

## Additivity in the Domain of Eventualities

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This paper discusses novel data concerning the additive reading of the particle *more* (*more<sub>add</sub>* henceforth), as in (1).

(1) John ate 3 cookies. Mary ate one more.

I show that, despite its nominal nature, *more<sub>add</sub>* is subject to constraints in the eventuality domain. I take this fact to indicate that *more<sub>add</sub>* expresses **addition in the eventuality domain**: It triggers the presupposition that there is an existing eventuality ( $e_2$ ), which together with the asserted eventuality ( $e_1$ ) creates a larger and more developed eventuality ( $e_3$ ).

I examine several ways to formally capture the intuitive notion of 'a more developed eventuality', inspired by Landman's 2000 group formation operation, and by Laserson's 1995 and Kratzer's (forthcoming) approach to the Semantics of *together*. I conclude, however, that the best way to capture this component in the semantics of *more<sub>add</sub>* is by taking the presupposed eventuality to be not only *a part of* the summed event, but also *a stage of* that event (following Landman's 1992 and Rothstein's 2004 approach to the semantics of the progressive).

I propose that the nominal additive particle indirectly measures the development of the summed and more developed event  $e_3$  by measuring the cardinality of the sum of the participants in the asserted and presupposed subevents  $e_1$  and  $e_2$ . Following ideas in Krifka 1998, Nakanishi 2007, this is done by taking nominal *more<sub>add</sub>* to denote a derived additive measure function, which applies to the range of a homomorphism from eventualities to their individual participants. I show how this analysis can be extended to 'verbal' *more<sub>add</sub>* as in (2):

(2) Mary ran in the morning. In the evening she ran a bit more.

I propose that in these cases the additive particle indirectly measures the development of the summed event  $e_3$  by measuring its running time or its spatial length (instead of measuring the cardinality of the set of its participants). Assuming this analysis can naturally explain some lexical aspect constraints on this particle.

I describe the main novel observations concerning the nominal additive particle in **section 1**. In **section 2** I examine several ways to capture the 'more developed' intuition found with this particle. **Section 3** introduces a semantic analysis of sentences with nominal *more<sub>add</sub>*, making use of a derived additive measure function (following Nakanishi 2007 and Krifka 1998). In **section 4** I show how the analysis presented for nominal *more<sub>add</sub>* can be extended to sentences with verbal *more<sub>add</sub>*. **Section 5** integrates the observations and ideas in the previous sections, and gives the denotations of the verbal and nominal *more<sub>add</sub>*. **Section 6** summarizes the paper, and raises some directions for further research.

### 1. Nominal *more<sub>add</sub>*: some preliminary observations

English *more* is usually discussed in the literature with respect to its comparative meaning, as in (3a), with an AP (see e.g. Kennedy 1999) or in (3b), with an NP (see e.g. Hackl 2000):

- (3) a. Mary is more intelligent than John  
b. Mary bought more books than John

However, *more* has another, so far un-discussed use, as an additive particle. Consider (4):

- (4) Yesterday John interviewed three students. Today he'll interview more (students)

(4) has two readings. On the first, comparative readings, the second sentence is true if John will interview tomorrow more than three students (e.g. 4). On the second, additive reading, the second

sentence is true even if John will interview tomorrow even one student.<sup>1</sup> I will concentrate from now on the additive reading.

On the surface, *more<sub>add</sub>*, as in (4), seems very similar to the more well known additive particle *too*, as in (5):

(5) Yesterday John interviewed three students. Today he'll interview students too.

For example, both (4), on the additive reading, and (5), with *too*, seem to presuppose that there are students that John interviewed, and assert that today he will interview students. But there are important differences between these two particles. Crucially, although syntactically *more<sub>add</sub>* seems to combine with a noun (e.g. *students* in (4)), it is subject to constraints in the domain of eventualities that *too* is not subject to. One constraint is illustrated by comparing (4) and (6):

(6) Today John interviewed three students. Yesterday he interviewed more.

