SOME NOTES ON THE SYNTAX OF QUANTITY

Hagit Borer
University of Southern California

1. INTRODUCTION

It has been suggested by Verkuyl (1972), (1989), (1999) that the presence of a direct argument with some specific properties (for Verkuyl, op. cit., 'specified quantity of A', [+SQA]) is essential for the derivation of a telic interpretation, an assumption that has proven very influential in subsequent treatment of *aktionsart* (see Platzack, 1979; Tenny, 1987; Dowty, 1991, Krifka, 1992, 1998, among many others). Wishing to abstract away, for the moment, from the debate concerning the properties of the argument in question (and the accuracy of the generalization in general), suppose we put together the broad description in (1), referring to it, without prejudice, as Verkuyl's generalization:

1. **Verkuyl's Generalization:**
   Telic interpretation can only emerge in the context of a direct argument with property α

To illustrate, the direct arguments in (2) are usually assumed to have property α, thereby giving rise to a possible telic interpretation, but not so the direct arguments in (3):

2. a. Kim ate some apples
   b. Pat drank too much beer
   c. Robin read two books
   d. Marcia built a house

3. a. Kim ate apples
   b. Pat drank beer

Although the nature of property α is generally sought within the domain of quantification, its precise characterization is not agreed upon, a matter to which I turn shortly. Suppose we adopt in this context the prevailing view that the telicity-atelicity distinction is to be viewed as equivalent to the semantic distinctions which are attested within the nominal domain, and specifically, to the distinction between quantity nominals and non-quantity nominals (cf. Bach, 1986, Krifka, 1989, 1992). Thus in some sense to be made precise, telic events are *quantities*, while atelic events are not. In turn, if the property *quantity*, however refined, is to be represented within the nominal domain as a specific syntactic node, then a principled approach to the syntax-semantics interface would require that within the domain of events as well, the property *quantity* must be represented as a specific syntactic node. The purpose of this presentation is to elaborate on this parallelism between the nominal domain and the event domain and to pursue its ramifications, with the aim of shedding light on the constituent structure of both nominals and events. To do so, we must commence with a

discussion of the structure of quantity nominals, where the existence of a specific syntactic node devoted to *quantity* is less controversial, although, as we shall see, its properties and its interaction with nominal interpretation is not self evident.

2. QUANTITY IN NOMINALS

Largely due to work by Ritter (1991, 1995) and others, it is now quite accepted that there is, within nominals, a functional projection dedicated specifically to quantity or number interpretation and which we shall call Quantity Phrase (#P). For the nominals in (2), then, a preliminary representation would be as in (4) (the nature and the status of the DP projection in nominals such as those in (4) is set aside for expository purposes):

4. a. ([$_{DP}$) [$_{\#P}$ *some* [$_{NP}$ *apples*]] (])
   b. ([$_{DP}$) [$_{\#P}$ *too much* [$_{NP}$ *beer*]](])
   c. ([$_{DP}$) [$_{\#P}$ *two* [$_{NP}$ *books*]](])
   d. ([$_{DP}$) [$_{\#P}$ *a* [$_{NP}$ *house*]](])

An immediate question which arises with respect to (4) concerns the plural marker *–s* in (4a,c). Usually, the plurality marker is considered a species of Number. Under such an analysis, *-s* (or PL) would be the head of #P, triggering head movement (overtly or covertly) while the quantity expressions in (4a,c) would, presumably, be specifiers. The resulting (hypothesized) structure would be as in (5) (checking derivation assumed for expository purposes):

5. a. ([$_{DP}$) [$_{\#P}$ *some apples* [$_{NP}$ ~~*apples*~~]](])
   b. ([$_{DP}$) [$_{\#P}$ *two books* [$_{NP}$ ~~*books*~~]](])

However, if the *–s* is a Number head, this means that bare plurals, as in (3a), likewise must include a Quantity Phrase, yielding the structure in (6) (presumably, in English, with covert N movement):

6. ([$_{DP}$) [$_{\#P}$ *apples* [$_{NP}$ ~~*apples*~~]] (])

In turn, for the bare mass noun in (3b), there is no prima facie reason to postulate an #P, and the simplest representation for it would be as in (7):

7. ([$_{DP}$) [$_{NP}$ *beer*] (])

A clear difficulty now emerges concerning the syntactic characterization of the notion *quantity*, such that it renders the nominal in (2) *quantity*, but not so the nominal in (3a). Nor can the notion of head vs. specifier be appealed to successfully to give a common syntactic description to (2) and (3a) (i.e., postulating that a nominal is *quantity* in the relevant syntactic sense only if it has a *quantity* specifier), as at least *a*, in *a house* is clearly a head, and not a specifier, and yet *a house* is a *quantity* expression in the required sense. It would thus appear that if structures (6)-(7) are adopted, then the distinction between quantity nominals and non-quantity nominals must be exclusively semantic, rather than syntactic in nature, and specifically, one would have to claim that *two houses,* or *a house* are in some semantically relevant sense *quantity* but *houses* is not, although their syntactic structure is, for all intents and purposes, identical.

The undesirability of lifting the relevant distinction from the realm of the syntax to the realm of the semantics, we note, is couched within a particular view of the syntax-semantics interface, and may not be viewed by some as problematic. However, as we shall see shortly, shifting the distinction to the semantics likewise fails to return correct results. In turn, once the semantic analysis is modified, it becomes possible to return to the syntax, and give a distinct syntactic structure to quantity and non-quantity nominals, thereby rescuing, within this domain, a stricter view of the syntax/semantics interface.

Within join, semi-lattice type of approaches to plurality and mass interpretation (cf. Link, 1983, Bach, 1986, Krifka, 1989, among others), the affinity between bare plurals and mass nouns is blamed on the fact that the interpretation of plurals is vague in the following sense. Suppose the denotation of plurals consists of all or any subsets of singularities, as the diagram in (8) shows:

8.

$$\{a, b, c, d, \ldots\}$$

$$\{a, b, c\} \quad \{a, b, d\} \quad \{b, c, d\} \quad \{a, c, d\} \ldots.$$

$$\underline{\{a, b\} \quad \{a, c\} \quad \{a, d\} \quad \{b, c\} \quad \{b, d\} \quad \{c, d\} \quad \ldots}$$
$$a \quad b \quad c \quad d \ldots. \quad = \text{Atoms}$$

Suppose now that we talk about *circles*. The number of atoms implicated in *circles* remains entirely vague, as it can consist of any of the sets above the atom line in (8). Similarly, for mass nouns, any reference to, e.g., *sand* suffers from similar vagueness, as the actual amount of sand involved is under-determined by the utterance. It is on that level, then, that the commonality of bare mass nouns and bare plurals can be defined so as to account for their similar properties.

There are, however, a number of problems with the join semi-lattice approach to plurality, based as it is on the assumption that plurals are a function from singulars. First, note, the interpretation of the bare plural does not, actually, consist of any subset of (well-defined) singulars. Specifically, if *Kim* ate a portion (potentially of a different size) from a number of apples, although we are justified in saying that she ate apples, the set of elements that she ate does not consist of singular apples, but rather, of apple portions. More devastatingly, consider the following paradigm:

9. 0.2 apples/*apple
   0.1 apples/*apple
   1.5 apples/*apple
   1.0 apples/*apple

10. zero apples/*apple

Zero apples or *0.5 apples* do not presuppose the existence of singulars although they occur with plural marking, and hence are not well-defined sets within the join semi lattice representation in (8).

An additional set of problems, often pointed out in conjunction with telicity, is associated specifically with the quantification in (11b-c).

11. a. Kim ate three apples (in an hour)
    b. Pat built more than three houses (in two months)

c. My kid sister drew some circles (in half an hour)

Although an expression such as *more than three* narrows somewhat the possible interpretation of plurals (e.g., *more than three* cuts off the bottom two, non atomic, lines in (8)) one would be somewhat hard pressed to suggest that this narrowing down suffices to make the vagueness of the plural interpretation disappear, so as to allow for the appropriate contrast to be drawn between the bare plural *apples* and *more than three apples*. Likewise *some*, which, potentially, refers to any of the non-atomic sets in (8), nevertheless triggers a telic interpretation, unlike a bare plural. The problem extends to the domain of mass nouns as well. Specifically, how much is *too much*? How much is *more than enough* (assuming that *much* and *enough* are well-defined quantities in a given context)?[1]

12. a. Kim ate more than enough meat (in an hour)
    b. Pat built most furniture (in two months)
    c. Robin sifted (too) much sand (in half an hour)

Viewed differently, however, note that although expressions such as *more than three circles* or *some circles* do not resolve the vagueness associated with the interpretation of bare plurals, they do have an interpretation which is radically different from that of bare plurals. If Kim drew more than three circles, then there are at least three individual circles such that Kim drew them. The truth conditions of *more than three circles* could not, in fact, be computed without assuming individual circles. Likewise, if *Kim drew some circles*, then there are at least two individual circles such that Kim drew them, and the sentence cannot be true if there is only an assortment of incomplete arches on the page, a situation which would render *drew circles (for an hour*) true. In each case, the computation of the meaning does appear to be presupposing individuals, in a way which the interpretation of bare plurals does not. We submit, then, that individuals cannot be created by the plural inflection and the plurality marker does not imply the existence of a set of singulars. Thus, the plural inflection can occur without such individuals. In turn, individuals within a plural set emerge as a result of the presence of a quantity expression distinct from the plurality marker.

