘eat’. So, the result is:

$\exists w [ \cup \cap$ apples (w) & eat (j, w) ]

In the case of,  $\exists e \exists t [ \forall y [ y \leq g(\cap$ apples ) -- >  $\exists e' [ e' \leq e \ \& \ Eat(e', j, y) ] ] \ \& \ \pi(e) \subseteq t \ \& \ t < n ]$  the closest predicate is ‘be\_a\_part-of-mush’. When the standard DKP applies, the existential will be introduced into the scope of the universal quantifier thus getting the narrow-most scope. (Suggested by Dayla pc). As a result we will get:

$\exists e \exists t \forall y \exists w [ \cup \cap$ apples (w) &  $y \leq g(w) -- > \exists e' [ e' \leq e \ \& \ Eat(e', j, y) ] ] \ \& \ \pi(e) \subseteq t \ \& \ t < n ]$

Maximality obtains because every mush-part of w such that w is an apple must be eaten in some event. If s contains 3 apples {a, b, c} then every part of a, b, and c must be eaten. The locality of the existential quantifier is crucial in getting the maximal reading. This is similar to what happens when DKP introduces an existential quantifier into the scope of negation yielding the narrow-scope-only reading for a bare plural as in the example repeated from above:

Dima did not see spots =  $\neg$  see (dima,  $\cap$ spots) apply DKP to get to the members of the kind  
 $\implies \neg \exists x [ \cup \cap$ spots (x) & see(dima, x)]

The interaction of the bare plural and the universal introduced by the aspectual operator works the same way as the interaction between the bare plural and negation. (There is another way of getting maximality: the kind can be extensionalized not into a set but into an individual of type  $\langle e \rangle$ . This individual will contain all the members of the kind in some s. The new DKP is shown in End-Note 1).

At this point I would like to briefly address a question pointed out by Roger Schwarzschild concerning the possibility of placing the existential into the scope of the universal quantifier introduced by the perfective prefix. Since the verb *s-eat* looks like a single morphological unit much like the verb “ignore”, how come the existential can break it up? If we expect that the existential can break up words, we should also expect that “ignore” which can be analyzed as ‘not notice’ should also have only the narrow scope reading for a bare plural in the object position. However, the sentence “John ignored spots on the floor” does allow a reading where only some spots are ignored, i.e there is a wide scope reading. This suggests that the existential introduced by DKP cannot break up a word. My answer here is that introducing the existential into the scope of the universal is possible in case of the perfective verbs because the verb +perfective prefix are two separate units, analogously to a verb+ negation. Although on the surface they form a single word, the perfective prefix is distinct from the verb. For example, the prefix *s-* can attach not only to “eat” but also to other words (e.g. *s-lomat*’ = to break ). In contrast, a verb like “ignore” does not decompose into “not notice” – at least, such a decomposition would have to be argued for. Thus, “John ignored spots on the floor” does allow a reading where the existential has a wide scope, while “john *s-eat* apples” does not because “ignore” does not involve an existential introduced into the scope of negation – the negation is not there. (Words like ‘re-read’ that also allow a

wide-scope reading similarly to ‘ignore’ may pose a problem because they seem to consist of two morphological units. At this point, I do not have a way to account for them and leave the question for future research).

Now let us proceed to the discussion of the po-perfective and the imperfective and show that if the aspectual operator is not completive, maximality will not arise.

### 3.3 Aspectual operators that do not impose the maximality requirement: po-perfective and imperfective

As seen from the data section repeated below, po-perfectives unlike the s-perfectives do not have a maximality requirement on the NP:

(20) Dima pojel jabloka  
 Dima po-eat apple-gen  
 Dima ate some of the apple/ (some part of an apple)

(21) Dima jel jabloko  
 Dima ate-imp apple  
 Dima was eating an/the apple

The above sentences are true as long as at least one part of the apple is a theme of an eating event<sup>7</sup>. The po-perfective and the imperfective thus quantify existentially over parts of the theme. At this point the two aspectual operators are given identical semantics. This will be revised in section 5.

*Dima po-jel jabloka.*

*Dima po-eat apple*

Derivation (also works for the imperfective):

V [eat]  $\sim > \lambda x \lambda z \lambda e [ \text{Eat}(e, z, x) ] < e, < e < st >$

Asp0 [po- ]  $\sim > \lambda P \lambda x \lambda z \lambda e \exists y [ y \leq g(x) \ \& \ \exists e' [e' \leq e \ \& \ P(e', z, y) ] ]$

Asp0 [po-eat]  $\sim > \lambda x \lambda z \lambda e \exists y [ y \leq g(x) \ \& \ \exists e' [e' \leq e \ \& \ \text{Eat}(e', z, y) ] ]$

NP [apple]  $\sim > \iota \text{apple}$

Asp' [po-eat apple]  $\sim > \lambda z \lambda e \exists y [ y \leq g(\iota \text{apple} ) \ \& \ \exists e' [e' \leq e \ \& \ \text{Eat}(e', z, y) ] ]$

NP [john]  $\sim > j$

AspP [john po-eat apple]  $\sim > \lambda e \exists y [ y \leq g(\iota \text{apple} ) \ \& \ \exists e' [e' \leq e \ \& \ \text{Eat}(e', j, y) ] ]$

T [past]  $\sim > \lambda P \exists e \exists t [ P(e) \ \& \ \tau(e) \subseteq t \ \& \ t < n ]$

TP [john po-eat-past apple]  $\sim >$

$\exists e \exists t \exists y [ y \leq g(\iota \text{apple} ) \ \& \ \exists e' [e' \leq e \ \& \ \text{Eat}(e', j, y) ] ] \ \& \ \tau(e) \subseteq t \ \& \ t < n ]$

The above sentence is true if at least one part of the apple is eaten in some sub-event of eating.

<sup>7</sup> While the translation indicates that there is a determiner “some” on the English NP, and there in fact is some inference of partiality, this is defeasible because (15) can be continued with: “as a matter of fact he ate the entire apple”. This indicates that while po-perfective does not require a maximal eating event, it does not exclude it either. The same can be said about the imperfective. Note that unlike a completive prefix, po-perfective and imperfective specify the relation between parts of event and parts of theme in a rather trivial way because the denotation of a verb like “Eat” already requires that at least one part of x be consumed; the existential quantification over parts of the theme is implicit in the meaning of the verb.

### 3.4 The interaction between po-perfectives and imperfectives with the bare plural.

Next we look at the interaction between imperfectives and po-perfectives with the bare plural.

- (22) a. John po-jel jablok                      b. Dima jel jabloki  
        John po-eat apples-Gen                 Dima eat-imperf apples  
        J ate some apples                         Dima ate apples

Unlike the s-perf, there is no maximality imposed on the bare plural by these aspectual operators. Consider the derivation of (22):

Derivation:

V [eat]  $\sim >$   $\lambda x \lambda z \lambda e$  [ Eat (e, z, x) ]  $\langle e, \langle e \langle st \rangle \rangle$   
 Asp0 [po- ]  $\sim >$   $\lambda P \lambda x \lambda z \lambda e \exists y$  [  $y \leq g(x)$  &  $\exists e'$  [  $e' \leq e$  &  $P(e', z, y)$  ] ]  
 Asp0 [po-eat]  $\sim >$   $\lambda x \lambda z \lambda e \exists y$  [  $y \leq g(x)$  &  $\exists e'$  [  $e' \leq e$  &  $Eat(e', z, y)$  ] ]  
 NP [apples]  $\sim >$   $\cap$ apples  
 Asp' [po-eat apples]  $\sim >$   $\lambda z \lambda e \exists y$  [  $y \leq g(\cap$ apples ) &  $\exists e'$  [  $e' \leq e$  &  $Eat(e', z, y)$  ] ]  
 NP [john]  $\sim >$  j  
 AspP [john po-eat apples]  $\sim >$   $\lambda e \exists y$  [  $y \leq g(\cap$ apples ) &  $\exists e'$  [  $e' \leq e$  &  $Eat(e', j, y)$  ] ]  
 T [past]  $\sim >$   $\lambda P \exists e \exists t$  [  $P(e)$  &  $\tau(e) \subseteq t$  &  $t < n$  ]  
 TP [john po-eat-past apples]  $\sim >$   
         $\exists e \exists t \exists y$  [  $y \leq g(\cap$ apples ) &  $\exists e'$  [  $e' \leq e$  &  $Eat(e', j, y)$  ] ] &  $\tau(e) \subseteq t$  &  $t < n$