Unlike (4), (6) only has the comparative reading (John interviewed more than three students), and *more<sub>add</sub>* is infelicitous in it. In contrast, *too* in (7) is as felicitous as in (5):

(7) Today John interviewed three students. Yesterday he interviewed students too.

That is, with *more<sub>add</sub>*, but not with *too*, we can add 'forward' (e.g. from yesterday to today), but not 'backward' (from today to yesterday). This indicates that, unlike the presupposition triggered by *too*, in the case of *more<sub>add</sub>* we do not presuppose the existence of members of the denotation of the nominal expression. For example, presupposing that there are existing *students* before today would be met in (6) as well. Instead, the sentence with *more<sub>add</sub>* seems to presuppose that an *eventuality* of interviewing students existed before today.

Notice, that in many cases the asserted and presupposed eventualities need not be characterized by the same verb:

(8) John baked 3 cakes for the birthday party. I will buy some more tomorrow

(9) I got 30 sheep from my uncle. Next week I will buy 10 more.

However, crucially, despite these variations, not anything goes here. There are further constraints on the relation between the presupposed and asserted eventualities with *more<sub>add</sub>* that do not find with *too*. One constraint, which concerns the nominal domain, is that the sets denoted by the nominal arguments of the asserted and presupposed eventualities do not overlap. Compare (10) and (11):

(10) Today John spoke with 4 students. Tomorrow Mary will speak with 4 more (students).

(11) Today John spoke with 4 students. Tomorrow Mary will speak with 4 students too.

If  $N_1$  is the set of students that Mary will speak with, and  $N_2$  is the set of students that John spoke with, then in (10), with *more<sub>add</sub>*, but not in (11), with *too*,  $N_1 \cap N_2 = \emptyset$ : I.e. Mary will speak with 4 different students.

The second further constraint on *more<sub>add</sub>* involves again the eventuality domain. Intuitively, the asserted and the presupposed eventualities should be summed together to create an eventuality which is perceived as singular in some sense. For example, in (8)  $e_1$  and  $e_2$  can be summed into an intuitively singular eventuality of "preparing cakes for the party". In (9),  $e_1$  and  $e_2$  can be summed into an intuitively singular eventuality of "having sheep" and in (10)  $e_1$  and  $e_2$  can be summed into an intuitively singular eventuality of speaking with students (today and tomorrow). Crucially, when

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<sup>1</sup> The focus pattern in (4) and the rest of the sentences below is one where the nominal argument (e.g. *students*) is not focused. Instead, other elements in the sentences get a (rise) fall-rise intonation (e.g. *today* in (4)). In addition, *more<sub>add</sub>* is focused as well. This makes *more<sub>add</sub>* similar to *too*, which Krifka 1999 takes to be associated with contrastive topics. Umbach 2008 examines this focus pattern for the German correlate of *more<sub>add</sub>*, namely *noch*, and shows that another focus pattern is possible, where *noch* is not focused. This focus pattern leads to different implications (an element of another type is added). I am not sure to what extent this latter focus pattern is possible for *more<sub>add</sub>*. (ii), for example, does not sound as felicitous as (i) (unless we assume that John drank some beer before the evening):

(i) In the morning John drank beer. [In the evening]<sub>F</sub> he drank [more]<sub>F</sub> beer

(ii) In the morning, John drank wine. In the evening he drank (??more) beer.

this intuitive constraint is not met, the presence of *more<sub>add</sub>* is infelicitous. Consider, for example (12) and (13):

(12) I baked (three) cakes for my son's birthday party. A woman I know in New York baked more cakes for her son's party (**comparative only**)

(13) The prime minister has three children. I have more (**comparative only**).