But if this is the case, then perhaps there is much to be gained from assuming that plurality markers are **not** quantity heads, but rather, fulfill a different function in the grammar. I have argued elsewhere that plural markers are, in actuality, classifiers, and that like other classifiers, their main function is divisional. I will set aside the detailed argumentation for that position, noting only the following paradigm, from Armenian (pointed out to me by M. Siegler):

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[1] Krifka (1998), in attempting to address these problems, proposes that quantifiers such as *more than three* or *some* scope outside the domain of the time-measure phrase *in x-time*, thereby giving rise to an interpretation of a fixed amount (and see Schein, 2002, for a similar assumption reached from a different perspective). There are, however, a number of problems with this assumption. See, specifically, Borer (to appear) as well as Zucchi and White (2001) for some discussion.

13. a. Numeral, no classifier, no plural
yergu hovanoc uni-m
two umbrellahave-1s
'I have two umbrellas'
'I have two umbrellas'

b. Numeral, classifier, no plural
yergu had hovanoc uni-m
two CL umbrella have-1s
'I have two umbrellas'

c. Numeral, no classifier, plural
yergu hovanoc-ner unim
two umbrella-pl have-1s
'I have two umbrellas'

d. *Numeral, classifier, plural
**yergu had hovanoc-ner unim*
two CL umbrella-pl have-1s
'I have two umbrellas'

Setting aside here the case in (13a), in which a numeral can occur without either a classifier or plural marking (and likewise, the complementary distribution of numerals and plural markers in Hungarian and in Turkish), and focusing on (13b-d), we note the complementary distribution of numerals and classifiers, which may never occur together. Similar situation is attested in Chinese, if we follow Li (1998) in assuming that *–men* in Chinese is a plurality marker (and see also Li and Thompson, 1981), noting specifically that it never co-occurs with a classifier. An explanation for this complementary distribution as well as the non-quantity properties of the plural marker in a language such as English follow directly if we assume that so-called plural inflection in actuality reflects the presence of a classifier phrase, and not that of an #P. That classifier fulfils a divisional function, rather than a quantity function.

Consider now a specific execution of the creation of individuals by the counting function. According to this execution, all noun denotations are mass. More specifically, we may assume that a mass denotation emerges whenever a noun denotation is not **grammatically** otherwise specified (which is to say, whenever it fails to be associated with some non-mass functional structure). The divisional function (associated with the classifier, or more accurately, a divisional head) involves the superimposition, on a mass denotation, of an infinite set of webs, or *reticules* (including, potentially, a reticule without any divisions, reticules without complete cells, or reticules which create cells that do not correspond to a canonical singular). The function of #P, on the other hand, is that of assigning quantity, or in the presence of a divisional structure, that of counting. More specifically, it involves the selection, among the reticules, of one which matches the properties of the specific #-determiner.[2] For e.g., a cardinal such as *three*, it involves the selection of a reticule with three cells, to which a uniform extension, presumably that associated with the conceptual meaning of the relevant N, can be applied. For *zero*, on the other hand, it will involve the selection of a reticule without any (completed) cells. For *more than three*, all reticules which include at least three complete cells will be selected, etc. For *0.5*, a reticule will

[2] With special thanks to Barry Schein (p.c.) for suggesting this specific execution.

be selected which involves a portion of the mass which does not correspond to a canonical singular. Of special interest is *some* when it occurs with a divisional structure (i.e., with plural inflection), where, I suggest, the # function will be equivalent to that of any unspecified number bigger than one. *Some*, then, could choose any (or all) reticules in which there are at least two cell divisions, thereby giving rise to some unspecified number of individuals, but individuals nevertheless.

Interestingly, in Romance languages, in which bare plurals exist alongside plurals with indefinite (plural) articles, we find the contrast in (14):

14. a. Juana comió manzanas (*en media hora/durante media hora)
Juana ate apples (*in half an hour/for half an hour)
b. Juana comió unas manzanas (en media hora/?durante media hora)
Juana ate ART.PL apples (in half an hour/?for half an hour)

We note that there is no sense in which the quantity of *manzanas* 'apples' in (14a) could possibly be assumed to be less well defined from that in (14b). The difference between (14a) and (14b), we submit, is in the function of the plural indefinite article. It is, we propose, a counter, although its cardinality remains undetermined, and as such, it performs a similar function to that of *some* or *several*. Syntactically, it licenses #P. Semantically, it selects those reticules in which there are at least two cell divisions, thereby giving rise, just like *some*, to an unspecified number of individuals, but individuals nevertheless.

We conclude that from a purely semantic perspective, plurality must be treated as different from quantity, thereby enabling us not only to resolve the problems for the semantic description of quantity, but also to resurrect the syntactic distinction between bare nouns, be they mass or plural, and quantity nominals. Specifically, the syntactic generalization is that whenever #P is assigned some value, telicity may be licensed by the emerging nominal. The structures in (6)-(7) must be rejected, then, and an alternative proposed structure for the nominals in (2)-(3) should thus be as in (15). We may now state the property *quantity* in syntactic (as well as semantic) terms, as that which involves the projection of #P:

15. a. ([$_{DP}$) [$_{\#P}$ *some* [$_{CLP}$ *apples* [$_{NP}$ ~~*apples*~~]](])
b. ([$_{DP}$) [$_{\#P}$ *two* [$_{CLP}$ *books* [$_{NP}$ ~~*books*~~]](])
c. ([$_{DP}$) [$_{CLP}$ *apples* [$_{NP}$ ~~*apples*~~]](])
d. ([$_{DP}$) [$_{NP}$ *beer*](])
e. ([$_{DP}$) [$_{\#P}$ *some* [$_{NP}$ ~~*beer*~~]](])

3. THE INTERPRETATION OF QUANTITY

We must now as why the existence of individuals within, e.g. *some apples*, as formed by the #P function, should give rise to telicity, while *apples*, which lacks such individuals within its denotation, should fail to do so. To see what effect the 'formation of individuals' may have, it might be worth while to consider some of the formal treatments of nominals and telicity, reviewing some of their merits and de-merits. Such a review in fact indicates that the claim that *apples* does not consist of singular *apples*, but *more than three apples* does, can resolve a number of rather tenacious problems for the interaction between telicity and nominal structure. Consider, again, the determiners in (11), which give rise to (optional) telicity, when compared with the absence of

telicity in (3). Krifka (1989, 1992, 1998), in attempting to characterize the class of nominals which give rise to a telic interpretation, proposes that such nominals must be *quantized*. *Quantized*, in turn, contrasts with *cumulative*, a property which is attributed to bare plurals and bare mass nouns, and which gives rise to atelicity. The definitions are given in (16):

16. a. **Cumulative** (Krifka, 1998)
X is *cumulative* iff there exist *y*, *x* with the property *X* (and *x* distinct from *y*) such that for all *x* and *y*, if *x*,*y* have the property *X*, then *X* is a property of the sum of *x* and *y*
$(\forall X \subseteq U_P[CUM_P(X) \leftrightarrow \exists x,y[X(x) \wedge X(y) \wedge \neg x=y] \wedge \forall x,y[X(x) \wedge X(y) \rightarrow X(x \oplus y)]])$
b. **Quantized** (Krifka, 1998)
X is *quantized* iff for all *x*,*y* with the property *X*, *y* is not a proper part of *x*
$(\forall X \subseteq U_P[QUA_P(X) \leftrightarrow \forall x,y[X(x) \wedge X(y) \rightarrow \neg y <_P x]])$

Bare plurals and bare mass nouns are clearly cumulative in the required sense (*apples* plus *apples* gives *apples*; *meat* plus *meat* gives *meat*), as well as non-quantized, given the fact that it is certainly not the case that all subparts of meat are not meat, or that all subparts of apples are not apples. Likewise, cardinals are clearly quantized, in that no part of *three apples* is *three apples*, etc. As often observed, however, *some* as well as *more than three* both trigger telicity, although by the definitions in (16) they are cumulative, rather than quantized.