DKP:  $\exists e \exists t \exists y \exists w$  [  $\cup$ apples (w) &  $y \leq g(w)$  &  $\exists e'$  [  $e' \leq e$  &  $Eat(e', j, y)$  ] ] &  $\tau(e) \subseteq t$  &  $t < n$

To conclude this section, the maximality requirement is a product of the interpretation of completive prefix that introduces a universal quantifier over parts of the theme and of the interpretation of the bare plural which denotes a kind. When the kind is extensionalized in some s, extension of the kind will contain every member of the kind in some s. Together with the denotation of a completive prefix this will amount to V-ing every part of every apple in s, i.e. to the maximal interpretation of the theme. If the aspectual operators is not completive, then maximality will not arise because only a part of the kind will be V-ed in some event. I now turn to the interaction between aspectual operators and the bare singulars that appear as internal arguments.

## Section 4. Bare Singulars.

### 4.0 Bare singulars: kinds or indefinites.

The question addressed in this section is why doesn't the bare singular show maximality when it appears in the object of the s-perfective verb? In case of the bare plural maximality was derived by assuming that [[  $\cup$ apples ]] in s denotes the maximal plurality of apples in the situation and the s-perfective requires that every part of the maximal plurality be consumed. If we give a uniform treatment to bare nominals – namely that they are kind-denoting – then [[  $\cap$ apple ]] =  $\lambda s$   $\iota$ apple (s) should also return the unique representative of the kind in s. So when the kind [[  $\lambda s$   $\iota$ apple(s) ]] is extensionalized in some s there must be only one apple in s for [[ $\iota$ apple(s) ]] to be defined. We should expect then that s-eat + bare singular entails that there is a unique apple which is completely eaten. However, this is not true. The sentence below is both true and felicitous in a situation where there is more than one apple and only one is eaten.

For example, if we are in a room where there are 5 apples on the table, and Dima eats only one, I can utter the sentence in (23a) and it will adequately describe the scenario:

- (23) a. Dima s'jel jabloko  
Dima s-eat apple

Things are more complex still because the following is not possible:

- b. # Dima s'jel jabloko no ostavil jabloko dlja Mishi  
Dima s-eat apple but left apple for Misha  
Dima ate an apple but left an apple for Misha

So we have a conundrum: on the one hand it is possible to utter (23a) in a situation where there is more than one apple, but on the other hand, the impossibility of b implies that the situation can only contain one apple for the bare singular to be felicitous. The corresponding construction with a NumP is possible:

- c. Dima s'jel odno jabloko no ostavil odno jabloko dlja Mishi  
Dima s-eat one apple but left one apple for Misha  
Dima ate one apple but left one apple for Misha

So, unlike a NumP a bare singular cannot have the reading equivalent to “one of the  $X^8$ ”. To deal with the puzzle that a bare singular seems to both not require uniqueness (19a) and disallow reference to more than one individual (19b), I would like to take a close look at the denotation of the bare singular and the question of situations.

#### 4. 1 Why do we think that bare singulars denote kinds?

Dayal 2002 argues that in languages with bare nominals bare singulars are ambiguous between the kind and the definite readings. She presents a number of arguments in favor of treating bare singulars as kind-denoting. They are based on the fact that like bare plurals, bare singulars can appear in kind-level predicates and take obligatory narrow scope with respect to negation, universal quantifiers and intensional operators. Let's illustrate these facts:

##### I. Bare singulars as arguments of kind-level predicates:

- (24) a. Sobaka – rasprostronennoje zivotnoje  
Dog - common animal  
The Dog is a common animal
- b. Tigr est mjaso / zashchischen zakonom  
Tiger eats meat / protected by law  
The tiger eats meat / is protected by law

---

<sup>8</sup> As noted by M. Bittner, the sentence in (19b) becomes better if instead of “but” we use “and”. While there is some degree of improvement, there is still a contrast between the conjunction using bare singulars and that using DP's with a determiner “one”.

II. Bare singulars cannot take wide scope over negation and universal quantifiers

- (25) a. Kazhdyi student poznakomilsja s izvestoj aktrisoj  $\forall \exists / \# \exists \forall$   
 Every student met-REFL with famous actress-instr.  
 Every student met a famous actress
- b. Dima ne zametil pjatno na polu  $\text{Neg } \exists / \# \exists \text{ Neg}$   
 Dima not noticed stain on floor  
 Dima did not notice a stain on the floor
- c. Dima xochet poznakomitsja s izvestoj aktrisoj  $\text{Want } \exists / \# \exists \text{ Want}$   
 Dima wants meet-pres-REFL with famous actress-instr.  
 Dima wants to meet a famous actress

The above examples indicate that it is not possible for a bare singular to have a wide scope reading with respect to a universal quantifier, negation, and an intensional verb such as “want”. The above sentences do not have the “specific indefinite” readings where there is one  $x$  out of many such that every student met  $x$  and  $x$  is a star; similarly, there no reading in (b) where Dima did not notice one spot out of many that were on the floor. Finally, in (c) there is no reading where there is a certain actress out of 5 and Dima wants to meet her. These facts are noted in Chierchia 1998 and discussed extensively in Dayal 2002 (also previous work). All of the above cases do admit the “definite” reading on which there is a unique and salient individual denoted by the bare singular. In other words, (a) has a reading on which every student met with “the” actress; (b) has a reading on which Dima didn’t see “the” spot on the floor; (c) has a reading on which Dima wants to meet with “the” actress. These facts form the basis for the claim that bare singulars are ambiguous between kind-terms and definites ( Dayal 2002 (as well as previous work)). However, as Dayal 2002 notes, treating bare singulars in the exact same way as bare plurals does not account for the following facts:

- (26) a. # Sobaka byla vezde  $\#$  Sobaki byli vezde  
 Dog was everywhere Dogs were everywhere
- (27) a. # Kot sidel na raznyx stuljax  $\#$  Koty sideli na raznyx stuljax  
 Cat sat on different chairs Cats sat on different chairs  
 A cat sat on different chairs

Additional examples come from the following:

- (28) a. Misha i Dima s-jeli / eli jabloko.  $\#$  Misha ate one and Dima ate one  
 Misha and Dima s-eat/ eat apple  
 Misha and Dima ate up/ ate an apple
- b. Misha i Dima s-jeli / eli jabloki. ok: Misha ate some and Dima ate some  
 Misha and Dima s-eat/ eat apples  
 Misha and Dima ate up/ ate apples

If bare singulars denote kinds, then when the kind-term is transformed into a predicate there should be a reading on which there is a different dog for every place; or a different cat for every chair. In other words, the bare singular should pattern with a bare plural in these cases and allow different instantiations of the kind per chair. Similarly, (28b) has a reading on which the plurality of apples is consumed distributively: Dima ate some apples and Misha ate some. The sentence in (28a), on the other hand, requires that there

be only one apple such that Misha and Dima collectively ate it. There is no distributive reading on which Dima eats an apple and Misha eats one too.

To account for these distinction between singular and plural bare nominals Dayal proposes the following: “kinds are conceptually plural, but number morphology constrains the size of the instantiation set” (Dayal 2002: p. 15) This is represented as follows:

*For all situations  $s$  such that  $\cup K(s) \neq \emptyset$ ,  $|\cup K(s)| = 1$  if  $K$  is a singular term and  $|\cup K(s)| \geq 1$  if  $K$  is a plural term.*

The above imposes a restriction on the instantiation set of the bare singular so that it denotes a singleton set in a situation. The situation index is set at the sentence level and can be changed by locative and temporal adverbials (Dayal 2002 p. 19). For example, the following is possible:

(29) Na etom stule kot sidel, a na tom stule kot lezhal.