Intuitively, baking cakes for two distinct parties, by two different people cannot be considered a singular eventuality. Similarly, the prime minister having children, and I having children cannot be summed together into a singular eventuality of having children. Hence *more* is interpreted as comparative only in (12) and (13), and the additive reading is odd.

## 2. Capturing the 'singular eventuality' intuition

One challenge we are facing is how to formally capture the intuition that summing the asserted and presupposed eventualities,  $e_1$  and  $e_2$  with *more<sub>add</sub>* should lead to an eventuality  $e_3$  which is, in some sense, singular. It is independently assumed (see e.g. Landman 2000, Kratzer (forthcoming)) that, as happens with summing of individuals (Link 1983), summing of two events, e.g.  $e_1+e_2$  should result in a *plural*, complex eventuality  $*e_3$ , and not in a singular one. Given the 'unique role requirement', this is especially the case if we also have e.g. two agents, as in (10) (*John+Mary*).

Let me examine here two potential solutions to this challenge which do not work, and one which I think does. The first solution is to use Landman's 2000 groupification operator  $\uparrow$ , and to take the summed event  $e_3$  as the group of events  $e_1$  and  $e_2$ , with a group of individuals as a singular theme of this event. In case  $e_1$  and  $e_2$  have two different agents, we apply  $\uparrow$  on their sum too, and take them then to form a group as well. Under this approach (10), for example, results in a singular event of interviewing a group of 8 students, which is done collectively by John and Mary, i.e. John and Mary act as a group. The infelicity of e.g. (12) will be easily explained by assuming that me and the woman in New York do not form a group, and are not collectively involved in one event (we do not have any common decision as to the event, shared responsibility for the event etc.).

The problem with this kind of approach is that there are many cases where *more<sub>add</sub>* is felicitous although no real group reading seems reasonable. Consider (14) and (15):

(14) (What happened to the cookies you baked?) Well, my nephews were here and ate most of them. Later I had a meeting with my student, and she ate some more.

(15) The hurricane killed 4 people in this village. A week later two more people were killed by robbers.

In (14) It is hard to take 'my nephews' and 'my students' to form a group (they may even not know each other). Thus, eating the cookies in the jar is not naturally considered a collective action of my nephews and my student. This is even clearer in (15), since we won't tend to consider the inanimate hurricane which killed four people, and the animate robbers who killed two people a week after as a group. Here too, then, we cannot talk about collective action or decision. Nonetheless *more<sub>add</sub>* is perfectly felicitous in these sentences.

A second solution might be to follow Lasnik's 1995 and Kratzer's (forthcoming) analyses of the collectivizing adverbial *together*. Given this approach the summed event  $e_3$  of 'interviewing 8 students' in (10) is technically a plural event, with a plural agent John+Mary, but it is understood as 'collective' or 'singular' because no subevent of 'interviewing 8 students' has only John or only Mary as agents.

However, adopting this strategy for the semantics of *more<sub>add</sub>* faces two problems. First, there are cases the condition is met, but *more<sub>add</sub>* is infelicitous. Consider (16):

(16) John weighs 90 kilograms. Mary weighs 60 kilograms more (**comparative only**)

Here the summed state is 'weighing 150 kilos', and there is indeed no sub-state of it which has less than the sum of John and Mary as the 'possessors'. But this is not enough to make (12) felicitous under the additive reading. To make it felicitous we need a stronger scenario, e.g. checking whether John and Mary can both enter a certain elevator, with a limited weight capacity.

Second, there are cases where the condition is not met, but *more<sub>add</sub>* is felicitous, as in (17):

(17) John interviewed some students. Mary interviewed some more.

In (17) the summed event is 'interviewing some students'. But crucially, *more<sub>add</sub>* is felicitous although there *is* a subevent that has less than John+Mary as an agent, e.g. the subevent  $e_1$ , where Mary interviewed some students, as well as the subevent  $e_2$  where John interviewed some students.