A somewhat different approach is put forth in Kiparsky, (1998). Kiparsky suggests that the key notion for the emergence of quantity interpretation (*boundedness*, in his terms) involves the notions *divisiveness*, *cumulativity* and *diversity*, as defined in (17):[3]

17. a. P is *divisive* if and only if for all *x* with property P, where *x* is non-atomic, there is a *y*, proper subset of *x* with the property P
$(P \text{ is divisive iff } \forall x\,[P(x) \wedge \neg atom(x) \rightarrow \exists y[y \subset x \wedge P(y)]])$
b. P is *cumulative* if and only iff for all *x* with property P, where *x* is not the maximal element with property P, there is a *y*, proper superset of *x* with the property P
$(P \text{ is cumulative iff } \forall x\,[P(x) \wedge \neg sup(x,P) \rightarrow \exists (y)(x \subset y \wedge P(y))])$
c. P is *diverse* if and only iff for all *x* with the property P and all *y* with the property P, and *x* distinct from *y*, *x* is not a proper subset of *y* and *y* is not a proper subset of *x*
$(P \text{ is diverse iff } \forall x \forall y[P(x) \wedge P(y) \wedge x \neq y \rightarrow \neg x \subset y \wedge \neg y \subset x])$

18. A predicate P is *unbounded* (-B) iff it is divisive and cumulative and not diverse

Cumulative reference requires, in essence, every proper superset of *x* within the denotation of P to be within the denotation of P. Divisive reference requires, in

[3] Kiparsky's notion *divisive reference*, as relevant for the definition of homogeneity and quantity should not be confused with the notion of *divisional* of *divided* put here in connection with plural marking. Thus by assumption bare plurals are both divided and divisive, but bare mass expressions are divisive, but not divided.

essence, the existence of some subset of *x* within the denotation of P to be within the denotation of P.

In turn, if *bounded* is true of any predicate which is not *unbounded*, then in order for a *bounded* reading to emerge either *divisive* reference or *cumulative* reference must fail (or alternatively, the predicate must be *diverse*).

The crucial contribution of Kiparsky's approach, which I will adopt below, is to set up conditions for the failure of non-quantity, so to speak, rather than setting up conditions for the failure of quantity. As such, it provides a solution for at least one class of cases which are a problem for Krifka's *quantization* approach, namely, cases such as *at least three apples*. Specifically, *at least three apples* is cumulative, but it is not divisive (i.e., there need not be a proper subset of *at least three* which is *at least three*), and hence is correctly predicted to give rise to telicity (or boundedness). We note however that for the bulk of the cases which are problematic for Krifka, the definitions in (17)-(18) do not provide a solution. Specifically, *some apples, several apples, many apples* etc. continue to be *unbounded*, as they are both cumulative and divisive (and non-diverse).

A few more comments are in order here concerning cases such as *more than three apples*, *several apples*, *some apples* and similar examples. For Krifka, they were cumulative, and in fact, non-quantized, as it is certainly not the case that every proper subset of *more than three apples* must be distinct from *more than three apples*. For Kiparsky's definition they continue to be cumulative, of course. Are they divisive, however? Let us consider more carefully the possible divisive properties of, e.g., *more than three apples*. If the set under consideration involves five or more apples, *more than three* is clearly divisive, as by definition, any set which is five or more has a subset, i.e., *four apples*, which is *more than three*, thereby passing the divisiveness test. What, however, of a set of four apples? Here, divisiveness fails (thereby making the entire *more than three* predicate non-divisive, as required), but only if we consider whole apples, exclusively. As a set of whole four apples does not have a subset which is *more than whole three apples*, it is non-divisive. If portions of apples are considered, on the other hand, than a set of four apples is divisive, with respect to *more than three apples*, as is any quantity of apples between three and four, under infinite division. A similar rationale applies to *several apples* and *some apples*, where, arguably, a set of two apples is not divisive as it has no subparts which are several or some *whole* apples.

One could propose, at this point, that only whole singular apples count, referring specifically to the denotation of plurals as sets of singulars. Under such an interpretation, note, *more than three apples* as well as *several apples* and *some apples* would become non-divisive, and hence bounded, as required, thereby solving the problem. However, the solution here is only apparent. Thus consider *apples*, under a scenario that includes two apples. If plural refers exclusively to sets of whole singulars, then *apples*, when referring to two apples, does not have any sub-parts which are *apples*, and we predict, erroneously, that *apples* is non-divisive. If, on the other hand, non-whole parts of apples do count, *apples* will be divisive, correctly, but so would *more than three apples*, *some apples* and *several apples* erroneously. It thus appears that even if something like the definitions in (17) could be made to work, there must be a distinction drawn, in principle, between the sort of plurality that is referred to by expressions such as *more than three apples*, and which seems to apply to sets of singulars, and the sort of plurality that is referred to by expressions such as *apples*, in

short, precisely the distinction we already suggested must exist, making *more than three apples* a true case of sets of singulars, but not so *apples*.

Seeking, however, to address specifically the cases which are resolved neither by Krifka's definition nor by that put forth by Kiparsky (1998), suppose we adopt a slightly modified definition of *homogeneity* as proposed in Kiparsky (1996) but abandoned in Kiparsky (1998), and which is based, specifically, on (a slightly modified) definition of *divisiveness* originally proposed in Krifka (1992):

19. a. *quantity:*
P is *quantity* iff P is not *homogenous*
b. *P* is *homogeneous* iff P is *cumulative* and *divisive*
i. *P* is *divisive* iff for all *x* with property *P* there is a *y*, proper subset of *x*, with property *P*, such that subtracting *y* from *x* yields a set with the property *P*.
P is divisive iff $\forall x\,[P(x) \rightarrow \exists y\,(P(y) \wedge y<x)] \wedge \forall x,y\,[P(x) \wedge P(y) \wedge y < x \rightarrow P(x\text{-}y)]$
ii. *P is cumulative iff* $\forall x\,[P(x) \wedge P(y) \rightarrow P(xUy)]$

We note now that divisive reference for bare plurals such as *apples* is met if we assume that singular atoms are not part of the denotation of (bare) plurals. On the other hand, if singular atoms **are** parts of the denotation of *more than three apples* as well as *some apples*, then *more than three apples* and *some apples* are non-divisive, and hence non-homogenous, as required.

An important empirical consequence now emerges from replacing Krifka's *quantization* notion with that of *quantity* as defined here. Specifically, a reference emerges as *quantity* even if *cumulative*, but *non-divisive*, e.g., *more than three apples*, which is *quantity* by the definition in (19), as it is *non-divisive* (subtracting *more than three apples* from *more than three apples* need not give rise to *more than three apples*). The distinction between the definitions rests here in the requirement placed by *quantization* that every subpart of a *quantized* P be not P. In contrast, *non-divisive* reference, as defined in (19) may emerge even though there may be some parts of P which are P. Thus the fact that *more than three apples* when subtracted from *more than three apples* may, but need not give rise to *more than three apples* suffices to make it a quantity.

I return to the relevance of these definitions within the domain of events shortly. Summarizing their applicability within the nominal domain, we reiterate that the interpretation of the plural does imply division, from which the possible existence of discreet portions does derive. However, the size, the nature, and the number of these portions, indeed, their existence, remains entirely open ended, as the division process is entirely open ended (and note in this context that many speakers accept a singular reading for *apples* in contexts such as *I ate apples*). In turn, counters (such as *three, every, one*) clearly may only operate on uniform sets.[4] I will assume that at this point

[4] Quite trivially, one cannot walk into a room, count every man-made object in sight, and conclude the counting by saying something like, "there are 11 chairs, tables, pictures, forks, and books in this room". Rather, a counter by definition establishes a homogenous set to count. Of course, that homogenous set may consist of chairs, tables, pictures, forks, and books, but in that case, it would be "11 man-made objects" that have been counted, finding an extension that could, in fact, include all these items. A similar point is made in

world-knowledge takes over in defining what is, in fact, a canonical portion for a given denotation, defined as it is on the basis of the salient properties of the relevant concept. We might note here, as elsewhere, that world-knowledge can be over-ridden. Thus although the uniformity of the counted set is required by the grammar, what counts as an object of a particular type in a particular context is subject to much flexibility. Thus, for instance, if Kim bought three apples, we are much inclined to assume that each of these apples was a whole one. In turn, if there are three apples in the salad, not only are we not committed to the shape of these apples, we are not even committed to the claim that the quantity of apples in the salad, which is equivalent to three apples, has ever constituted three discreet apples. And finally, if I tell Kim to throw some three apples away, it is entirely possible that Kim made a noble effort to eat those apples, bit into each of them in turn, consumed, perhaps, most of one but only a little or none of the others, and now remnants of the three apples are sitting on the living room table, ready to be thrown away. Likewise, characterizing a three year old's *three drawn circles* will almost certainly refer to objects which are vastly distinct from those characterized by the three circles drawn by a geometry student. The former, note, not only need not be truly round, but need not be complete, with the objects in (20) clearly qualifying as *circles* in that context:

20. 