On this chair cat sat, and on that chair cat lied.

In contrast, it is not possible to repeat the bare nominal in one sentence without introducing a different location:

(29') # Na etom stule kot sidit i kot lezhit

On this chair cat sits and cat lies

This means that two different bare nominals can have two different situation indexes if a location adverb provides the second index. A quantificational adverb such as “vesde = everywhere,” on the other hand, does not allow for the denotation of the bare nominal to co-vary with locations (Dayal 2002 p. 18).

However, it is still unclear why it is possible to utter the sentence in (19a) “Dima s-eat apple” in a situation where there is more than one apple – there is no adverb that limits the situation such that [[apple]] in  $s$  is a singleton. This problem is addressed below.

#### 4.2 Situation zooming.

**Proposal:** assume following Dayal (2002: 19) that bare nominals are interpreted with respect to a situation index that is set at the sentence level; two bare nominals in the same sentence have the same situation index unless there is an overt time/location adverb that introduces a different index for the second bare singular (Dayal p. 19). Assume further that when we are interpreting a bare singular we can restrict the situation  $s$  to the most minimal situation  $s1 \leq$  (part of)  $s$  such that the denotation of the bare singular is defined in  $s1$ , i.e. there is a unique object denoted by the bare singular in  $s1$ . This is called “zooming”. The uniqueness requirement is satisfied as long as an arbitrarily small space is occupied by a single apple (this is very weak – uniqueness is always satisfied because any location can be arbitrarily small). But, once the bare singular is introduced, the minimal situation  $s1$  in which it is unique is fixed, however small this situation is. If another bare singular of the same kind (e.g. apple) is introduced, it is introduced into  $s1$ , which violates uniqueness – since the bare singular is no longer unique in  $s1 < s$ . Hence (23 b) repeated below is impossible.

(23) b. # Dima s'jel jabloko no ostavil jabloko dlja Mishi

Dima s-eat apple but left apple for Misha

Dima ate an apple but left an apple for Misha

The sentence can be saved by introducing another location for the second bare singular:

(30) Dima s'jel jabloko iz etoi karcziny, no jabloko iz toj karcziny on ostavil Mishe

Dima s-eat apple from this basket, but apple from that basket he left Misha-dat  
 Dima ate an apple from this basket, but the apple from that basket he left to Misha

Here is how it works. When the noun ‘apple’ is introduced, we can zoom in on the most minimal space where the apple is unique. When the second bare singular is used, a different situation  $s' < s$  must be introduced such that the second apple is unique in  $s'$ . If the second location adverb “from that basket” is not present, the sentence is impossible.

One can ask then, what about the bare plural? why doesn't it allow such minimal situations? Why can't we select an arbitrarily small  $s' < s$  such that some subset of apples is unique/maximal in  $s'$  ?

*Building on the suggestion made by Dayal pc<sup>9</sup> the following constraint on zooming is introduced. When interpreting a bare plural in some  $s$  you can zoom to an  $s1$  where  $s1 \leq s$  but only if the denotation of the bare plural in  $s$  is maintained in  $s1$ . Suppose we are interpreting the bare plural “apples” in some situation  $s$ . If  $[[\cap \text{apples}]]$  in  $(s) = a+b+c$ , we cannot zoom in on  $s1 \leq s$  if  $[[\cap \text{apples}]]$  in  $(s1) = a+b$  because we would alter the original denotation of the bare plural. In case of the bare singulars, we were able to zoom in on a smaller situation because zooming on  $s1 < s$  made it possible for  $[[\cap \text{apple}]]$  in  $(s)$  to be defined, but it did not alter the original denotation of the bare singular: the bare singular was undefined in  $s$  and did not have a denotation.*

So when we are interpreting a bare singular, we can zoom in on the situation  $s1 < s$  such that  $s1$  includes just one entity. Doing so will not alter the denotation of the kind term because the kind term is undefined in the bigger situation  $s$ . For the bare plural, on the other hand, we can zoom in on some  $s'$  only if zooming will not change the existing denotation of the bare plural in  $s$ . Consequently, if the sentence with a bare plural is uttered in the living room then all the apples in the living room must be included. (There may still be apples in the store on the corner, or even in the fridge). If a locative adverb introduces a smaller situation that is included in  $s$  -- a basket that is in the living room, -- it can override the initial maximal situation setting and limit the domain of interpretation of the bare plural. It may appear that we fix situations ad hoc – just to accommodate the interpretation of the bare singulars but the same holds for limiting the domain of quantification for universal quantifiers:

- (31) # Dima s'jel vse jabloki no osal'nyje jabloki prodal  
 Dima ate all apples but other apples sold  
 Dima ate up all the apples, but the other apples he sold

The sentence is contradictory in both English and Russian because “all” quantifies over every apple in some  $s$ . However, the situation in which all the apples are eaten can also be shrunk by a location adverb:

- (32) Dima s'jel vse jabloki v etoj karzine no jabloki iz meshka on prodal  
 Dima ate all apples in this basket but apples from bag he sold  
 Dima ate up all the apples in this basket but the apples from the bag he sold

So, like quantified phrases, bare singulars and bare plurals involve an implicit or explicit domain restriction. In case of bare singulars, the situation ( which is the analogue of domain of interpretation) can be as small as needed to make the bare singular unique in it. Once the situation is introduced, (however small it is) any other nominal must also be introduced into this situation.

Let me summarize the argument and the data it aims to account for. The puzzle concerning bare singulars and maximality is the following: a bare singular can be uttered felicitously in some situation  $s$  if

<sup>9</sup> The suggestion made by Dayal pc. was that the cardinality of the realization set of the kind in  $s$  must respect the number feature of the bare nominal. The presuppositions of the number must be satisfied. Here I am building on this further, but the underlying idea is the same.

only one out of 4 apples is eaten in  $s$ . However, it is not possible to continue the sentence below with “but apple threw away” meaning that John ate one apple and another apple he threw away. This presents contradictory conditions: on the one hand the bare singular need not be unique, on the other it has to be since introducing another apple leads to infelicity:

- (33) a. J s'jel jabloko (ok in a situation in which there are 4 apples and only one is eaten)  
 J s-eat apple
- b. # J s'jel jabloko i jabloko vybrosil  
 J s'eat apple i apple threw away  
 J ate an apple and threw away an apple

To explain the seemingly contradictory requirements imposed by bare singulars I build on the proposal made in Dayal that the situation index for a bare nominal is initially fixed at the sentence level and can be manipulated by locative adverbs. I further assume that the situation can be shrunk to a minimally small situation – just enough to include a single apple (it is ok if many more are present around it). Once the situation for the bare singular is set, however small it may be, another nominal that denotes the same kind will be interpreted in this situation. The reason why the bare singular allows for uneaten apples is that the uneaten apples are not in the situation  $s'$  in which the singular is unique. So if we are in  $s =$  the living room where there are 5 apples,  $[[\text{apple}]]$  can refer to the one apple that is unique in the most minimal situation  $s' \leq s$ .  $[[s\text{-eat apple}]]$  is then true at  $s' \leq s$  iff the entire apple at  $s'$  is eaten. The bare plural, unlike the bare singular, does not allow zooming on the most minimal situation when doing so will alter the denotation of the bare singular in  $s$ . This is why  $[[s\text{-eat apples}]]$  when uttered in  $s$  is true only if all 5 apples are eaten. Thus, both the bare singular and the bare plural involve situations with respect to which they have to be unique; the difference is that the singular allows zooming to the most minimal situation, while the bare plural allows zooming only as long as the denotation of the bare plural in the original situation is maintained. In both cases, the situation index can be reset but only with the help of a locative adverb:

- (34) a. Dima s'jel jabloki v komnate, no v kuxne eshche est' jabloki  
 Dima ate apples in room, but in kitchen still are apples  
 Dima ate the apples in the room but in the kitchen there are still apples left.