Given the shortcomings of these two solutions I suggest a third one. Under this solution we focus on the intuition that using *more<sub>add</sub>* leads not only to a larger ad plural event  $e_3$ , the sum of the asserted and presupposed eventualities, but also to a more *developed* situation. In (10) above, for example, adding John's interviewing of students to Mary's interviewing of students, creates not only an eventuality which is larger in terms of the number of students interviewed. It also advances a certain event and makes it more developed, e.g. one where we try to interview as many students for the department. In contrast, in (12), the woman from New York's baking of the cakes is not naturally taken as advancing an event and making it more developed, but only as leading to a plural eventuality  $e_3$  where both me and that woman baked cakes for parties.

I suggest that we can capture this intuition by using the notion of the stage-of (as opposed to the part-of) relation between eventualities, used in the analysis of the progressive (Landman 1992, Rothstein 2004). Specifically,  $e_3$  is indeed defined as a plural event which is the sum of  $e_1$  and  $e_2$ . But the presupposed eventuality  $e_2$  is required to be not only a part of  $e_3$  ( $e_2 < e_3$ ) but also a stage of  $e_3$  ( $e_2 <_s e_3$ ). In addition, as indicated by the infelicity of (6) above, the presupposed eventuality  $e_2$  cannot be temporally later than the asserted one,  $e_1$ . I.e. we require that  $\tau(e_2) \leq \tau(e_1)$  (where  $\tau$  is the temporal trace function). This can be also naturally derived from the notion of 'development'. If adding  $e_1$  to  $e_2$  leads to a more developed situation  $e_3$  (and not merely to a plural situation), then  $e_1$ , which advances the situation, should not be prior to  $e_2$ .

### 3. *More<sub>add</sub>* denotes a derived additive measure function

We still need to understand (a) how come *more<sub>add</sub>*, which seems to combine with a nominal expression, expresses additivity in the domain of eventualities and (b) why can not the denotations of the nominal arguments in the asserted and presupposed eventualities,  $e_1$  and  $e_2$ , overlap.

I suggest that by enlarging a nominal set, namely a set of individuals, *more<sub>add</sub>* indirectly enlarges and develops an eventuality which has these individuals as participants. More precisely, *more<sub>add</sub>* is used to sum the individuals who are participants in two events  $e_1$  and  $e_2$ , and through the growth of this set of individuals it indirectly measures the growth and development of the event  $e_3$ , of which  $e_1$  and  $e_2$  are parts, and of which  $e_2$  is also a stage.

Formally, I follow here Nakainishi's 2007 treatment of split measure phrases in Japanese. Nakanishi shows that these phrases seem to obey constraints in both the eventuality and in the nominal domain, although they seem to modify a nominal expression and give its size. Following Schwarzschild's 2002 approach to measure functions, Nakanishi takes such phrases to involve a derived measure function  $\mu'$ : cardinality, which combines with a degree word (e.g. 3 individuals).  $\mu'$  is a *derived* measure function because it indirectly measures an event. Following ideas in Krifka 1998 this is done by assuming that this function applies to the range of a homomorphism from the domain of eventualities to the domain of individuals, and more specifically, from eventualities to their participants. That is,  $\mu'(e) = \mu(h(e))$ . For example, the Japanese counterpart of *Two boys danced*, with a split measure phrase, is interpreted as in (18)<sup>2</sup>, where  $\mu$  is 'cardinality', and  $h$  is the homomorphism from events to their agents:

(18)  $\exists e \exists x [*boy(x) \wedge Ag(e)=x \wedge *dance(e) \wedge \mu(h(e))=2 \text{ individuals}]$

Turning now back to nominal *more<sub>add</sub>*, I propose that it also involves a derived measure function  $\mu'$ , and here too  $\mu$  is 'cardinality'. Unlike the Japanese case, though, here the function is also additive, i.e. it indirectly measures an event ( $e_3$ ), by measuring the sum of the range of the homomorphisms

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<sup>2</sup> Nakanishi adds that one presupposition of the split measure construction in Japanese is that the measure function  $\mu$  has to be monotonic, in the sense of Schwarzschild 2002. This should not be stated in our definition, since it naturally follows from the additivity of the function, discussed below.

applied to its two subevents: the asserted subevent  $e_1$  and the presupposed one  $e_2$  (where  $e_2$  is also a stage of  $e_3$ ), i.e. it measures the sum of the participants in these asserted and presupposed subevents.