To conclude, the existence of (grammatical) individuals within a plural denotation, it appears, comes about through the mediation of counters, in turn projected, in our system, in #P and assigning value to it. Plurality, in English, is not a function from individuals, but rather, a divider. As such, it takes as its input 'stuff' and returns divided stuff. These divisions of stuff may be of varying size, and may or may not correspond to canonical divisions, as observed in the world or as represented in our conceptual system. Indeed, they may return a null set. In turn, telicity emerges, for 'plurals', in the context of a counter, and is absent in the absence of a counter.

And what of mass nouns? The very same explanation is immediately available when we consider the contrast between (3b) and (12). Note that an account which is based on the inherent vagueness of quantities associated with something like *meat* or *sand* in (3b) fail directly when the equally inherent vagueness of quantities such as *more than two pounds*, or *too much* are considered. Even if we grant that quantities associated with *two pounds* or *much* are, presumably, well-defined, how much is *more than two pounds*? How much is *too much*?

Viewed differently, however, *much*, as well as *too much* are quantity expressions, projecting in #P and assigning value to it. As in the case of *more than three*, the interpretation of *too much* must start from the computation of *much*, a well-defined quantity (in a particular context), just like the interpretation of *more than two pounds* must take as its starting point the well-defined quantity *two pounds*. It is precisely the existence of this well-defined quantity, whether a singularity or a fixed mass, which is characterizable, in our system, by the #P projection, and it is this property, we argue,

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Muromatsu (1998), who further quotes, in this context, from Frege (1950), stating that "we only think of things in terms of number after they have first been reduced to a common genus".

which is relevant for the emergence of a telic interpretation.[5] The relevant structure of quantity mass expressions would thus be as in (21):[6]

21. ([$_{DP}$] [$_{\#P}$ *much* [$_{NP}$ *salt*]](])

4. QUANTITY IN EVENT STRUCTURE

Before we turn to the nature of quantity in events, it might be worthwhile to summarize some of our conclusions concerning quantity in nominals, such that we expect them to be attested in event structure, if, indeed, the parallelism between nominal structure and event structure is to be upheld.

22. a. (Semantic) quantity is mediated through dedicated syntactic (functional) structure
    b. If the notion of *quantity*, as put forth in (19) is the correct one, we expect it to be the one used in interpreting event structure as well, in preference to other notions, e.g., that of Krifka's or Kiparsky's.

Turning to the first issue, a syntactic structure dedicated specifically to telicity has been proposed quite extensively in the literature, at times identified with AgrO (cf. van Hout, 1992, 1996, Borer, 1994, 1998, Ritter and Rosen, 1998, Schmitt, 1996 among quite a few others). It would thus be a natural extension of the system put forth here thus far to assume that this is, indeed, the node which is dedicated to the assignment of

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[5] An unresolved issue does remain, however, concerning mass expressions quantified by *some*, or *a quantity of*, which, by the definitions given thus far, remain homogenous. I set this matter aside here, in the hope that a further refinement of a reticule-based system could account for these cases. For a recent relevant discussion, see Zucchi and White (2001).

[6] The reader will no doubt note at this point that a number of important issues remain open, especially concerning the structure and the interpretation of singulars. At a first approximation, these issues include the following (as before, issues concerning the projection of DP and its licensing are set aside):

i. A List of Open Issues:
   a. Is there a #P in (iia-c), and if there is, how is it assigned value (and note in this context that definite descriptions act as *quantity* expressions in potentially inducing telicity)?
   b. How does a singular reading emerge in (iia), and what assigns value to CLP, so as to distinguish it from a mass noun?
   c. How does a singular reading emerge in (iii), or more specifically, what assigns value to CLP, so as to distinguish (iii) from a mass noun?

ii. a. the cat
    b. the cats
    c. the salt

iii. a cat

These matters are treated in great detail in Borer (to appear), where I argue that the definite article does originate in #P for (iib-c), where it inherits its quantity value from the quantity of the discourse antecedent of the definite description. As concerning the singular interpretation, I argue that for singulars, the dividing function, by assumption in CLP, and the #P functions are identified, resulting in *the* and *a*, respectively, assigning value to both CLP and #P. The resulting structure, not argued for in detail here, are as follows:

iv. a. [$_{DP}$ *the* [$_{\#P=CLP}$ ~~*the*~~ [$_{CLP=\#P}$ ~~*the*~~ [$_{NP}$ *cat*]]]]
    b. [$_{DP}$ *the* [$_{\#P}$ ~~*the*~~ [$_{CLP}$ *cat-s* [$_{NP}$ ~~*cat*~~]]]]
    c. [$_{DP}$ *the* [$_{\#P}$ ~~*the*~~ [$_{NP}$ *salt*]]]
    d. [$_{DP}$ [$_{\#P=CLP}$ *a* [$_{CLP=\#P}$ ~~*a*~~ [$_{NP}$ *cat*]]]]

quantity within the event domain. Let us then label this node accordingly, calling it Asp_Q, Q for quantity. We note now that in a language such as English, Asp_Q is (typically) not assigned value directly, in the absence of any overt quantificational markers for events. Following the specific execution in Benua and Borer (1996) (and see also Schmitt, 1996), we may assume that the quantity value of the nominal expression in [Spec, ASP_Q] transfers to that of the head ASP_Q, through specifier - head agreement. In other words, the phrase marker in (23) is interpreted as a (part of) a quantity event, because ASP_Q is *quantity*. ASP_Q is *quantity*, in turn, because the nominal in its specifier is *quantity*, having (one of) the structure in (15a-b) or (21) (verb movement set aside for expository purposes):

23. $[_{ASPQ}$ [*too much salt*] ASP_Q $[_{VP}$ *ate*]]

Viewed differently, it is precisely the absence of direct marking for ASP_Q in a language such as English which renders the direct object in quantity events obligatory. As ASP_Q cannot be marked directly, the presence of a quantity nominal in [Spec,ASP_Q] is arguably the only way to give rise to a quantity event, thereby deriving Verkuyl's generalization.

That values otherwise associated with DPs may be translated to events or predicates in general is not a new observation or a new idea. Thus consider the sentences in

24. a. John's hat
    b. a boy's hat

25. 4000 ships passed through the lock

In (24), as is well known, the expressions *John's hat* and *a boy's hat* must be definite or indefinite, respectively, copying, it would appear, the definiteness value that is associated with the possessor. We note that there is no semantic reason for a nominal expression to inherit such (in)definiteness value from a possessor, and that if the possessor is post nominal, no such effects are in evidence:

26. a. a hat of John's
    b. the hat of a boy

Rather, it is precisely the syntactic position of the possessor, presumably as specifier of DP, that results in the transfer of its properties to that of the DP in general, lending itself quite naturally to an explanation in terms of specifier – head agreement, with the relevant structure as in (27) (irrelevant details omitted):

27. a. $[_{DP}$ [*John's* $]_{def}$ D_{def} … $[_{NP}$ *hat*]]
    b. $[_{DP}$ [*a boy's* $]_{indef}$ D_{indef}… $[_{NP}$ *hat*]]

As for (25), a much discussed case (see, in particular, Krifka, 1990, Doetjes and Hancoop, 1997, among others), it is well known that it is ambiguous, with the cardinal *4000* referring either to individual ships, or alternatively, to events of lock-passing. It is in this latter case that there are good grounds for the claim that the numeral associated with the DP transfers its properties to some event node, again, arguably, through

specifier – head agreement.[7] That a similar effect on the quantity interpretation of an event should come about through the quantity properties of a DP is neither problematic nor surprising.

Consider now the Slavic languages, where quantity on ASP_Q is directly marked, through quantificational prefixes (see Filip, 1996, 2000 for much discussion). We expect two results here. First, through specifier – head agreement, we expect it to be possible for the quantity specification on ASP_Q to be shared by the nominal in its specifier. That this is indeed the case has been shown by Filip (1992, 1993, 1996, 2000), and an account in terms of specifier – head agreement for this is put forth in Benua and Borer (1996) as well as in Schmitt (1996). Thus consider (28) (Czech):

28. *Petr* ***na****-pekl* *housky*
Petr NA-baked rolls.pl.acc
'Peter baked a lot of rolls/a batch of rolls'

Czech, like most Slavic languages, has neither definite nor indefinite articles. In the context of the bare noun in (28), the prefix *na* accomplishes a double role: first, it gives rise to a quantity-telic interpretation, and second, it binds a variable in the nominal argumental object. The binding of the direct object, in turn, results in the interpretation 'a lot', or 'a batch of'. It might be worthwhile to note that the function of *na* here goes beyond that which is involved in assigning quantity to ASP_Q and deriving quantity-telicity, in that quantity assignment to ASP_Q, in general, need not be associated specifically with 'a lot of' objects, in this case, rolls. Nor is an interpretation which restricts the scope of *na* to the verb appropriate. One can do a lot of baking, and the event could be neither telic, nor give rise to a lot of rolls. Further, a telic event of prolonged baking need not give rise to multiple rolls. And finally, restricting the scope of *na* to the direct object would not do either. As is often noted, quantity direct objects do not necessarily trigger telicity, and an atelic event of baking a lot of rolls is a perfectly coherent one, and would have the direct object marked overtly as partitive in a language such as Finnish. We must then conclude with Filip (op. cit.) that the interpretation associated with (28) must involve the execution, by *na*, of the double duty of making the event as quantity, and assigning quantity to the DP.