If there is no location adverb, the sentence will be a contradiction because “apples” are interpreted as the maximal individual in  $s$  where  $s =$  house, not just one room.

- # b. Dima s'jel jabloki, no v kuxne eshche est' jabloki  
 Dima ate apples, but in kitchen still are apples  
 Dima ate the apples but in the kitchen there are still apples left.

The same kind of situation/ domain manipulation is true of quantified NP's such as “every  $x$ ” and definite descriptions in English, which initially assume the maximal domain of quantification (within reason, of course), but the domain can be shrunk:

- (35) # Homer broke every chair, but there is more in the kitchen  
 Homer broke every chair from the living room but there is more in the kitchen
- (36) # Homer hit the boy on the head but he didn't touch the other boy. [ok for some people??]  
 Homer hit the boy in the corner on the head but he didn't touch the other boy.

The way to deal with the bare singular puzzle is to allow zooming on a smaller situation  $s'$  where the denotation of the bare singular is unique. The arbitrarily small situation  $s'$  may be a part of a larger situation  $s$  that contains other instantiations of the bare singular, but that is ok as long as uniqueness is respected in some small situation. Below is the derivation of a bare singular and a completive perfective prefix:

*John s-eat apple*

Asp' [s-eat apple]  $\sim > \lambda z \lambda e \forall y [ y \leq g(\cap \text{apple}) \rightarrow \exists e' [e' \leq e \ \& \ \text{Eat}(e', z, y) ] ]$

NP [john]  $\sim > j$

AspP [john s-eat apple]  $\sim > \lambda e \forall y [ y \leq g(\cap \text{apple}) \rightarrow \exists e' [e' \leq e \ \& \ \text{Eat}(e', j, y) ] ]$

T [past]  $\sim > \lambda P \exists e \exists t [ P(e) \ \& \ \tau(e) \subseteq t \ \& \ t < n ]$

TP [john s-eat-past apple]  $\sim >$

$\exists e \exists t [ \forall y [ y \leq g(\cap \text{apple}) \rightarrow \exists e' [e' \leq e \ \& \ \text{Eat}(e', j, y) ] ] \ \& \ \tau(e) \subseteq t \ \& \ t < n ]$

DKP:  $\exists e \exists t \forall y \exists w [ \cup \cap \text{apple}(w) \ \& \ y \leq g(w) \rightarrow \exists e' [e' \leq e \ \& \ \text{Eat}(e', j, y) ] ] \ \& \ \tau(e) \subseteq t \ \& \ t < n ]$

The above sentence is true in a situation  $s$  iff there is an eating event  $e$  such that for every part  $y$  of  $w$  where  $w$  is in the extension of  $[[\text{apple}]]$  in  $(s)$ , there is an event  $e' < e$  such that  $y$  is the theme of  $e'$ . This means that every part  $y$  of  $w$  in  $s$  must be eaten. If  $s$  includes more than one apple, then zooming applies and  $[[\cap \text{apple}]]$  is evaluated in some  $s' < s$  where there is a unique apple.

## Section 5. Events and Temporality.

### 5.0 Why do we want to distinguish perfectives and imperfectives?

So far my treatment of the imperfective and po-perfective gives the two operators identical semantics. While both interact with the incremental theme in the same way, they are not the same in the way they interact with time and in the way they interact with certain temporal modifiers. For example, imperfectives but not po-perfectives are compatible with the modifier “at different times,” habitual constructions such as “every day”, and duration measure adverbials such as “for an hour”. These distinctions apply to the perfective and imperfective aspectual operators in general. In this section I propose a way to capture a number of differences between perfectives and imperfectives by refining the semantics for the aspectual operators given in Section 3. Below is the data indicating that a distinction between perfectives and imperfectives is called for.

- (37) a. Dima jel jabloki v raznoje vremja (dnja)  
 Dima eat-imp apples at different time (day-gen)  
 Dima ate apples at different times (of day)
- b. #Dima s'jel/ po-jel jabloki v raznoje vremja dnja  
 Dima s-eat /po-eat apples at different time day-gen  
 Dima ate up apples at different time of day.

The sentences in (37) indicate that the perfective unlike the imperfective is impossible with a modifier like “at different times”. Po-perfectives (and other perfectives) also cannot appear with such quantificational adverbials as “every day” as shown in (38):

(38)a. Dima jel jabloki kazhdyi den'  
Dima every day eat-imp apples

b.# Dima kazhdyi den' pojel jablok  
Dima every day po-eat apples

Finally, “for an hour” adverbials are possible only with imperfectives:

(39) a. Dima jel jabloko v techenii chasa  
Dima eat-imp apple in duration hour-gen  
Dima was eating an/the apple for an hour

b.# Dima po-jel jabloko v techenii chasa  
Dima po-eat apple in duration hour-gen  
Dima ate some of an/the apple for an hour

To account for the fact that perfectives pattern differently than imperfectives in the above constructions we have to investigate the second dimension of aspect: the interaction between events and times. In this section I argue that perfectives are atomic events like singular NPs, while imperfectives are non-atomic like plural NPs. The proposal builds on the previous work discussing the parallels between the domain of individuals and the domain of events (Bach 1986, Krifka 1989, 1992, 1998, Filip 1999) where it was claimed (in one form or another) that perfectives are atomic/quantized while imperfectives are cumulative/summative. In the following sections two questions are addressed: (1) How can we show that perfectives are atoms and imperfectives are non-atoms? (2) Even if we do show it, how can the atomic/non-atomic distinction help explain the contrast exhibited by perfectives and imperfectives in the above constructions e.g (37-39)? In the following sections I address each of these questions.

### 5.1 Why should we think that perfectives are atoms and imperfectives as sums?

In his book *Pluralities*, Schwarzschild 1996 presents a number of tests that help distinguish between plurals and singulars. If these tests can be replicated in the event domain, and it can be shown that perfectives pattern with singulars on these tests, we will have our answer to question (1). Consider the following tests.

1) the possibility of having “each of” precede the NP indicates plurality:

- a) Each of the boys ate an apple [ok with plurals]
- b) Each of the boy ate an apple [bad with singulars]
- c) \*The group each left [bad with bunches]

(The singulars are possible with the quantifier “each of” only if something introduces partitivity, e.g. “each part of the apple.” It is unclear why “each” and “every” is possible with singular N’s. I leave this question for further research).

2) The possibility of having “part of” next to the noun indicates that the NP is a singularity:

- a) Part of the car was painted red [ok]
- b) #Part of the cars was painted red [not possible on the intended reading]
- c) Part of the group was eating. [ok with bunches]

3) The possibility of having reciprocals indicates plurality:

- a) The boys like each other
- b) \*The/ a boy likes each other
- c) \*The group/ the committee like/ likes each other. [bunches pattern with singularities]

#### **Fitting these tests to events:**

We can replicate the “each of the” test by using the adverbial “each of the times”.

4) a) Kazhdyi iz razov kogdaVP [ok with imperfectives, but not possible with perfectives]  
each of times when ...

b) Kazhdyi iz razov kogda Dima jel jabloko on ronjal kusok  
Each of times when Dima ate-IMP apple he dropped-IMP piece  
Each one of the times when Dima ate an apple he dropped a piece

c) \*Kazhdyi iz razov kogda Dima s-jel/ po-jel jabloko on ronjal kusok  
Each of times when Dima s-ate/ po-ate apple he dropped-IMP piece  
Each one of the times when Dima ate an apple he dropped a piece

The sentences with perfective eat – regardless of the prefix – are not possible in these constructions. Note that perfectives are possible in when-clauses<sup>10</sup>, but not in quantificational structures such as “each one of the times when”.