Thus, for example, the truth conditions of a sentence like (19) are given in (20), where  $\mu$  is 'cardinality'. (20a) gives the assertion, and (20b) the two presuppositions, relating to the existence of the eventuality  $e_2$  and to that of the summed and more developed eventuality  $e_3$ :

- (19) (Three men arrived this morning). Two more<sub>add</sub> men arrived at noon.
- (20) a. Assertion:  $\exists e_1, x, t$  [ arrive ( $e_1$ ), \*man ( $x$ ), Agent ( $e_1$ ) =  $x$ ,  $\tau(e_1) = t$ ,  $t \subset$  noon,  $t < n$ ,  $\mu$  (Agent ( $e_1$ )) = 2 individuals ]
- b. Presuppositions:
- (i)  $\exists e_2, y, t'$  [ arrive ( $e_2$ ), \*man ( $y$ ), Agent ( $e_2$ ) =  $y$ ,  $\tau(e_2) = t'$ ,  $t' \leq t$ ,  $\mu$  (Agent( $e_2$ )) = 3 individuals]
- (ii)  $\exists e_3, z$  [ $e_3 = e_1 + e_2$ ,  $e_2 <_S e_3$ ,  $z = x + y$ , \*arrive ( $e_3$ ), \*man ( $z$ ), Agent ( $e_3$ ) =  $z$ ,  $\mu$  (Agent ( $e_3$ )) = 3 individuals + 2 individuals = 5 individuals]

The 'additivity' component can now naturally explain the fact that the sets of participants of  $e_1$  and  $e_2$  cannot overlap (see e.g. Krifka 1998 and Moltmann 2004).

#### 4. Extending the analysis to 'verbal' *more*<sub>add</sub>

The above treatment of the nominal additive *more* can be naturally extended to verbal *more*<sub>add</sub> in post predicate position, as in (21):

- (21) a. In the morning Mary ran 4 kilometers. In the evening she ran 3 kilometers more
- b. In the morning Mary slept 4 hours. In the afternoon she slept 2 hours more
- c. Mary started cooking the chicken. John cooked it a bit more.

I will assume that here too the main operation of *more* is additive: We start with two eventualities,  $e_1$  (asserted) and  $e_2$  (presupposed), which are summed together into an eventuality  $e_3$ . Here too we take the addition of  $e_1$  to  $e_2$  to lead not only to a plural and larger eventuality, but also to a more developed eventuality. Hence  $e_2$  is again, not only a part of, but also a stage of  $e_3$ .

In addition, here too the use of *more*<sub>add</sub> indicates that there is a derived additive measure function, which can indirectly measure the whole event  $e_3$ . But unlike the operation of the nominal additive, here it is not the growth of the cardinality / size of the set of participants which indirectly measures the development of  $e_3$ . Rather, the development is done along other dimensions. In (21a) the measure function measures spatial length, in (21b) it is temporal length, and in (21c) it is the degree to which the chicken is cooked. This implies that the relevant homomorphisms we use here are also different, namely the spatial path of the event, its run time, and a directed abstract path, from 'not cooked' to 'cooked' (see Krifka 1998), respectively. Thus, for example, the truth conditions of (21a), will be as in (22), where  $\mu$  is 'spatial length':

