

## Additivity in the Domain of Eventualities

**Abstract:** I discuss novel data concerning the additive reading of the additive particle *more* (*more<sub>add</sub>* henceforth), as in *John ate 3 cookies. Mary ate one more.* I claim that despite its nominal nature *more<sub>add</sub>* express **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 eventuality ( $e_3$ ). The nominal additive indirectly measures the summed event by measuring the cardinality of its participants (using a homomorphism from eventualities to individuals, following ideas in e.g. Krifka 1998, Nakanishi 2007).

I show that a condition on the felicity of *more<sub>add</sub>* is that the resulting eventuality must be perceived as 'singular', despite the fact that it is the result of summing two eventualities. I examine several ways to formally capture this constraint (inspired by Landman's 2000 group formation, and by theories concerning the Semantics of *together*), but conclude that the best way to capture it is by taking the asserted and presupposed eventualities to be not only parts of the summed event, but also stages of that event (following Landman's 1992 and Rothstein's 2004 intuitions about the progressive). The summed event is thus viewed as a more developed version of its parts.

Finally, I show how this analysis can be extended to post verbal *more<sub>add</sub>* (as in *Mary slept a bit in the afternoon. In the evening she slept some more.*). Here the additive indirectly measures the summed event by measuring its running time (instead of measuring the cardinality of the set of its participants). Assuming this analysis can naturally explain why post predicate *more<sub>add</sub>* is incompatible with stative verbs, (which are known not to have stages), and with achievements (which are near-instantaneous and 'fully developed').

**The data:** English *more* is usually discussed in the literature with respect to its comparative meaning, as in (1a), with an AP (see e.g. Kennedy 1999) and in (1b), with an NP (see e.g. Hackle 2000):

(1) a. *Mary is more intelligent than John b. Mary bought more books than John*

However, *more* has another, so far undiscussed use, as an additive particle. Consider (2):

(2) *Today John interviewed three students. Tomorrow he'll interview more (students)*

(2) 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 one student<sup>1</sup>. I will concentrate from now on the additive reading.

Crucially, although syntactically *more<sub>add</sub>* combines with a noun it is subject to constraints in the domain of eventualities Consider (3):

(3) *Today John interviewed three students. Yesterday he interviewed more*

(3) only has the comparative reading (he interviewed more than three students). This indicate that we can add 'forward' (from today to tomorrow), but not 'backward' (from today to yesterday). The important implication is that despite the nominal nature of *more<sub>add</sub>*, it seems to be additive in the domain of events. I.e. we don't want to say that a sentence like (2) presupposes that there are existing students before today- this is met also in the infelicitous (3). Instead: the sentence seems to presuppose that an eventuality of interviewing students existed before today. This leads to a preliminary analysis of (2) as in (4) (ignoring tense):

(4) a. *Today John interviewed (some) more students* (First version)

b. *Assertion:*  $\exists e_1, x, t$  [interview ( $e_1$ )  $\wedge$  Ag( $e_1$ ) =  $j$   $\wedge$  The( $e_1$ ) =  $x$   $\wedge$  \*student ( $x$ )  $\wedge$   $\tau(e_1) \subset t \wedge t = \text{today}$ ]

(**"There is an interviewing students eventuality by John,  $e_1$ , whose time is included in today"**)

c. *Presupposition:*  $\exists e_2, y, t'$  [interview ( $e_2$ )  $\wedge$  Ag( $e_2$ ) =  $j$   $\wedge$  The( $e_2$ ) =  $y$   $\wedge$  \*student ( $y$ )  $\wedge$   $\tau(e_2) \subset t' \wedge t' < \text{today}$ ] (**"There is an interviewing student(s) eventuality by John,  $e_2$ , before today"**)

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

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

(6) *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 two main constraints on the relation between the presupposed and asserted eventualities:

**First:** The sets denoted by the N arguments of the asserted and presupposed eventualities do not overlap:

(7) *Today John spoke with some students. Tomorrow Mary will speak with more (students).*

If  $N_1$  is the set of students that Mary will speak with, and  $N_2$  is the set of students that John spoke to, then  $N_1 \cap N_2 = \emptyset$ : I.e. Mary will speak with different students.

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<sup>1</sup> Other languages encode the comparative and additive readings using two different lexical items, Hebrew, for example, uses *yoter* and *od*, respectively.