5) Adverbial modification with “partly”. The adverbial analogy of “part of” is “partly”. The s-perfective when used with “partly” creates a sense of retraction because the s-perfective requires the entire theme to be eaten and “partly” states that only part of the event has taken place, i.e the theme is not fully V-ed yet. However, the adverb is still possible with the s-perfective. It is also possible with the po-perfective.

a) Dima chastichno po-jel jabloka / s’jel jabloko -acc  
Dima partly po-eat apple-gen / s-eat apple-acc  
Dima partly ate the apple

The imperfectives appearing with “partly” are impossible:

b) ??/#Dima chastichno jel jabloko.  
Dima partly ate-IMP apple  
Dima was partly eating the apple

6) While there is no analogue for reciprocity in the event domain, we can use the notion of distributivity which is indirectly related to reciprocity (Schwarzschild (1996: 168)). Distributivity is possible only with plurals as demonstrated by the following examples:

- a) # The boy was in different rooms [this sentence has only a very gruesome reading]
- b) The boys were in different rooms
- c) ?/ #The group/ the committee was in different rooms [nouns denoting bunches are also odd in this construction]

Consider now the event analogue: “at different times” / “at different time of day” (This example is repeated from the beginning of this section):

---

<sup>10</sup> Kogda Dima s’jel jablko, on ushel  
When Dima s-eat apple, he left  
When Dima ate an apple, he left.

The sentence states that there is a single occurrence of an eating event that is followed by an event of Dima’s leaving. No habituality is involved here. For an extensive discussion of this topic see Bonomi 1995.

- 6') a) Dima jest jabloki v raznoje vremja dnja  
 Dima eats-IMP apples at different time day-gen  
 Dima is eating/ eats apples at different times of day

The perfective counterpart is completely out:

- b) # Dima s'jel/po-jel jabloki /jabloko v raznoje vremja dnja  
 Dima ate-perf apples / apple at different time day-gen  
 Dima ate apples at different times of day

This is true not only of predicates like 'eat', but also of predicates like 'write' and 'read':

- c)# Dima napisal pis'ma/ prochital knigu / po-chital knigu v raznoje vremja dnja  
 Dima perf-wrote letters/ perf-read books/ po-read book in different time day-gen  
 Dima wrote letters /read books/ read a book (for a while) at different times of day.

The above tests suggest strongly that perfective events pattern like singularities while imperfectives pattern like pluralities.

But what does it mean for an event to be singular or plural? **Proposal:** singular events like singular individuals are atomic in that they have m-parts in the sense of Link 1983 and Bach 1986. Each atomic individual has only one i-part - itself. Plural events like plural individuals have more than one i-part (again in the sense of Link 1983). (At this point I remain agnostic about whether atoms are in the denotation of plurals or not. This will be revised later when I present evidence suggesting that plurals do not include atoms into their denotation). So, aspect then does two things:

- (1) it specifies the relation between parts of event and parts of the theme by introducing quantification over parts of the theme (as discussed in Section 3). This relates to the first dimension of aspect
- (2) it specifies the relation that holds between events and their parts: maps events in the denotation of the verb to atomic/ non-atomic events. As will be shown in a moment, the atomic/non-atomic structure of events is related to the way events interact with time-intervals. This is the second dimension of aspect.

Below is the augmented version of Asp:

$$\text{Asp0} [s- ] \sim > \lambda P \lambda x \lambda z \lambda e \forall y [ y \leq g(x) \rightarrow \exists e' [e' \leq (m) e \& P(e', z, y)] ]$$

$$\text{AspP} [\text{john s-eat apple}] \sim > \lambda e \forall y [ y \leq g(\text{apple}) \rightarrow \exists e' [e' \leq (m) e \& \text{Eat}(e', \text{john}, y)] ]$$

The perfective-s operator is a function from the relation denoted by the verb to a relation between a theme, an agent, an event and every part y of the theme such that y is V-ed in some sub-event  $e' < e$  where the  $e'$  and  $e$  are related by an m-part relation<sup>11</sup> (This is a way of encoding the fact that perfective events are atomic since only atoms have m-parts). The same goes for the po-perfective which patterns with the s-perfective with respect to atomicity. So, while po-perfectives and s-perfectives differ with

<sup>11</sup> It is possible to explicitly represent the fact that perfective events are atomic:

$$\lambda e \forall y [ y \leq g(\text{apple}) \rightarrow \exists e' [e' \leq e \& \text{Eat}(e', d, y) \& \text{AT}(e) ] ]$$

Where 'AT' is defined in the sense of Landman:  $\lambda e \text{AT}(e) \text{ iff } \lambda e \neg \exists e1 [e1 \leq (i)e \& e1 \neq e]$

I represent the predicate AT indirectly by stating that perfective events have only m-parts.

respect to their interaction with the theme, they share a crucial feature together – they both denote sets of atomic events.

An imperfective event, on the other hand, is non-atomic; it may be a sum of two or more events. The imperfective events relate to their subevents by an i-part relation:

$$\begin{aligned} Asp0 [imp] &\sim > \lambda P \lambda x \lambda z \lambda e \exists y [ y \leq g(x) \ \& \ \exists e' [e' \leq(i) e \ \& \ P(e', z, y) ] ] \\ AspP [john eat-imp apples] &\sim > \lambda e \exists y [ y \leq g(x) \ \& \ \exists e' [e' \leq(i) e \ \& \ Eat(e', z, y) ] ] \end{aligned}$$

Now, let's see how treating perfectives as atoms and imperfectives as sums helps explain why perfectives are impossible with the modifiers “at different times”, “for an hour”, and “every day” but are possible with “partly”. (And vice versa for the imperfective).

## 5.2 What is the relationship between atomicity/ non-atomicity and the temporal modifiers?

First consider the modifier “at different times”. Let's see why the semantics of this modifier require the imperfective, but not the perfective. Below I repeat the construction I will be concerned with :

- (40) a. Dima jel jabloki v raznoje vramja dnja  
 Dima ate-imp apples at different time day-gen  
 Dima ate apples at different times of day
- b. # Dima s'jel jabloki v raznoje vremja dnja.  
 Dima perf-eat-past apples in different (various) time day-gen  
 Dima ate apples at a different time of day.

The modifier works essentially the same way as the adjective ‘different’ that applies to a plurality (Carlson 1987). The adverbial is a function from a set of events <st> denoted by the AspP to another set of events such that the output set contains events that have at least 2 i-parts with non-overlapping run-times. I represent “at different times” as a single adverbial abstracting away from the fact that it is built from “different” + “times”.

$$at\ different\ times \sim > \lambda P \lambda e \exists e1 \exists e2 [ P(e) \ \& \ e1 \leq(i) e \ \& \ e2 \leq(i) e \ \& \ \tau(e1) \neq \tau(e2) ]$$

As previously, ‘ $\tau$ ’ is the function that maps events to their run times. ‘ $\neq$ ’ indicates non-overlap.

$$AspP [Dima eat- imp apples] \sim > \lambda e \exists y [ y \leq g(apples) \ \& \ \exists e' [e' \leq(i) e \ \& \ Eat(e', d, y) ] ]$$

$$\begin{aligned} Dima\ eat- imp\ apples\ at\ different\ times \sim > \\ \lambda P \lambda e \exists e1 \exists e2 [ P(e) \ \& \ e1 \leq(i) e \ \& \ e2 \leq(i) e \ \& \ \tau(e1) \neq \tau(e2) ] (\lambda e \exists y [ y \leq g(a) \ \& \ \exists e' [e' \leq(i) e \ \& \ Eat(e', d, y) ] ] ) \end{aligned}$$

Lambda conversion yields:

$$\lambda e \exists e1 \exists e2 \exists y [ y \leq g(apples) \ \& \ \exists e' [e' \leq(i) e \ \& \ Eat(e', z, y) ] ] \ \& \ e1 \leq(i) e \ \& \ e2 \leq(i) e \ \& \ \tau(e1) \neq \tau(e2)$$

Tense now applies to this set introducing existential closure over the event variable as well as an interval during which the event takes place.

$$T [past] \sim > \lambda P \exists e \exists t [ P(e) \ \& \ \tau(e) \subseteq t \ \& \ t < n ]$$

TP [dima ate-imp apples at different times] ~ >

$$\exists e \exists t \exists e_1 \exists e_2 \exists y [ y \leq g(\text{apples}) \ \& \ \exists e' [ e' \leq(i) e \ \& \ \text{Eat}(e', z, y) ] ] \ \& \ e_1 \leq(i) e \ \& \ e_2 \leq(i) e \ \& \ \tau(e_1) \neq \tau(e_2) \ \& \ \tau(e) \subseteq t \ \& \ t < n ]$$

The above expression is verified iff there is an event  $e$  at some  $t < n$  such that some part of apples is eaten in one of its sub-events and this event contains at least two  $i$ -parts that have non-overlapping run times.