- (22) Assertion:  $\exists e_1, t$  [ run ( $e_1$ ), Agent ( $e_1$ ) =  $m$ ,  $\tau(e_1) = t$ ,  $t \subset$  morning,  $t < n$ ,  $\mu$ (path ( $e_1$ )) = 3 kilometers ]
- Presupposition:
- (i)  $\exists e_2 t'$  [ run ( $e_2$ ), Agent ( $e_2$ ) =  $m$ ,  $\tau(e_2) = t'$ ,  $t' \leq t$ ,  $\mu$ (path ( $e_2$ )) = 4 kilometers]
- (ii)  $\exists e_3$  [ $e_3 = e_1 + e_2$ ,  $e_2 <_S e_3$ , \*run ( $e_3$ ), Agent ( $e_3$ ) =  $m$ ,  $\mu$ (path ( $e_3$ )) = 4 kilometers + 3 kilometers = 7 kilometers]

There are two main pieces of data supporting this analysis of verbal *more*. First, combining *more*<sub>add</sub> with stative predicates is problematic:

- (23) ?? Mary was sad / dirty / tired some more

The reason has to do with the notions of *development* and *stages*: Stative predicates do not develop in time, and do not have stages (Rothstein 2004). For example, an event  $e$  of running from 2 to 4 is a more developed version of the subevent  $e'$  of running from 2 to 3, hence  $e'$  can be considered a stage of  $e$ . But, if  $e$  is a state where I was sad from 2 to 4, this state cannot be considered a 'more developed' version of  $e'$  - my being sad from 2 to 3. This state is clearly longer, but not more developed. Hence here  $e'$  cannot be considered a stage of  $e$ .

In (23), *more<sub>add</sub>* cannot measure spatial length, since the states involve do not have a path. If at all, it would apply to the run time of these states. But if state do not develop in time, and do not have stages, then presupposition (i) triggered by *more<sub>add</sub>* cannot be met, and the infelicity is explained.<sup>3</sup>

Second, combining achievements with *more<sub>add</sub>* (but not with *again*), is infelicitous:

(24) I arrived to the station #some more / again

This is because achievements are known to be telic (already fully developed) and near instantaneous eventualities (Dowty 1979, Rothstein 2004). Thus, two such eventualities cannot be summed into a more developed longer eventuality, but result *only* in a plurality of eventualities. In addition, the duration of these subevents cannot be summed to measure the summed event  $e_3$ . Thus, the additive *some more* is out, but the repetitive *again* is ok, as its main function is to create two distinct eventualities (Ippolito 2007).

## 5. The denotations of verbal and nominal *more<sub>add</sub>*

We are now in a position to give the interpretation of the verbal and nominal *more<sub>add</sub>*. I follow Nakanishi 2007 in assuming that in a sentence like (25), the measure function  $\mu$ , which is not realized overtly, first combines with the degree phrase '3 kilometers', type  $d$ , to create modifier type  $\langle\langle v,t\rangle, \langle v,t\rangle\rangle$  (where  $v$  is the type of events), and then applies to the verbal expression 'walked' to create a set of events, type  $\langle v,t\rangle$ . Thus, (25) is interpreted as in (26) (ignoring tense), where  $\mu$  gives 'spatial length'.  $\mu$  itself has the denotation in (27):

(25) Mary walked 3 kilometers

(26)  $\exists e \text{ walk}(e) \wedge \text{Ag}(e) = m \wedge \text{spatial length}(\text{path}(e)) = 3 \text{ kilometers}$

(27)  $\mu_{\langle d, \langle\langle v,t\rangle, \langle v,t\rangle\rangle} : \lambda d_d. \lambda P_{\langle v,t\rangle}. \lambda e_v. P(e) \wedge \mu(h(e)) = d$

I take verbal *more<sub>add</sub>* to be an overt realization of  $\mu$ , and thus to have the same denotation as (27). However *more<sub>add</sub>* also triggers the presuppositions concerning  $e_2$  and  $e_3$ , discussed above. This gives us the denotation in (28):