Second: Intuitively, the asserted and the presupposed eventualities should be summed together into a singular larger, eventuality. I.e. the resulting eventuality should be perceived as singular  
For example. In (5)  $e_1$  and  $e_2$  can be summed into a singular eventuality of "preparing cakes for the party". In (6),  $e_1$  and  $e_2$  can be summed into a singular eventuality of "having sheep" and in (7)  $e_1$  and  $e_2$  can be summed into a singular eventuality of John and Mary speaking with students (today and tomorrow).  
Support for this intuitive constraint: When the two eventualities CANNOT be intuitively summed up into a singular, larger eventuality, the presence of *more<sub>add</sub>* is infelicitous:

(8) *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)*

Intuitively, baking cakes for two distinct parties, by two different people cannot be considered a singular, larger eventuality.

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

Intuitively, the prime minister having children, and I having children cannot be summed together into a singular eventuality of having children.

### The analysis

The challenge we are facing is how to formally capture the intuitive 'singular summed eventuality' constraint on the felicity of *more<sub>add</sub>*. The main problem is that summing of two events  $e_1+e_2$  should result in a *plural*, complex eventuality  $*e_3$ , and not in a singular one (see e.g. Landman 2000, Kratzer (forthcoming). Given the 'unique role requirement', this is especially the case if we also have e.g. two agents, as in (7) (*John+Mary*).

I examine two solutions to this challenge which do not work, and one which does:

Solution # 1: Take the summed event  $e_3$  as collective, and the sum of John and Mary as a group (using Landman's 2000 group formation operation).

The problem: In many cases, there is no real group reading with the additive *more<sub>add</sub>*:

(10) *(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.*

(11) *This library has seven copies of this book. My father has some more copies.*

In (10) It is hard to take 'my nephews' and 'my students' to form a group (they may even not know each other). Eating the cookies in the jar is not naturally considered a collective action of my nephews and my student.

Similarly in (11) we won't naturally take 'this library' and "my father" to form a group (my father may not even know that there are seven copies of the book at this library). Here too, we wouldn't like to say that we have a collective state here.

Solution # 2: Follow Lasersohn 1995 and Kratzer (forthcoming) approach (in their analysis of *together*), according to this approach "Collective actions are actions by pluralities that have no subactions by anybody but those very same pluralities. Likewise, collective states have plural possessors who are also the possessors of all of their substates (Kratzer (forthcoming) chapter 4)".

However, adopting this strategy for the Semantics of *more<sub>add</sub>* faces two problems

First problem: The condition is met, but *more<sub>add</sub>* is infelicitous:

(12) *#John weighs 90 kilograms. Mary weighs 60 kilograms more (fine as a comparative only)*

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

Second problem: The condition is not met, but *more<sub>add</sub>* is felicitous

(13) *John interviewed some students in the office. Mary interviewed some more.*

In (13) there is a subevent of the summed eventuality ('interview (some) students') that has less than John +Mary as an agent: the subevent  $e_1$ , where Mary interviewed students, as well as the subevent  $e_2$  where John interviewed some students. So, the condition is not met, but nonetheless the sentence is fine.

### Solution # 3: Stages: The summed eventuality as a more developed version of its parts.

Consider again (14):

(14) *Yesterday John interviewed 5 students. Today he interviewed some more*

Intuitively, the summed eventuality  $e_3$ , is not only a sum of two eventualities – it is also a more 'developed' version than its parts: the use of *more<sub>add</sub>* in the assertion somehow advances a certain situation (e.g. the process of choosing which students to accept), and makes it more developed.

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). This gives us (15), as the DRT representation of (14), where  $<_s$  is the stage-of relation, and where the presupposition is underlined:

(15)  $[e_1, t, x, \underline{e_2, e_3, t', y, Q: t < n, \text{interview}(e_1), \text{Ag}(e_1) = j, \text{Th}(e_1) = x, *student(x), \tau(e) \subset t, \text{interview}(e_2, m, y), t' \leq t, *student(y), \tau(e_2) \subset t', Q(e_3), e_3 = (e_1 + e_2), \text{Ag}(e_3) = j + m, \text{The}(e_3) = x + y, e_1 <_s e_3, e_2 <_s e_3}]$

Thus, we end up with an eventuality which is strictly speaking a plural eventuality (with a plural sum as an agent) but there is a sense in which it is singular: We don't have merely summing of two parts (and thus merely a plurality of parts): rather the parts are also stages in a single development.

