

The uniformity of nominal and verbal comparatives*

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1 Introduction

We consider two generalizations that have been proposed for nominal comparatives and investigate to what extent they hold with verbal comparatives.

(1) Nominal comparative

More students than professors came to the party

(2) Verbal comparative

John kicked the statue more than Mary

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After elaborating these generalizations in §2, we briefly discuss parallels between the nominal and verbal domain: (i) the mass/count distinction to VP telicity, (ii) grammatical number to grammatical aspect. In §3 we provide novel data from English, Spanish, Bulgarian, and Hindi, demonstrating that the properties of adverbial *more* are quite similar to those of nominal determiner *more*.

The first generalization comes from Hackl (2001), who provides a decompositional analysis of the nominal determiner *more*. He argues that it incorporates a measure function that orderly maps individuals to degrees on a scale of increasing cardinality. The requirement rules out singular count NPs, since their denotations would all be mapped to the trivial degree of one.

The second generalization concerns how the grammar constrains the scale of comparison. Bale & Barner (2009; a.o.) demonstrate that this depends not only on the ‘lexical’ properties of *more*’s NP arguments, but also number morphology, i.e. singular marked NPs are compared along any preferred dimension, whereas plural-marked NPs are obligatorily in terms of cardinality.

2 Nominal comparatives

Hackl considers a paradigm like (3a-b) as evidence that the determiner *more* requires semantically plural arguments.

- (3) a. There were more students than professors at the party
 b. #There was more student than professor at the party

The sentence in (3a) is true whenever the number of students that attended the party is greater than the number of professors that attended. To the extent that (3b) is interpretable, it does *not* have the meaning of the sentence in (3a), namely a comparison of individuals by cardinality.

He interprets the *-s* on NPs with *more* as the pluralizing **-operator* of Link (1983),¹ which combines with a set of atomic individuals (the extension of NP) and returns their closure under sum-formation (notated as \oplus).

Atoms are retained in the denotation of NP+*-s*, so examples like (6) are not ruled out; indeed, the denotation of NP and of NP+SG are identical, while that of NP+PL has the structure of a join semi-lattice.

(4) Link/Hackl-style interpretation of number morphology¹

a. $\llbracket \text{NP} \rrbracket = \{a, b, c\}$

b. $\text{SG}(\llbracket \text{NP} \rrbracket) = \llbracket \text{NP} \rrbracket = \{a, b, c\}$ $\text{PL}(\llbracket \text{NP} \rrbracket) = * \llbracket \text{NP} \rrbracket = \{a, b, c, ab, ac, bc, abc\}$

c. $\text{SG}(\llbracket \text{NP} \rrbracket) = \{ \quad a \quad b \quad c \quad \}$ $\text{PL}(\llbracket \text{NP} \rrbracket) = \{ \quad abc \quad \}$

$$ab \quad ac \quad bc$$

$$a \quad b \quad c$$

Hackl decomposes *more* into a measure function MANY and *-er*. MANY involves a non-trivial, orderly mapping of individual sums to degrees of cardinality, and *-er* compares those degrees.

¹For simplicity, we do not consider here alternative interpretations of *-s*, e.g. that it represents a ‘count’ functional head (e.g. Borer 2005, Bale & Barner 2009), nor an alternative characterization of Hackl’s distributional restriction in terms of plural variables (i.e., *more* does not combine with variables restricted to singular).

- (5) [λd [[*d*-MANY students] were at the party]] [*-er than* [λd [*d*-MANY professors]]]

Such an account naturally excludes singular count NPs in nominal comparatives as in (3b): the measure function that *more* incorporates maps all of the individuals in this denotation to the trivial degree of one.

2.1 Grammatical number

Hackl's empirical evidence for a plurality requirement on *more* is essentially limited to the paradigm in (3), yet it has been repeatedly debated whether the *-s* marking in English tracks semantic plurality (Krifka 1989, 1995; Schein 1993; Sauerland, Andersen, & Yatsushiro 2005; Borer 2005, a.o.).