(28) Verbal *more<sub>add</sub>*  $\langle d, \langle\langle v,t\rangle, \langle v,t\rangle\rangle$ :  $\lambda d_1. \lambda P_{1\langle v,t\rangle}. \lambda e_{1v}. [P_1(e_1) \wedge \mu(h(e_1)) = d_1]$

Presupposition:  $\exists e_2, e_3, P_2, P_3 d_2 [P_2(e_2) \wedge \mu(h(e_2)) = d_2 \wedge \tau(e_2) \leq \tau(e_1) \wedge *P_3(e_3) \wedge e_3 = e_1 + e_2 \wedge e_2 <_S e_3 \wedge \mu(h(e_3)) = d_1 + d_2]$

In the case of the nominal *more<sub>add</sub>*, the interpretation is very similar. The important differences are (a)  $\mu$  has to also combine with a nominal predicate, type  $\langle e,t\rangle$  (b) the verbal predicate denotes a relation between individuals and events (and not only a set of events) and (c) the measure function  $\mu$  denoted by *more* is restricted to be 'cardinality'. Thus, nominal *more<sub>add</sub>* will be of type  $\langle d, \langle\langle e,t\rangle, \langle\langle e, \langle v,t\rangle\rangle, \langle v,t\rangle\rangle\rangle$ , with the following denotation:

(29) Nominal *more<sub>add</sub>*  $\langle d, \langle\langle e,t\rangle, \langle\langle e, \langle v,t\rangle\rangle, \langle v,t\rangle\rangle\rangle$ :

$\lambda d_1. \lambda Q_{\langle e,t\rangle}. \lambda P_{1\langle e, \langle v,t\rangle\rangle}. \lambda e_{1v}. [\exists x [Q(x) \wedge P(x)(e) \wedge \text{cardinality}(h(e)) = d_1]]$

Presupposition:  $\exists e_2, e_3, P_2, P_3 d_2, y, z [P_2(y)(e_2) \wedge Q(y) \wedge \text{cardinality}(h(e_2)) = d_2 \wedge \tau(e_2) \leq \tau(e_1) \wedge *P_3(z)(e_3) \wedge e_3 = e_1 + e_2 \wedge e_2 <_S e_3 \wedge Q(z) \wedge z = x + y \wedge \text{cardinality}(h(e_3)) = d_1 + d_2]$

<sup>3</sup> One question which is immediately raised by this proposal is the following: If *more<sub>add</sub>* involves development and stages, and states do not have stages, how come we can have states with nominal additivity, as (i) ?

(i) I have 30 sheep. I will have some more next week.

A preliminary answer to this question has to do with the fact that in (i) the development of the eventuality is not along the time dimension, but along the 'number of participants' dimension. We can hypothesize, then, that states do not develop over time, but can be considered more developed along the participants domain. Further research should examine this direction in more detail.

## 6. Conclusion and directions for further research

This paper examined novel data concerning the interpretation of the additive particle *more* (*more<sub>add</sub>*), and the constraints on its felicity. Following ideas in Nakanishi 2007 and Krifka 1998, I argued that the full range of facts concerning both nominal and verbal *more<sub>add</sub>* can be accounted for if we assume that this particle always expresses addition and measurement in the eventuality domain. Specifically, in both cases the particle denotes a derived additive measure function, namely a one which indirectly measures the development of an event,  $e_3$ , by measuring the sum of the ranges of a homomorphism applied to its two subevents, namely the asserted eventuality  $e_1$ , and a presupposed eventuality  $e_2$ . In particular the presupposed event  $e_2$  is required to be a stage of the summed event  $e_3$ , and not only a part of it. In the case of the verbal *more<sub>add</sub>* the measure function can measure spatial length, temporal length, or a degree on some other salient directed path, and thus the homomorphism can be some path of the event, or its run time. The denotation of the nominal *more<sub>add</sub>* is more restricted, and can be *cardinality* only. Hence the relevant homomorphism is from events to individual participants.