Alongside *na* we find the prefix *u*, meaning, typically, 'all (the-)'. Not surprisingly, *u* as well accomplishes the double role of giving rise to quantity-telicity within the event domain, alongside a quantity interpretation for the nominal:

29. *Petr* ***u****-pekl* *housky*
Petr U-baked.3.sg rolls.pl.acc
'Peter baked all the rolls'

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[7] A detailed execution is set aside here as it is largely orthogonal to the main focus of this discussion. We note, however, that in line with the discussion in the text, the event reading of the cardinal, the DP *4000 ships* must be at least at some point of the derivation in the specifier of some node that is associated with the event, say EP, as schematized in (i):

i. $[_{EP}$ 400 ships $[_{E}$ E ….

We set aside, however, the exact position of EP in the syntactic tree. For some discussion, see Borer (to appear).

The incorporation of Filip's analysis into the syntactic structures proposed here is entirely straightforward, where <***na***> and <***u***> assign quantity value to ASP_Q as well as to the DP in [Spec,ASP_Q], the latter through specifier – head agreement (irrelevant details are glossed over in (30)):

30. a. *Petr* [$_{TP}$ *napekl* [$_{ASPQ}$ [$_{DP}$ [$_{\#P}$ e^{na} [$_{NP}$*housky*]]] [$_{ASPQ}$ ***na-*** ~~***pekl***~~ [$_{VP}$ ~~***pekl***~~]]]

b. *Petr* [$_{TP}$ *upekl* [$_{ASPQ}$ [$_{DP}$ [$_{\#P}$ e^{u} [$_{NP}$*housky*]]] [$_{ASPQ}$ ***u-*** ~~***pekl***~~ [$_{VP}$ ~~***pekl***~~]]]

Traditionally, the verbal forms in both (28) and (29) as classified as *perfective*. Morphologically, they consist of the bare verbal stem, otherwise interpreted as non-culminating, and the prefixes *na* and *u* respectively. Filip (op. cit.) extends her analysis of the prefixes *na* and *u* to the analysis of the perfective paradigm in general, even in the absence of any clear quantificational interpretation that may be associated with perfective prefixes, or at times, in the absence of such an (overt) prefix altogether. Specifically, she suggests that the meaning of the perfective includes a (covert) *totality* operator. The *totality* operator binds the nominal argument, giving it a *totality* interpretation. The totality interpretation of the nominal is realized in the obligatorily holistic (and by extension definite) interpretation associated with direct objects such as those in (31):

31. *pavel snûdl*^{P} *jablko*
Paul ate.3.sg.perf apple.sg.acc
'Paul ate (up) the whole apple'
'Paul finished eating the (whole) apple'

In turn, in the presence of a bare verbal stem, most typically classified as imperfective, the interpretation assigned to the nominal is considerably freer:

32. *pavel jedl*^{I} *jablko*
Paul ate.3.sg.imp apple.sg.acc
'Paul ate an /the /some apple'
'Paul was eating an/ the /some apple'

In discussing the interpretational differences between 'apple' in (31) and 'apple' in (32), Filip says: "The speaker of [31] commits himself to the proposition that the whole apple was consumed when the event was terminated. This does not necessarily hold for [32]. From the point of view of the direct object argument, 'apple', what is at issue in [31] contrasted with [32] is whether the whole apple was eaten [31] or just possibly part of it, but not necessarily the whole apple [32]".

Within the model presented here, we will assume that an abstract, covert 'totality' operator, if indeed present, is only available, indeed needed, for those few cases in which a bare stem appears to give rise to a quantity-telic reading without overt prefixation. More concretely, such cases, idiosyncratic as they indeed are, should be compared with, e.g., the absence of an overt past tense phonological realization for a verb such as *put*, or the absence of an overt plural inflection distinguishing between *fish.sg* and *fish.pl*. Otherwise, we will assume that the perfective affixation itself is

quantificational in nature. The very same prefix, whether overt or covert, triggers, through specifier - head agreement, the projection of #P within the nominal in its specifier to which, in turn, it assigns value, resulting in a quantity interpretation for that nominal.[8]

Note now that while in English-type languages Verkuyl's generalization could be derived from the absence of direct quantity markers for ASP_Q, it cannot be derived in a similar fashion for Slavic languages. If, indeed, ASP_Q can be directly marked in Slavic languages, the presence of a direct object is no longer needed. I turn shortly to cases which illustrate that this is indeed the case.

Having postulated a quantity structure for events in the form of ASP_Q, it is worthwhile investigating whether the quantity properties of the nominals in (22c-d) could be associated with ASP_Q, or with the quantity interpretation of events. A few additional words are in order, however, before we turn to the illustration that the notion of *quantity*, as defined in (19) is to be favored for events as well. For Krifka, nominals which meet Verkuyl's generalization are specifically argued to be associated with a property which allows the natural partitioning of the event into gradual subparts, a property not unlike that argued by Tenny (1987, 1994) to give rise to measuring out the event, or alternatively, to its delimitation. In Krifka's (1998) terms, the homomorphism between events and objects, defined in (33) must hold:[9]

33. a. *Uniqueness of Objects:*
there can be no two distinct objects which bear relation R to the same event
b. *Uniqueness of Events:*
there can be no two distinct event which bear R to the same object
c. *Mapping to Objects:*
if an event bears R to an object, any subpart of the event bears R to some subpart of the object
d. *Mapping to Events:*
if an event bears R to an object, any subpart of the object bears R to some subpart of the event.

The event-object mapping in (33) is intended to capture both the mapping of events onto *quantized* objects (e.g., *reading three books*), and the mapping of events onto properties of an object. Consider, as an illustrative example, the reading of a (single) book that involves, presumably, a unique event of reading a unique book. In turn, it

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[8] We are setting aside here for reasons of space a detailed review of the system proposed in Filip (1996, 2000), and specifically the ways her view of the role of quantificational prefixes in Slavic differs from the one put forth here. See, however, section 6 for some additional brief comments.

[9] From Krifka (1998):

i. θ shows uniqueness of events, UE(θ) iff
$\forall x, y \in U_P \forall e \in U_E [\theta(x, e) \wedge y \leq_P x \rightarrow \exists! e' [e' \leq_E e \wedge \theta(y. e')]]$

ii. θ shows uniqueness of objects, UO(θ) iff
$\forall x \in U_P \forall e, e' \in U_E [\theta(x, e) \wedge e' \leq_E e \rightarrow \exists! y [y \leq_P x \wedge \theta(y. e')]]$

iii. θ shows mapping to events, (ME(θ) iff
$\forall x, y \in U_P \forall e \in U_E [\theta(x, e) \wedge y \leq_P x \rightarrow \exists e' [e' \leq_E e \wedge \theta(y. e')]]$

iv. θ shows mapping to objects, MO(θ), iff:
$\forall x \in U_P \forall e, e' \in U_E [\theta(x, e) \wedge e' \leq_E e \rightarrow \exists y [y \leq_P x \wedge \theta(y. e')]]$

consists of a series of sub events, each of these sub events defined on the basis of divisions introduced naturally by the object 'book'. Each such sub event may be 'read a chapter', 'read a page', or even 'read a single word'. None of these subparts of the book are, in turn, a book, nor are any of the sub events the same as the whole event, namely reading a book. In turn, the object must be *quantized*, in the sense of (16b). Thus no subpart of *a book* is *a book* making *a book* quantized, but there are subparts of *books* that are *books*, and thereby *books* is not *quantized*. Following a similar line of reasoning, *read books* when added to *read books* makes up an event of *read books*, and the event denoted by *read books* certainly could have subparts which are likewise *read books*. But not so an event of *read a book* when added to *read a* book, which gives rise to two events, each consisting of reading one book. Similarly, no part of *read a book* is, in itself, *read a book* (with a culminating reading). Thus, in the presence of a cumulative theme, at least (33c,d) do not hold (and arguably, neither do (33a,b). Telicity, in turn, is defined by (34):

34. a. Telicity is the property of an event predicate *X* that applies to event *e* such that all parts of *e* that fall under *X* are initial and final parts of *e*
    b. If a quantized predicate *X* applies to some event *e* then it does not apply to any proper part of *e*. Hence the only *e'* such that *X(e')* and $e' \leq e$ is *e* itself.