Indeed, bare plurals sometimes convey the meaning 'at least one':

- (6) If you have children, please raise your hand

The speaker of (6) would not be taken to exclude parents of just one child. Further, and perhaps more convincingly, *-s* appears on NPs that most certainly do not denote pluralities:

- (7) One **cow** One-point-oh **cows** Zero **cows** (Krifka 1989)

Thus, while Hackl's proposal is conceptually appealing, the empirical evidence for it is scant. Does *more* require semantically plural arguments?

We observe that the best examples of *-s* as vacuous morphosyntactic agreement, namely (7), is challenged by cross-linguistic evidence that suggests the marking on NPs with numerals and NPs with *more* are different.

- (8) **Bulgarian - two plurals**

<i>osem stola</i>	* <i>osem stolove</i>	<i>poveče stolove</i>	* <i>poveče stola</i>
eight chair-PL1	eight chair-PL2	more chair-PL2	more chair-PL1
'eight chairs'		'more chairs'	

Further, PL2 is used for bare plurals, whereas *chair*+PL1 in this context is ungrammatical.

- (9) **Bulgarian - bare plurals**

<i>V stajata ima stolove</i>	* <i>V stajata ima stola</i>
in the-room has chair-PL2	in the-room has chair-PL1
'There are chairs in the room'	*'There are chairs in the room'

We see a similar pattern to (8) and (9) in Finnish with singular and plural partitive marking.

- (10) **Finnish - two plurals/bare plurals**

<i>kahdeksan tuolia</i>	<i>enemmän tuoleja</i>	<i>Huoneessa on tuoleja</i>
eight chair-PART.SG	more chair-PART.PL	Room-INESSIVE is chair-PART.PL
'eight chairs'	'more chairs'	'There are chairs in the room'

These facts suggest that *-s* marking on NPs in English may spell out two different underlying functional categories—that which appears on arguments to *more* may signal semantic plurality and the other morphosyntactic agreement.

2.2 Individuals and extents

We may extend Hackl's proposal to mass nouns (where *more* would decompose into *much* plus *-er*) if we assume these also denote join semi-lattices (e.g. Link 1983, Chierchia 1998; a.o.). In these cases, entities or portions of stuff may be similarly non-trivially mapped to degrees on a quantity scale.

Of course, the comparative determiner easily combines with mass NPs.

(11) There was more wine than beer at the party *measure: volume/...*

Interestingly, mass NPs may also be compared along a cardinal dimension:

(12) Mary has more luggage than furniture

(12) is most naturally construed as a comparison of numbers of pieces of luggage, and of pieces of furniture.

Yet, as Bale & Barner (2009) point out, adding plural *-s* requires comparison in terms of cardinality:

(13) Mary brought more waters than coffees *measure: cardinality of servings/...*

While the preferred scale for measurement for singular-marked NPs is idiosyncratic to the predicate, cardinality (any way you can get it) is necessarily chosen as the dimension of comparison when NPs are marked with *-s* in English (see Barner & Snedeker 2005 for an experimental demonstration).

It is clear (see e.g. Gillon 1992) that the denotation of a given NP depends on multiple factors.

(14) Factors relevant for NP denotation

- 'Lexical':² is the NP **mass?** **count?**
- 'Grammatical': **singular?** **'plural'?**

We can see that, for nominal comparatives, the interpretation depends on the interaction of these factors, as the examples in (15) show.

- (15)
- | | |
|--|--|
| a. I have more coffee than Mary does | <i>measure: weight/volume/...</i> |
| b. ?I have more coffees than Mary does | <i>measure: cardinality (servings/kinds/...)</i> |
| c. #I have more toy than John does | <i>measure: ??</i> |
| d. I have more toys than John does | <i>measure: cardinality (objects)</i> |

For concreteness, we can show that these interactions have truth-conditional effects. Consider the pattern of judgments for English speakers in a scenario where Mary has three (100ml) bottles of water, and John two big (5000ml) bottles.