We can now explain the fact that *more<sub>add</sub>* operates on events, despite its nominal nature: The nominal additive *more* indirectly measures the summed event  $e_3$  by measuring the cardinality of the participants in the stages of this event. This is formally captured using Krifka 1989 derived measure functions, based on a homomorphism from the domain of eventualities to the domain of individuals, as in (16) (following Nakanishi's 2007 for a similar treatment of apparently 'nominal' measure functions in Japanese, which indirectly measure events).

(16)  $\forall e [f'(e) = f(h(e))]$  (where  $f'$  is the derived measure function, and  $h$  is the homomorphism)

The derived measure function with *more<sub>add</sub>* is additive. I.e. it doesn't merely measure (participants in) a single event. Rather – it measures the sum of (the participants in) two eventualities: the presupposed and asserted eventualities: The sum of the participants of the two events indirectly measures the resulting summed eventuality ( $e_3$ ). Consider (17):

(17) *Yesterday John interviewed 5 students. Today he interviewed 3 more*

In (17)  $f(h(e_1)) + f(h(e_2)) = f(h(e_3))$ . We end up with a cardinality of 8 as the value of the derived additive measure function measuring the number of students interviewed in the summed event  $e_3$ .

This now naturally explains the fact noted above: why the sets denoted by  $N_1$  and  $N_2$  cannot overlap: Additive (or extensive) measure function cannot involve overlapping entities:

(18) *A measure function  $f$  is additive iff  $\neg x O y$  and  $F(x) = n \ \& \ f(y) = m \rightarrow f(x \text{ SUM } y) = n + m$  (Moltman 2004, P. 296, see also Krifka 1998)*

**Extension:** The above treatment of the nominal additive *more* can be extended to post predicate *more<sub>add</sub>* as well, as in (19):

(19) *In the evening Mary ran some more / sang some more / read some more / developed her theory some more*

I will assume that here too the main operation of *some more* is additive: We start with two eventualities,  $e_1$  (asserted) and  $e_2$  (presupposed), which are summed together into a strictly speaking plural eventuality ( $e_3$ ). And here too  $e_1$  and  $e_2$  are not merely parts of  $e_3$  but, stages of  $e_3$ , i.e.  $e_3$  is a more developed version of  $e_1$  and  $e_2$  (and not merely their sum).

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 cardinality / size of the set of participants which indirectly measures  $e_3$ , but rather its duration / run time. I.e. the relevant homomorphism here is from the domain of events to the domain of times (the running times of events). And the relevant 'development' is done along the dimension of time.

**There are two main pieces of data supporting this direction:**

**Support #1:** Combining *more<sub>add</sub>* with stative predicates is problematic:

- (20) a. *Mary slept some more*  
 b. # *Mary was asleep some more*  
 c. ?? *Mary was sad / dirty / tired some more*

- But why should these be bad? If all we do with *more<sub>add</sub>* is sum eventualities (in this case states), and measure their duration / time, these should have been fine. There is no problem measuring the run time of states:

(21) *Mary was asleep from 3 to 6 / Mary was sad / tired for two days*

The reason has to do with the notion 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 part 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 – it is longer, but not more developed. Hence here e' cannot be considered a stage of e.

- If we are right that additivity expressed with *more<sub>add</sub>* involves stages, and a more developed summed eventuality - these facts can be explained.

-Support # 2: - Combining *more<sub>add</sub>* with achievements is problematic.

(22) *I arrived to the station (#some more) / I noticed you (#some more) / I found my shoe (#some more)*

Notice that using here *again* is absolutely fine:

(23) *I arrived to the station again / I noticed Mary again / I found my shoe again*

This can be explained as follows: 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 distinct eventualities.

And 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)).

Time permitting, I will compare the Semantics of *more<sub>add</sub>* in English, developed above, to its French and Italian counterparts *encore* and *ancora*, based on Tovená & Donnazan's 2008 analysis. I will show that these latter particles do not seem to be subject to the 'one eventuality' constraint on the Semantics of *more<sub>add</sub>*.

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