We already noted that Krifka's account (as well as Kiparsky's) faces problems precisely with those telic events whose direct objects are not *quantized* (or alternatively, are *unbounded*) in the relevant sense, to wit, the cases in (11)-(12). A number of additional objections have emerged in the literature concerning this particular concept of telicity.[10] Thus an event such as *build a house* may consist of much activity that does not map onto house parts (hiring an architect, reviewing blueprints, buying lumber, etc.). An event of reading an article, even if it does culminate, may include a re-reading of various sections, or indeed, reading the article twice, assuming that the first reading didn't yield satisfactory comprehension, thereby violating both *quantization* and the homomorphism between sub-events and parts of the object. To echo another well-discussed objection (cf. Tenny, 1987; Dowty, 1991; Verkuyl, 1993, Kratzer, 1994; Schein, 2002, among others), we note that for the propositions in (35), all with an intended telic interpretation, the object cannot provide a natural endpoint for measuring out the event, in the intended sense:

35. a. her face reddened
    b. her mood brightened
    c. we cooked the eggs
    d. we filled the room with smoke
    e. we wrote a sequence of numbers

Suppose we consider as an illustration of the problem here (35d), based on the discussion in Schein (2002), defining '*full of smoke*' for my living room as a milligram of smoke per cubic yard of air. We can then measure the event by mapping filling of smoke to cubic yards of air in the room, to the point that the room is full of smoke.

[10] I am setting aside in this article matters having to do with the assumption that telicity must involve an incremental *theme* (cf. Dowty, 1991, Krifka, 1992). See Borer (to appear) as well as Rothstein (2000) for a detailed criticism.

Suppose, however, we continue to pump smoke into the room subsequent to that point, stopping only when there are two milligrams of smoke per cubic yard. This is clearly not a new event, nor is it an event of 'overfilling' the room with smoke. Nor can we assume that the definition of 'full' is relativized here to the time of the completion of the event, or a clear circularity would emerge, so that *full of smoke* is precisely when the event was over, and hence only posteriori can the relevant room parts be defined with respect to the filling event. The problem, we note, is a particularly acute one because *smoke*, the substance being filled into the room, is a bare mass noun, and hence we cannot assume that it is, itself, the relevant object measuring out the event in (35d), and that subparts of the events map onto subparts of *smoke*. In turn, the event thus described clearly is not *quantized*, as filling the room with smoke has subparts which are, themselves, *filling the room with smoke*, namely, all portions of the event that progress past the *full of smoke* point, regardless of when they end.[11]

A somewhat different class of cases which are likewise problematic for *quantization* are in (36):

36. a. Kim ran to the store
    b. The ship sank (to the bottom of the ocean)
    c. Pat walked home

We note that while (36a-c) are telic, they are not quantized. In fact, they are neither quantized nor cumulative. Specifically, there are proper subparts of *Pat walked home* which are *Pat walked home*, including all subparts of the walking event that terminate at home, regardless of their starting point.

Faced with such difficulties, Krifka (1998) separates the notion of telicity from the notion of *quantization*, stating that while the latter implies the former, the former does not imply the latter, an unfortunate conclusion, as it leads one to wonder what the explanatory range of the notion *quantization* might be.

Consider, however, the notion of *homogeneity* in (19). I proposed, largely following Kiparsky (1996), that a notion of *homogeneity* be defined on the basis of cumulativity and divisiveness, the latter slightly modified from Krifka (1992), and requiring, specifically, every interval of P to be P. The reader should also bear in mind here that 'plural' inflection, so called, does not mark the existence of a set of singulars, but rather, an infinitive number of possible division configurations of mass, with any possible number of cells, including none and one. Crucially, when such a system is put in place, *books* is divisive (and, of course, cumulative), as required, as there are no parts of *books* which are not *books*, *a single book* no longer being part of *books*. On the other hand, all plural-selecting quantifiers, including 'cumulative' ones, such as *some, many, several, more than three, at least three* etc. select reticules which are sets of singulars and hence non-divisive, in the required sense. Finally, as they are not divisive, they are not homogenous, and thus may give rise to a telic interpretation.

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[11] As such, *fill the room with smoke* is not amenable to the solution which Krifka (1998) proposes for the telicity of both (ia) and (ib), and which involves the scoping out of the underlined DP from within the domain of the *in three minutes* phrase, thereby acquiring an interpretation associated with a given, but unspecified amount. The reader is referred to Zucchi and White (2001) for some additional relevant discussion:

i. a. we wrote a sequence of numbers in three minutes
   b. we ate some apples in three minutes

We noted already that the notion of quantity proposed here is weaker than that of quantization, in that *non-divisive* reference may be met even if there are proper subparts of *x* with the property *P*. But now it turns out that if we adopt this weaker notion of *quantity*, we can equate *telicity* and *quantity*. As in the case of nominals, events that were quantized or unbounded for Krifka and Kiparsky, (1998), turn out to be quantity, by this weaker definition. To illustrate, *run to the store*, *read more than three books*, as well as *read some books* are all now *quantities*, as none of them are homogeneous. Further, consider again an event of continuing to fill the room with smoke past some conventional, agreed-upon *full of smoke* point. In this case, there clearly is a sub-event of *fill the room with smoke* which could be obtained by subtracting *fill the room with smoke* from *fill the room with smoke*, i.e., if the filling commenced at point 1 and ends at point 100, the event transpiring from point 2 to point 100 is *fill the room with smoke*, but its subtraction from the 1-100 event would give rise to a proper part which is not, itself, *fill the room with smoke*, quite regardless of the fact that the filling event may continue past the point of *full*. The predicate, then, is non-homogenous, a *quantity*, and as predicted, telic. Finally, the fact that *build a house* (under a non-activity interpretation) may involve actions which cannot be measured by the progression of the house, or the fact that *read a book* (under a non-activity interpretation) may consist of re-reading some of its portions are quite simply irrelevant. As either event must include sub-events which are not *build a house* or *read a book*, and which can be obtained by subtracting *build a house* or *read a book* from *build a house* or *read a book*, both predicates are *quantities*, and hence telic.[12]

Consider now some consequences. The weakening of the condition on telicity requires that the strict mapping between objects and events in (33c-d) be abandoned. Once it is abandoned, however, we no longer predict that a telic event must culminate when the object is exhausted, so to speak. Therefore, our notion of telicity does not predict co-finality or, for that matter co-initiality. Rather, what is required is that there would be some sub-part of an event P which is not, itself, P. We note that any reference either to the final point of the event or its initial point are sufficient to establish a sub-interval within P which is not P, specifically any interval which excludes either the initial point or the final point, and hence any specification of such an initial point or a final point would immediately give rise to telicity. If, however, some intermediate point within the event should turn out to be sufficiently well differentiated from the rest of the event, in involving, specifically, the (sub-) culmination of some sub-event, we predict the emergence of a telic reading without co-finality.

Consider again, in this view, the examples in (37)-(38):

37. a. Kim ate more than enough meat
    b. Robin read at least three books
    c. We filled the room with smoke

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[12] Kiparsky's (1998) *boundedness* does not face problems with at least some of these cases, notably *run to the store* and similar cases in which both cumulativity and quantization fail. This is because telicity, or boundedness, emerges if either cumulativity or divisiveness, in Kiparsky's sense, fails. While the predicates in (36) are divisive, by Kiparsky's definition, they are not cumulative, and hence a bounded reading is predicted, as necessary. A more tricky issue for *boundedness* is presented by *fill the room with smoke*, with the filling event progressing beyond the full point, or *eat more than three apples*. Thus both are divisive by Kiparsky (1998). It thus emerges not only that both cumulativity and divisiveness are required to properly define *quantity* (and telicity), but that the notion of divisiveness must be, essentially, that originally proposed in Krifka (1992) (and used in Kiparsky, 1996), and not its modification in Kiparsky (1998).

38. a. The boat floated under the bridge (in two hours)
b. The boat floated under the bridge (for two hours)

We do not actually know how much meat Kim ate, or how many books Robin read. What we do know, however, is the point at which the predicates in (37) become non-homogenous. As soon as Kim ate enough meat, regardless of whether or not she proceeded to eat, the event became non-homogenous, and hence telic. As soon as the room became full of smoke, according to whatever definition of 'full of smoke' we may choose, and regardless of whether or not filling proceeded, the event became telic. It is, in fact, entirely consistent with a situation where the sub-event that follows e.g., the eating of more than enough meat is not, itself, a culminating one, in that the final amount of meat eaten remains immaterial for the truth conditions, just as how far John ran is immaterial for the truth conditions of *John ran*, and how much *meat* was eaten is immaterial for establishing the truth value of *Kim ate meat*.