Now let us see why the perfective is out in this construction (cf 40b).

*Dima s-eat apples* ~ >  $\lambda e \forall y [ y \leq g(\text{apple}) \ --> \exists e' [ e' \leq(m) e \ \& \ \text{Eat}(e', d, y) ] ]$

*Dima s-eat apples at different times* ~ >

$$\lambda P \lambda e \exists e_1 \exists e_2 [ P(e) \ \& \ e_1 \leq(i) e \ \& \ e_2 \leq(i) e \ \& \ \tau(e_1) \neq \tau(e_2) ] (\lambda e \forall y [ y \leq g(\text{apple}) \ --> \exists e' [ e' \leq(m) e \ \& \ \text{Eat}(e', d, y) ] ] )$$

Lambda conversion yields:

$$\lambda e \exists e_1 \exists e_2 \forall y [ y \leq g(\text{apple}) \ --> \exists e' [ e' \leq(m) e \ \& \ \text{Eat}(e', d, y) ] ] \ \& \ [ e_1 \leq(i) e \ \& \ e_2 \leq(i) e \ \& \ \tau(e_1) \neq \tau(e_2) ] ]$$

TP [Dima s-ate apples at different times] ~ >

$$\exists e \exists t \exists e_1 \exists e_2 \forall y [ y \leq g(\text{apple}) \ --> \exists e' [ e' \leq(m) e \ \& \ \text{Eat}(e', d, y) ] ] \ \& \ [ e_1 \leq(i) e \ \& \ e_2 \leq(i) e \ \& \ \tau(e_1) \neq \tau(e_2) ] ] \ \& \ \tau(e) \subseteq t \ \& \ t < n ]$$

Since the set of perfective events contains only atoms, there will be no event  $e$  such that it consists of two distinct  $i$ -parts. The resulting construction will be ill-formed<sup>12</sup>. At this point, I have simply stipulated that “at different times” requires that an event have two distinct  $i$ -parts as opposed to  $m$ -parts. After I consider the denotation of “for an hour” and “every day” I will suggest a possible explanation for this stipulation.

*Why perfectives cannot appear with “for an hour” adverbials ?*

Only imperfectives can appear with the “for an hour” adverbials. Let’s see why this may be so. Below is the semantics of ‘for an hour’:

*for an hour* ~ >  $\lambda P \lambda e \exists t' [ t' = 1hr \ \& \ P(e) \ \& \ \forall t_1 [ t_1 \leq t' \ \text{--->} \exists e_1 [ e_1 \leq(i) e \ \& \ \tau(e_1) \subseteq t_1 ] ] ]$

*AspP [Dima eat- imp apples]* ~ >  $\lambda e \exists y [ y \leq g(\text{apples}) \ \& \ \exists e' [ e' \leq(i) e \ \& \ \text{Eat}(e', d, y) ] ]$

*AspP [dima eat-imp apples for an hour]* ~ >

$$\lambda P \lambda e \exists t' [ t' = 1hr \ \& \ P(e) \ \& \ \forall t_1 [ t_1 \leq t' \ \text{--->} \exists e_1 [ e_1 \leq(i) e \ \& \ \tau(e_1) \subseteq t_1 ] ] ] (\lambda e \exists y [ y \leq g(\text{apples}) \ \& \ \exists e' [ e' \leq(i) e \ \& \ \text{Eat}(e', d, y) ] ] )$$

<sup>12</sup> There is a question why the result is ill-formed as opposed to just false. At this point, I am willing to stipulate that for this expression to be defined we need more than one  $i$ -part. This is reminiscent to the issues involved in determining the cause of the ill-formedness of definite descriptions when there is more than one entity satisfying the description.

Lambda conversion yields:

$$\lambda e \exists t' \exists y [t' = 1hr \ \& \ y \leq g(apples) \ \& \ \exists e' [e' \leq(i) e \ \& \ Eat(e', d, y) ] ] ) \ \& \\ \forall t1 [t1 \leq t' \ \text{---} \rightarrow \exists e1 [e1 \leq(i) e \ \& \ \tau(e1) \subseteq t1 ] ] ]$$

$$T[past] \sim \lambda P \exists e \exists t [ P(e) \ \& \ \tau(e) \subseteq t \ \& \ t < n ]$$

$$TP [dima ate-imp apples for an hour ] \sim \lambda P \exists e \exists t \exists t' \exists y [t' = 1hr \ \& \ y \leq g(apples) \ \& \ \exists e' [e' \leq(i) e \ \& \ Eat(e', d, y) ] ] ) \ \& \\ \forall t1 [t1 \leq t' \ \text{---} \rightarrow \exists e1 [e1 \leq(i) e \ \& \ \tau(e1) \subseteq t1 ] ] ] \ \& \ \tau(e) \subseteq t \ \& \ t < n ]$$

The above is true iff for every t1 sub-interval of an hour there is an event e1, i-part of an event e, such that the run time of e1 is included in t1. Imperfectives are compatible with this kind of a measure adverbial because imperfectives have i-parts and each i-part can be located in a subinterval of an hour. Now let's look at what happens when this adverbial applies to a perfective aspectual phrase:

- (41) #Dima s-jel jabloki na protjazhenii chasa  
 Dima s-eat apples for duration hour-gen  
 Dima ate up the apples for an hour

$$for \ an \ hour \ \sim \lambda P \lambda e \exists t' [t' = 1hr \ \& \ P(e) \ \& \ \forall t1 [t1 \leq t' \ \text{---} \rightarrow \exists e1 [e1 \leq(i) e \ \& \ \tau(e1) \subseteq t1 ] ] ] \\ Dima \ s-eat \ apples \ \sim \lambda e \forall y [y \leq g(apple) \ \text{--} \rightarrow \exists e' [e' \leq(m) e \ \& \ Eat(e', d, y) ] ]$$

$$Dima \ s-eat \ apples \ for \ an \ hour \ \sim \lambda P \lambda e \exists t' [t' = 1hr \ \& \ \forall y [y \leq g(apple) \ \text{--} \rightarrow \exists e' [e' \leq(m) e \ \& \ Eat(e', d, y) ] ] ] \\ \ \& \ \forall t1 [t1 \leq t' \ \text{---} \rightarrow \exists e1 [e1 \leq(i) e \ \& \ \tau(e1) \subseteq t1 ] ] ]$$

Since perfectives are atomic, they only have trivial i-parts. The universal quantifier introduced by the adverbial 'segments' the interval t' = 1hr into more than one sub-interval and requires that an i-part of e be located in each sub-interval. But this is precisely what the perfective cannot provide. Consequently, the perfective is impossible with this adverbial.

*Perfectives and quantificational constructions such as "every day".*

The next construction that is possible with the imperfective, but not with the perfective is the habitual illustrated below:

- (42) John jel / #s-jel jabloki kazhdyi den'  
 john eat-imp / #s-eat apple every day.  
 John ate apples every day

This construction, as the previous two adverbials, also requires that events in the [[AspP]] have more than one i-part:

$$every \ day \ \sim \lambda P \lambda e [ P(e) \ \& \ \forall t [ t = 1 \ day \ \rightarrow \exists e1 [e1 \leq(i) e \ \& \ \tau(e1) \subseteq t ] ] ] \\ AspP [Dima eat- imp apples] \sim \lambda e \exists y [ y \leq g(\cap apples) \ \& \ \exists e' [e' \leq(i) e \ \& \ Eat(e', d, y) ] ]$$

$$AspP [Dima eat-imp apples every day] \sim \lambda e \exists y [ y \leq g(\cap apples) \ \& \ \exists e' [e' \leq(i) e \ \& \ Eat(e', d, y) ] ] \ \& \ \forall t [ t = 1 \ day \ \rightarrow \exists e1 [e1 \leq(i) e \ \& \ \tau(e1) \subseteq t ] ]$$

If an event has only one i-part then the universal quantification will apply trivially. This is essentially the same as what happens with the “for an hour” construction. In fact, the habitual construction such as “Dima eat-imp apples every day” and the progressive construction “Dima eat-imp apples for an hour” are given similar semantics: both involve universal quantification<sup>13</sup>.