There are many questions and directions for further research raised by this paper. Let me briefly mention here three of them.

First, assuming that *more<sub>add</sub>* indeed denotes a measure function which combines with a degree phrase may look problematic if we consider the fact that in many cases this particle appears with no measure phrase at all as in (30) and (31):

(30) Mary ran three kilometers in the morning. In the evening she ran some more

(31) John spoke with three students. Today he will speak with some more

I assume that in both cases we have a degree which is existentially quantified. E.g. (30) says that in the evening Mary ran, and that there is some degree of spatial length of the path of the running event. This requires us to give a denotation of the quantifier *some* in (30), as quantifying over degrees. I suggest that a similar thing happens with (31), where *some* does not directly bind individuals, but a degree of cardinality. Further research is needed here in order to make sure the denotation of *some* is the right one in these cases.

The second issue has to do with the ambiguity of *more*. Assuming that the denotation of *more<sub>add</sub>* is indeed along the lines in (28) and (29) above, would not it be preferable to relate this denotation to the more well known denotation of *more* as a comparative expression? The direction we can develop is to make use of the fact that on both interpretations the denotation of this particle makes reference to degrees (the comparative *more* says that a degree of a certain entity is higher on a certain scale than the degree of another entity, see e.g. Kennedy 1999). The relevant observation is that whenever a sentence with *more<sub>add</sub>* is true, the degree which indirectly measures the summed event  $e_3$  is higher than the degree which indirectly measures the presupposed event  $e_2$  (as well as than that of the asserted event  $e_1$ ). More intuitively, if (32), with *more<sub>add</sub>* is true, then this entails (33), with *more<sub>comparative</sub>*:

(32) John spoke with 4 students. Mary spoke with some more

(33) John and Mary spoke with more students than John spoke with

We can try and develop a unified analysis of *more*, which will enable us to derive these two readings. However, the extent to which this task is productive is not clear, since in many languages, these two readings of *more* are expressed by two distinct lexical items. Examples are German (e.g. Umbach 2008), French, Italian and Chinese (Tovana & Donazzan 2008) and modern Hebrew (Greenberg 2008). It may be, then, that the relation between the additive and the comparative in English is coincidental. This should be further examined, though.

The third issue has to do with the fact that in the languages just mentioned, the lexical item expressing event additivity (corresponding to *more<sub>add</sub>* in English) has other meanings as well. One of these meanings corresponds to the English *still* (sometimes called an aspectual additive particle). Here is an example from Hebrew, where both *more<sub>add</sub>* and *still* are translated as *od* (see also

Umbach 2008 for the German *noch* and Tovana & Donazzan 2008 for the Italian *ancora*, the French *encore* and the Chinese *zai*):

(34) dani axal od ugot  
Danny ate more<sub>add</sub> cakes  
"Danny ate more<sub>add</sub> cakes"

(35) dani od yaSen  
Danny still asleep  
"Danny is still asleep"

In fact, although in English the aspectual particle is not *more* but *still*, we can nonetheless find *more* in the negative counterpart of *still*, namely the NPI *anymore*, as in (36):

(36) John is not asleep anymore.

In Greenberg 2008 I suggested that in both cases the additive particle leads to making a certain event larger. However in sentence like (34) this happens as a result of summing two different subevents of this event, leading to a plural and more developed event, whereas with sentences as in (35) it is the very same event which is enlarged, and we end up with a singular and longer event. This intuitive idea is empirically supported by the fact that the *still* type of reading is only compatible with homogeneous particles (e.g. Michaelis 1993), which indeed necessarily leads to one and the same event being lengthened. It is theoretically supported by Ippolito's 2007 independent claim that the event in the assertion of *still* is the very same event in the presupposition. Further research should attempt to integrate these intuitions within a unified semantic characterization of event additivity.

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