A similar rationale applies to (38a-c). Higginbotham (2000), in discussing these examples, suggests that (38a) consists of a transition and a telos, the latter expressed through a locative preposition. Specifically, in (38a) the boat was once elsewhere, but has come to be under the bridge. In ((38b), on the other hand, the boat is under the bridge throughout.

Viewing the paradigm from our perspective, we note that (38a) is non-homogenous while (38b) is homogenous in the required sense. We note further that to the extent that ((38a) is non-homogenous, precisely insofar as the boat is not under the bridge throughout the event, it does not actually imply that *under the bridge* is the telos, if we take *telos* here to be the starting point of some resultant state (in the sense of Parsons, 1990) characterizing the location of the boat. If *under the bridge* did characterize the *telos*, and if we were to take the time adverbial *in two hours* to measure the time that passed between the origination of the event and its telos, as is specifically suggested in Higginbotham (2000), we would expect the emerging interpretation for (38a) to be that two hours passed from the time that the event originated to the time that the boat *was* actually under the bridge. Such an interpretation, while perhaps possible for (38a), is not, in actuality, the most salient one. The most salient interpretation suggests that at the time that two hours have elapsed, the boat is no longer under the bridge, and that it took two hours for the boat to pass from one side of the bridge to the other, with the strong suggestion that the endpoint is, in fact, specifically *not* under the bridge. In turn, to the extent that the relevant culmination is not denoted by *under the bridge* this strongly suggests that a sentence such as that in (38a-b) cannot be decomposed, usefully, into a progression part, as denoted by the verb *float*, and a culmination point, as denoted by *under the bridge*. Any floating from one side of the bridge to the other, note, suffices to give rise to a quantity reading in our sense. However, a decomposition of the event, so as to allow the expression (*boat*) *under the bridge* to act as characterizing the point of culmination, or the onset of some resulting state, clearly misses the most salient interpretation for (38a). *Float under the bridge*, then, is yet another instantiation of quantity defined not by the endpoint of the event, but by some intermediate point, specifically, whatever point involves the boat *not* being under the bridge, quite regardless of whether or not that point precedes or follows the point at which the boat is under the bridge. *Float under the bridge* thus becomes a case of *fill the room with smoke*, where quantity is defined on the basis of the existence of a *full of smoke* point, or *under the bridge* point, but where that point need not be at the end of

the event. If on the right track, co-finality then becomes a special case of telicity, and the existence of cases in which telicity is not defined by the situation at the very end of the event thus provides support for the notion of quantity put forth here.

5. DOES SLAVIC PERFECTIVE MARK TELICITY?

In view of the conclusion that telicity is quantity, as defined in (19), consider again Slavic perfective markers and their grammatical role. In recent work, Filip (2000) argues in detail that perfective prefixes cannot be viewed, in and of themselves, as markers of telicity. In support of her claim, she discusses the paradigm in (39) from Russian (Filip's (9), p. 47):

39. a. *Ivan guljál*^{I}
Ivan walk.pst
'Ivan walked'; Ivan was walking
b. *Ivan* ***na****-guljálsja*^{P} *po górodu*
Ivan NA-walk.pst.refl around town
'Ivan walked a lot/enough/to his heart's content around the town'
c. *Ivan* ***po****-guljál*^{P} *po górodu*
Ivan PO-walk.pst around town
'Ivan took a (short) walk around the town'

The prefixed verbs in (39) are associated with events which, Filip notes, are neither quantized nor cumulative, by Krifka's (1992, 1998) definition. Quoting, Filip says:

> Take *poguljál*^{P} in the sense of 'to walk for a (short) time', where *po-* functions as a measure of time. Suppose that *e* is an event of walking for a short time, then there is a proper sub event of *e*, *e'*, which also counts as an event of walking for a short time. Hence both *e* and *e'* fall under the denotation of *poguljál*^{P}, and consequently, *poguljál*^{P} fails to be quantized…. At the same time *poguljál*^{P} fails to be cumulative… because two events of walking for a (short) time do not necessarily add up to one event of walking for a short time….
> Now let us take *naguljálsja*^{P}, in the sense of 'to walk for a long time'. If six hours of walking is considered to be walking for a long time in a given context (event *e*), then in the same context walking for five hours (event *e'*) may be as well, but not walking for one hour (event *e''*). This means that there are events like *e* (walking six hours) in the denotation of *naguljálsja*^{P} 'to walk for a long time' that have a proper subpart like *e'* (walking for five hours) which is also an event in the denotation of this verb. Therefore *naguljálsja*^{P} fails to be quantized… and it qualifies as cumulative. (p. 51)

From the failure of *na* and *po* verbs to return a quantized output, Filip concludes that the function of prefixes such as *na* and *po* cannot be equated with semantic perfectivity, where by semantic perfectivity she refers, in essence, to telicity.

We note, in considering the paradigm in (39), that it parallels exactly cases within the nominal and the predicate domain which we already discussed, and which likewise presented a problem for the quantized/cumulative picture. Specifically, and considering again the relevant cases, note that (40a) behaves exactly like *poguljál*^{P}, while ((40b) behaves exactly like *naguljálsja*^{P}. Within the predicate domain, (41a) illustrates a case which is neither quantized nor cumulative (and hence like *poguljál*^{P}), while (41b) are

both cumulative and non-quantized, although telic by other tests, on a par with *naguljálsja*^{P}.

40. a. less than three apples
    b. more than three apples

41. a. run to the store
    b. cook three eggs; write a sequence of numbers; fill the room with smoke

Krifka's quantized/cumulative distinction, then, cannot be rescued merely by relegating its counter-examples within the domain of Slavic morphology to some other semantic domain. Rather, as we already argued, what is needed is a revised notion of quantity. Once the appropriate notion of quantity is used, the anomaly of the paradigm in (39) vanishes, just as it vanished for (40)-(41). All events under consideration are quantities, and hence telic, exactly as would be predicted if prefixation does, indeed, correlate with telicity-quantity (or, in Filip's terms, semantic perfectivity).[13]

6. TELICITY WITHOUT VERKUYL'S GENERALIZATION

We suggested that in a language such as English, quantity is achieved through specifier – head agreement between the event-quantity node ASP_Q and a quantity DP in its specifier. We also noted that in a language such as English, this state of affairs directly derives Verkuyl's generalization – if ASP_Q cannot be assigned value directly, and can only inherit it from a quantity DP in its specifier, and if, by assumption, [Spec,ASP_Q] is the position of direct (internal) arguments, the obligatoriness of a quantity direct (internal) argument in order for telicity to emerge follows directly.

Consider, however, the Slavic languages where, we suggested, ASP_Q may be directly marked as quantity through the presence of quantity prefixes. Here, a quantity DP in [Spec,ASP_Q] is not required, and we expect Verkuyl's generalization to be violated, or more specifically, we expect telicity-quantity interpretation without a quantity direct internal argument. Note now that (39b-c) are, in fact, cases of quantity without Verkuyl's generalization, therefore confirming our prediction that such cases could, indeed, occur, precisely in Slavic languages. Before elaborating on the properties of such cases, however, let us consider briefly the context in which the absence of Verkuyl's generalization can be confirmed. Given the system presented here, a peculiar asymmetry emerges between the behavior of dyadic and monadic predicates, whenever ASP_Q is marked directly as quantity through, e.g., a quantity prefix and not through specifier - head agreement with a quantity DP. In order to see that this is so, consider the following logically possible configurations of direct arguments:

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[13] Filip notes that with respect to (almost) all other tests, the forms in (39) pattern with "verbs that are both clearly perfective and semantically quantized". The one exception are attenuative *po*-verbs, as in (39c), which may not occur with temporal measure phrases such as *in-x-time*, but can occur with durative time spans, such as *for-x-time*. We speculate that the exclusion of measure phrases may be due to the fact that time span is already built into the meaning of *po*. In turn, the possibility of durative temporal expressions could very well be licensed as a modifier on 'short' (i.e., how short? One hour).

42. a. perfective dyadic predicate, nominative, accusative
b. perfective dyadic predicate, nominative, indirect argument
b. perfective monadic predicate, nominative

(42a) is the structure associated with standard transitive perfectives in the Slavic languages. Here, ASP_Q is marked by quantity affixation. In turn, through specifier - head agreement, the quantity value of ASP_Q is transmitted to the DP in [Spec, ASP_Q], assigning it a quantity value as well. It thus emerges that in contexts such as those in (42a) Verkuyl's generalization is always met, in spite of the fact that quantity is assigned through prefixation, quite simply because that quantity value is transmitted to the direct object, with the result that it is obligatorily quantity.