Now, I would like to suggest a possible explanation for why the above adverbials require i-parts as opposed to m-parts of an event. In short, I would like to adopt an idea presented in Moltmann 1991 that a measure adverb such as “for an hour” must apply to a homogenous domain – a requirement that would block it from applying to atoms. I then extend the same claim to “every day”. Let us see how the argument goes. Consider first the modifier “for an hour”. Moltmann 1991<sup>14</sup> argues that temporal and spatial measure adverbs such as “for an hour” and “throughout”/ “worldwide” have analogous semantics in that they both involve universal quantification over parts of subintervals or sub-regions. She further claims that these measure adverbs must apply to a homogeneous domain, a domain of subintervals or subregions that is cumulative and divisive<sup>15</sup> (p.638). This is called the Homogeneity Requirement. The requirement is better illustrated with spatial adverbs, so let us consider those first. In particular, let us look at two adverbs ‘everywhere’ and ‘along the road’. They both involve universal quantification over sub-regions, and are therefore analogous to “worldwide” or “throughout”. I would like to use these adverbs because they are clear analogues to the temporal adverbials ‘every day’ and ‘for an hour’ in which I am interested here. For a nominal to satisfy the homogeneity requirement it would have to be a plural or a mass term since both plurals and mass terms are cumulative and divisive. In other words, an i-part of apples is apples and a portion (m-part) of apple cider is apple cider (see Krifka 1989, Bach 1986, inter alia for extensive discussion about cumulativity). Atomic or singular individuals are not homogeneous: an m-part of John is not John. If a spatial measure adverb such as “everywhere” or “along the road” applies to an atomic individual, the individual would have to be ‘homogenized’ for the construction to be defined. This is why these adverbials yield strange readings when applied to atomic individuals:

- (43) a. ?/# John was everywhere.  
 b. ## Bill stood along the road

The sentence in (43a) has only a very gory reading – John has to be ground up into john-parts so that each m-part of john is located in a different sub-region of some location. This massification is needed because as was mentioned above, an m-part of John such as his arm, for example, is not John, but for ‘John is everywhere’ to be true, every sub-region of some location R has to contain *some* John. So, if an

<sup>13</sup> That progressive and habitual have the same semantics is argued in Bonomi 1995. He argues that the progressive and the habitual differ only in the contextual background against which the sentence is evaluated. According to his theory, both readings involve universal quantification over eventualities. The habitual reading obtains when an extended period of time is characterized by the multiple occurrence of some V-ing event, while the progressive is characterized by a local period of time having a series of V-ing events. A given context can then favor one interpretation over the other depending on whether we are considering a large or a small period of time. The analysis I present is different from his in that the universal quantification is over time intervals not eventualities.

<sup>14</sup> Her semantics for an adverbial such as “for two hours” are:  
 $\exists t(\text{two hours}(t) \ \& \ \forall t'(t'P t \ \rightarrow \ \exists e(\text{eat apples}(e, [\text{John}]) \ \& \ \text{at}(e, t') \ \& \ \text{past}(t))))$ .  
 Moltmann’s “at(e, t’)” is equivalent to  $\tau(e) \subseteq t'$ . There is an interval of two hours such that for every part t’ of t there is an eating event. Moltmann’s part relation is a contextually determined relation that holds between an interval and a part of that interval (p. 633). My analysis is different from Moltmann’s in that I allow that for every sub-interval of t there be an i-part of the eating event e.

<sup>15</sup> Moltmann uses the following definitions:  
 Q is Cumulative iff  $\forall xy(Q(x) \ \& \ Q(y) \ \rightarrow \ Q(x \vee y))$ , where ‘ $\vee$ ’ is the least upper bound of x and y (the sum of x and y); Q is divisive iff  $\forall xy(Q(x) \ \& \ y \ \text{part-of } x \ \rightarrow \ Q(y))$

individual is atomic, it is non-homogenous. It has to be re-interpreted to be “stuff” rather than an atom, i.e. “massified” to satisfy the requirement imposed by this adverbial. Note that the sentence in (43b) is completely un-interpretable because in order to stand Bill has to be an ‘integral,’ non-massified individual, whereas the modifier ‘along the road’ requires that he be ”ground-up” into parts.

Turning to events now, let us ask what happens if we apply an adverb like “for an hour” or “every day” to an atomic event? For an atomic event to be located in different sub-intervals of some time interval, it would also have to be re-interpreted as non-atomic, i.e ground into event-mush and\_split into m-parts such that each m-part is in some different time interval. If events behave the same way as individuals, then we would expect that an atomic event should also be able to undergo this kind of ‘grinding’ into homogenous event-stuff where each m-part is given a different temporal trace. However, it appears that creating event-mush from an atomic event is not possible. This restriction can be due to the fact that events are abstract entities. We cannot conceive of event- grinding the way we can of individual- grinding which is, in fact, physically possible. That is, “john s-eat apples every day/for an hour” is not just odd like “John was everywhere” – it is actually impossible. Now, if ‘massifying’ an atomic event is ruled out on conceptual grounds, we can see why “for an hour” and “every day” would require i-parts and not m-parts. This is a consequence of the fact that (a) these adverbials all require a homogenous domain, and (b) the homogeneity requirement can only be satisfied by non-atomic events that have i-part structure defined on them.

Finally, let’s look at the adverb “at different times” which also applies to ‘plural’ events. The semantics of this adverb requires that an event contain at least two sub-events with non-overlapping run-times. In other words, the adverb wants a discontinuous event. If an event is atomic, it would have to be split-up into disjoint subevents. This kind of splitting can be ruled out by an extension of the restriction discussed above: you cannot ‘massify’ atomic events and you also cannot split them into m-parts. A non-atomic event would not require this kind of splitting because it already consists of separable i-parts. This is completely analogous to what happens in the nominal constructions: “# John is in different rooms” vs. “John and Bill are in different rooms”. The first construction is odd because it requires john to be chopped up and placed in different (non-overlapping) locations, while the second construction is fine. For the second sentence to be verified john has to be in the room distinct from the one mary is in. No splitting is needed. Thus, the adverbs ‘at different times’, ‘every day’ and ‘for an hour’ must select plural events denoted by the imperfective because atomic events are incompatible with the requirements these adverbs impose.

Next, I turn to the question why the adverb “partly” is possible with the perfectives but not with the imperfectives. I adopt the same semantics as used in Schwarzschild 1996 for [[part]].

Below are Schwarzschild 1996 semantics for [[part]] :

$$[[part]] = \{ \langle A,B \rangle \in D \times D^* \mid \text{piece}(A) \cap B \neq \emptyset \}$$

**piece** = a contextually specified partial function from D to D\* that gives for every element in its domain the set of parts of that element. John’s arm in some contexts will be a member of piece([[John]]) (Schwarzschild 1996: 163).

The semantics of partly can be based on the semantics of “piece”.

[[Partly]] = function from a set of events to a set of event-m-parts of each event in that set.

partly ([[s-eat apple]]) = set of m-parts of [[s-eat]].

*partly* ~ >  $\lambda P \lambda e M\text{-part}(e, P)$

*john s-eat apple* ~ >  $(\lambda e \forall y [ y \leq \text{apple} \rightarrow \exists e' [ e' < (m) e \ \& \ \text{Eat}(e,j, y) ] ] )$

*partly s-eat* ~ >

$\lambda e'' M\text{-part}[e'', (\lambda e \forall y [ y \leq \text{apple} \rightarrow \exists e' [ e' < (m) e \ \& \ \text{Eat}(e,j, y) ] ] )$

So, since “partly” is defined in terms of m-parts, which plurals do not have, this adverb is not defined on plural events (imperfectives) like “part” is not defined on plurals. At this point, the question of whether plurals include atoms in their denotation becomes relevant. As Roger Schwarzschild points out, if atoms are in the set of imperfective events, then “partly” should be able to apply to the atomic events in the denotation of the imperfective and yield a well-formed construction “John partly eat-imp apples”. But this is not what happens – the imperfective is impossible with this adverbial. At this point I take this as evidence that imperfectives do not contain atoms in their denotation.

Summing up, the aim of this section was to show that while imperfective and po- perfective may pattern together in the way they interact with the theme argument, they should not be given identical semantics because they interact differently with temporal modifiers. Building on the claim made Filip 1999 that perfectives are “integral wholes” and drawing on the parallels between event and nominal domains proposed in Bach 1986, Krifka 1992, 1998 Filip 1999, I have argued that po-perfectives and the s- perfectives are atomic events or singularities in that they relate to their subevents by an m-part relation. Imperfectives are pluralities; they relate to their subevents by an i-part relation. Consequently, imperfectives are possible with a number of temporal modifiers whose semantics require plurality. Perfectives, on the other hand, are precluded from occurring in these constructions.

## *Section 6. Conclusion*

To conclude, let’s restate the questions that were raised and the claims that were advanced. First, I have claimed that completive prefixes induce a maximality requirement on the bare plural – they require that the plurality denoted by the bare plural be completely affected by the verb. So, if the verb in question is “eat” and the object is “apples” “perf-s -eat apples” is true iff there are no apples left. I have claimed that the maximality requirement on the bare plural is a product of the semantics of the completive prefix and that of the bare plural. Crucially, when a completive prefix attaches to a non-bare plural, there can be other apples left uneaten. Similarly, if the verb is marked with a non-completive aspectual operator such as the po-perfective and the imperfective, the theme can also be partially affected by the verb even if the theme is a bare plural. To explain the maximality requirement I have first proposed the semantics of the completive prefix. Building on the idea presented in Filip 1999, I treated a completive prefix such as s- as introducing a universal quantifier over parts of the theme argument. The semantics of this prefix requires that for every part  $y$  of some theme  $x$  there be a sub-event  $e'$  of  $e$  such that  $\text{Verb}(e', j, y)$  holds. This captures one dimension of aspect: the fact that it relates parts of events to parts of themes by introducing quantification over parts of the theme. However, the claim that a completive prefix introduces a universal quantifier over parts of the theme will still not account for the fact that the entire plurality denoted by the bare plural has to be consumed. To explain this we had to also take into consideration the denotation of the bare plural. I have followed the arguments in Carlson 1978, Chierchia 1998, Dayal 2000, 2002 that bare plurals denote kinds. They are functions from situations to the maximal instantiation of the kind in the situation. When the kind is extensionalized, it yields a set containing every member of the kind in  $s$ . When the existential quantifier introduced by the DKP applies, it is placed inside the scope of the universal quantifier introduced by a completive aspectual operator. As a result, every part of some  $x$  where  $x$  is in the extension of  $[[\cup k]]$  is consumed. (Alternatively, the kind can also be transformed into the maximal individual of type  $\langle e \rangle$  that consists of all the members of the kind in  $s$ .) The combination of the universal quantifier introduced by aspect and the meaning of the kind-term yields the maximality requirement. If the verb is marked with a non-completive aspectual operator such as the po- perfective or the imperfective, maximality will not arise. In Section 4 I have addressed the question why bare singulars do not require maximality. Building on Dayal 2002 who treats bare singulars as kind-denoting I have argued that the situation in which the bare singular is unique can be minimally small. So if we are in  $s$  where there are 4 apples, we can zoom in on  $s_1 < s$  where there is only one apple. Consequently, the denotation of the kind is unique (maximal) in  $s_1$  but not in  $s$ . The bare plural also allows zooming but only if the original denotation of the bare plural in  $s$  is maintained in  $s_1$ . Section 5

was dedicated to teasing apart the previously conflated po-perfective and imperfective. While both interact in the same way with the theme argument, they differ in their interaction with temporal adverbials. Building on the second part of the proposal in Filip 1999, I have argued that perfectives are atoms while imperfectives are non-atoms. This distinction explained why perfectives interact with temporal adverbs differently than the imperfectives. Crucially, unlike Filip 1999, I treat the atom/non-atom distinction as orthogonal to the kind of quantification over the theme introduced by aspectual operators. This distinction relates to the second dimension of aspect: the relation between events and temporality.

Clearly, many questions are left un-addressed. For example, I have not provided a way to formally integrate situations into the semantics, I have simply stipulated their existence. I have also not shown how aspect-marked verbs interact with quantified expressions. The status of intransitive verbs has not been discussed at all since the focus of the paper was on verbs with incremental themes. However, intransitives are briefly addressed in End-Note 2. There are also many constructions where the perfective and imperfective differ that I do not consider. One such construction is “V-ed and still V-ing” that can only appear with the imperfective. In other words, only an event denoted by the imperfective can begin in the past and continue through the present. It is unclear whether treating perfectives as atoms and imperfectives as sums would explain why perfectives whose run-time begins prior to the time of utterance cannot extend to the present. More likely, this distinction is due to the fact that perfective events interact with time intervals via a different inclusion relation than imperfectives do: perfectives are included into some time interval *t* while imperfectives overlap with *t*. (Comrie 1976, Kamp and Reyle 1983 inter alia). There are many more important and interesting questions. However, they extend beyond the scope of this paper and are left for future research.

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### **End Note 1.**

To represent the sortal-adjustment we can adopt a version of DKP that does not have existential quantification. Chierchia defines Pred so that the output of Pred is a set of type  $\langle et \rangle$  that has all the members of the kind in  $s$ . But nothing prevents us from introducing a version of Pred that would apply to a kind and return the maximal individual that consists of all the members of the kind in some  $s$ . The new Pred will enable the verb to apply to its argument without the use of the existential quantifier, so the derivation is more economic. The output of the new- Pred will be of type  $\langle e \rangle$  :

$$\text{new-}\cup = \lambda k \langle i, e \rangle t x [x = k(s)].$$

The denotation of the bare plural after the application of our version of Pred is the maximal individual instantiating the kind in  $s$ . The completive prefix, in turn, requires that every part of this individual be consumed. Thus, the maximality requirement is a product of the denotation of the bare plural and the denotation of the completive prefix. The subset reading on which only a part of the plurality is V-ed is ruled out because the bare plural encodes maximality in its denotation and the completive prefix quantifies universally over this maximal plural individual.

**End Note2 Perfective aspect and intransitives**

*It is a fact of Russian that completeive prefixes require transitive verbs. If –s is added to an intransitive verb, the verb is re-interpreted or is simply ill-formed. Crucially, what is not possible is to pro-drop the theme with an s-perfective. For example, we can have (i) but not (ii)*

(i)     *John jel / po-jel*  
          *John eat-imp / po-eat*

(ii)    \**John s-eat*

*This can be explained as follows. Assume that the above verbs involve a pro-dropped theme argument. The aspectual operator then quantifies over this argument. While the imperfective and the po-perfective introduce existential quantification, the s-perf introduces universal. In the absence of an overt theme, this quantification is vacuous. Existential quantification is more “basic” and can work on an implicit argument. A part of the pro-dropped theme can be existentially closed off, but not universally quantified over. Moreover, if the theme is easily recoverable from prior discourse, then s-perf also becomes acceptable:*

(iii)    *Gde jabloki? Ja s’jela.*  
          *Where apples? I s-ate*  
          *Where are the apples? I ate (them)*

*The s-perf is possible when answering a question that refers to apples as in (iii). Clearly, much more needs to be said here.*