Consider however (42b-c). Here, there is no direct argument and hence Verkuyl's generalization cannot be met, in principle. If, however, a quantity interpretation is available for the predicate nevertheless, then we must conclude that precisely when the predicate can be otherwise marked for quantity, a quantity direct internal argument is not necessary and Verkuyl's generalization violable. Thus the structures which are relevant to the illustration of our point are those in (43), and specifically, cases in which [Spec,ASP_Q] is unfilled (irrelevant details omitted):

43. DP_{NOM} $[_{ASPQ}$ Q-V $[_{VP}$ ….]]

Crucially, of course, the argument for the structure in (43) must be accompanied by showing that the nominative argument is not a deep object, i.e., that the structure in (43) is distinct from the structure in (44), in which Verkuyl's generalization is potentially met through a copy of a quantity DP in [Spec,ASP_Q]:

44. DP_{NOM} $[_{ASPQ}$ ~~DP_{NOM}~~ Q-V $[_{VP}$ ….]]

Consider from this perspective the Russian paradigm which Schoorlemmer (to appear) refers to as *semelfactive*, involving verbal marking that expresses one instance of a potentially repetitive action, as illustrated by (45)-(46):[14]

45. a. *Ja morg**nu**la^P (*casami)*
I blinked (*for hours)
b. *Ja kašlja**nu**la^P (*casami)*
I coughed (*for hours)
c. *On krik**nu**l^P za minutu (*casami)*
he shouted in minute (*for hours)

46. a. *Ja morgala^I casami*
I blinked for hours
b. *Ja kašljala^I casami*
I coughed for hours
c. *On krical^I za minutu*
he shouted in minute

[14] I am indebted to M. Schoorlemmer for making her work available to me, and for discussing it with me extensively. This statement by no means commits her to an agreement with my conclusions.

In (46), imperfective forms are used. In (45), on the other hand, the verb stem has a *nu* suffix, roughly translatable as 'once'. The resulting interpretation is telic, as is clear from the ungrammaticality of modification with adverbials such as *for hours*.

Schoorlemmer (to appear), within an approach that crucially assumes no (compositional) telicity without Verkuyl's generalization, points out that there is little evidence for an internal argument in (45). *Po*, a distributive marker, argued by Pesetsky (1982) and Schoorlemmer (to appear) to be sensitive to the existence of a direct internal argument, is not possible with (46). Furthermore, to the extent that some *semelfactives* can take an (optional) object, that object is often instrumental rather than accusative and it does not passivize, thereby indicating that it is not a direct argument:

47. a. *Vasja tolk**nu**l dver*
Vasja pushed door
'Vasja gave a push into (the) door
b. *Sobaka max**nu**la xvostom*
dog wagged tail.INSTR
('the dog wagged with the tail')
c. *Vasja p**nu**l (mašinu) nogoj*
Vasja kicked (the car) leg.INSTR
'Vasja kicked (the car) with his leg'

48. a. **dver' byla tolk**nu**ta Vasej*
door was pushed by-Vasja
b. **Mašina byla p**nu**ta nogoj*
car was kicked leg.INSTR

Schoorlemmer thus concludes that *semelfactive* verbs, in the specific sense of the paradigm in (45), are *lexically* marked as perfective, and that telicity, to the extent that it is derived with such verbs, is not compositional in these cases.[15] We note, nevertheless, that the suffix *nu*, found in (45) and (47) is entirely productive, and that its affixation to a particular verb stem gives rise to compositional rather than idiosyncratic information. Nor is the emerging telicity surprising, in view of the existence of telic paradigms such as those in (49), with roughly identical interpretation, which cannot be lexically derived (and see Borer, to appear, for the argument that these are cases of inner aspect):

49. a. Pat laughed twice and cried twice
b. Robin danced once and sang once
c. Robin loved Kim three times

The behavior of *–nu* is not unique in Russian. Other verbal markers can give rise to perfectivity (and quantity/telicity) without a discernible internal argument, thereby echoing the cases we already noted in (39):

[15] For Schoorlemmer (1995, to appear), perfectivity is the result of agreement of the verb stem with an internal argument, making the latter crucial. Because the perfectivity involved in *semelfactive* verbs cannot be thus derived it must be lexical, in the intended sense.

50. a. ***po***-*spat'* 'sleep for a while'
b. ***pro***-*spat'* 'sleep for a long time'
c. ***po***-*igrat* 'play for a while'

51. a. ***ras***-*smejat'sja* 'burst out laughing'
b. ***ot***-*smejat'sja* 'stop laughing
c. ***za***-*revet* 'start to bawl'

And finally, Schoorlemmer (1995, to appear) provides compelling evidence that (50)-(51) are not unaccusatives, and hence do not involve a (copy of a) direct internal argument in [Spec,ASP_Q]. As it turns out, secondary imperfective suffixation in Russian only applies to perfectives with a quantity DP direct argument (i.e., transitives and unaccusatives, but not unergatives). As such, it is possible with, e.g., the cases in (52):

52. a. ***vy***-*prosit'*^{P} 'request'
vy-*prošivat'*^{I}
b. ***pere***-*dvigat'sja*^{P} 'move'
pere-*dvižit'sja*^{I}
c. ***na***-*pisat*^{P} 'write'
na-*pisyvat'*^{I}
d. ***vz***-*bodrit*^{P} 'stimulate, cheer'
vz-*badrivat'*^{I}
e. ***vy***-*rasti*^{P} 'grow, unaccusative'
vy-*rastat'*^{I} 'grow, unaccusative'

It is however ruled out for (53), where telicity is induced with a perfective marker assigning range to ASP_Q, but where there is no quantity DP in [Spec,ASP_Q]:

53. a.****po***-*sypat'*^{I} 'sleep for a while'
b.****pro***-*sypat'*^{I} 'sleep for a long time'
c. ****ras***-*smeivat'sja*^{I} 'burst out laughing'
b. ****ot***-*smejivat'sja*^{I} 'stop laughing
c. ****za***-*revyvat'*^{I} 'start to bawl'

Although we do not offer here an account for the impossibility of secondary imperfectives without a quantity DP in [Spec,ASP_Q] (and see Schoorlemmer (1995, to appear, for some discussion), the correlation seems robust enough for us to conclude that there is, in Slavic, a construction which exhibits precisely the properties one would expect from the structure in (43b). Morphologically, it is marked as perfective, and semantically it is quantity (non-homogeneous). It does not, however, have an internal argument, and it violates Verkuyl's generalization. It is nonetheless a licit quantity structure, we submit, because ASP_Q is directly marked as quantity, rendering a quantity DP in [Spec,ASP_Q] – and Verkuyl's generalization – unnecessary.

We note in conclusion that English as well can be shown to have cases of telicity without Verkuyl's generalizations, precisely where it stands to reason that ASP_Q is marked by a locative particle, as in (54a-b) or, at times, by an adverb, as in (55a-b) (and see Borer, to appear, for additional examples and discussion):

54. a. The army took over
    b. Jake pulled up alongside us (in two minutes)
    c. Kim shoved off (in two minutes)
    d. We were ready to push off at ten o'clock
    e. John and Mary paired up

55. a. Mary cried twice (in two hours)
    b. Bill loved Mary three times (in his entire life)

7. CONCLUSION

Fundamentally, the purpose of this article is to propose the existence of a syntactic structure of quantity, which is instantiated both within the nominal domain and within the domain of events. Crucially, this syntactic structure is interpreted in a similar way, within the domain of both events and nominals.

The argumentation was based on a number of intermediate steps. First, we argued that plural inflection, as such, does not denote the existence of a set of singulars, and that the existence of singulars is associated with #-determiners, such as *three, some, several, more than three* etc. Second, we argued for a modified notion of *quantity*, to replace notions such as *quantization* or *boundedness*, as proposed by Krifka (1992, 1998) and Kiparsky (1998) respectively. Both the interpretation of plural inflection and of *quantity* were independently supported. Once these notions were in place, however, they turned out to allow for the existence of quantity structures within the syntactic domain with coherent semantic interpretation, and with an increase range of explanatory adequacy. It further allowed us to re-formulate our understanding of telicity, such that, in actuality, it would include not only events with an actual telos, but any event which is non-homogenous, regardless of the point during the event in which homogeneity failed. Finally, it allowed us to retrieve Slavic perfective marking as marking of quantity-telicity, thereby providing a unified account for its morpho-semantic distribution.

One prediction of the system put forth here was not pursued, for reasons of space. We noted that bare mass nouns and bare plurals are structurally akin in that both are missing the quantity node #P. By extension, this would suggest that atelicity should be characterized by the absence of structure (to wit, ASP_Q), rather than by the presence of some specific atelic syntactic node. For a detailed confirmation of this prediction, the reader is referred to Borer (to appear).

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Hagit Borer
Department of Linguistics
University of Southern California
Los Angeles, CA 90089-1693
USA

borer@usc.edu