²It is not entirely appropriate to say 'lexical' factors, if e.g. Borer (2005) is right, and all nouns (cross-linguistically) are lexically mass, and come to be 'count' only when combined with *-s*. Under such a view, the oddity of examples like (3b) arises because we have avoided using plural inflection, which is what we must do if we wish to express that the student-and professor-stuff is actually constituted of individuals. For the purposes of this paper, we will continue to talk about two 'levels' of meaning: 'lexical' and 'grammatical'.

(16) English mass NP

- a. Mary has more **waters** than John does *measure: cardinality*
b. Mary has more **water** than John does *measure: volume*

English informants³ judge (16b) with *water* to be false in this situation, since the total quantity that Mary possesses is less than the quantity John possesses. However, (16a) with *waters* is judged true, since the number of *units* possessed by Mary is greater than the number possessed by John.

2.3 Interim conclusions & generalizations

Theories of *adjectival* comparatives posit a measure function that relates individuals and degrees in an order-preserving way (von Stechow, 1984; Kennedy, 1999; Bale, 2008, a.o.). The (totally ordered) set of such degrees forms a scale.

If a measure function μ is order-preserving, and if *John is happier than Mary*, then μ maps *John* to a higher degree on the scale associated with *happy* than it does *Mary*. The dimension of a given scale is idiosyncratic to the adjective – e.g., *tall* refers to degrees on a scale of height, *beautiful* refers to degrees on a scale of beauty.

A measure function analysis of nominal determiner *more* is suggested by its distributional restrictions, as Hackl (2001) argued. As we showed, *more* combines with plural count *or* mass NPs, to the exclusion of singular count. Yet, the scale of comparison is idiosyncratic to the NP only in the absence of *-s* marking.

(17) Generalizations - nominal comparatives

- I Singular count NPs do not combine with the determiner *more*. (e.g. #*more student*)
- II The scale for comparison of singular-marked mass NPs is **underspecified**. (e.g. *more furniture, more water*)
- III The scale for comparison of plural-marked NPs is in terms of **cardinality**. (e.g. ?*more furnitures, more waters*)

3 Verbal comparatives

Are measure functions relevant for the interpretation of verbal comparatives like (18a-c)?

- (18) a. Mary ran more than John did
b. Mary climbed the mountain more than John did
c. Mary reached the top more than John did

Intuitively, (18a) can be true if the distance Mary ran was greater than that run by John, and (18b-c) can be true if Mary's climbings of the mountain or reachings of the top were more numerous than John's.

³The same holds for Spanish: *María tiene más agua que Juan* is judged by volume, whereas *María tiene más aguas que Juan* is judged by cardinality. Also in Bulgarian: *Maria ima poveče voda* [mass] *ot Ivan* is judged by volume, and *Maria ima poveče vodi* [plural] *ot Ivan* is judged by cardinality.

Nakanishi (2007) discusses a measure function, which measures events just in case the measurement is monotonic w.r.t. the domain being measured (à la Schwarzschild 2002):⁴ it is only defined for domains that may be non-trivially ordered by a part-of relation.

She cites compatibility with ‘repeatable’, Stage-level, and distributive predicates, but incompatibility with ‘once only’, Individual-level, or collective predicates as evidence for such a constraint. Interestingly, this pattern is reproduced with verbal comparatives in English (19a-f).

- (19)
- | | | |
|----|---|---------------------|
| a. | John hit the rabbit more than Mary did | <i>‘repeatable’</i> |
| b. | #John killed the rabbit more than Mary did | <i>‘once only’</i> |
| c. | Mary is available more than John is | <i>S-level</i> |
| d. | #Mary is a superstar more than John is | <i>I-level</i> |
| e. | The girls formed circles more than the boys did | $\pm coll$ |
| f. | #The girls formed a circle more than the boys did | $+coll$ |

These data support the idea that Nakanishi’s monotonicity constraint, which is similar if not identical to Hackl’s ‘plurality’ requirement for MANY in the nominal domain, applies to verbal comparatives.

If this is so, we should be able to precisify the distribution of adverbial *more* in a way that parallels that of determiner *more*. In particular, do ‘lexical’ and ‘grammatical’ properties here conspire to determine the interpretation of verbal comparatives?

Count/mass NPs are said to parallel telic/atelic VPs (as explored by Mourelatos 1978, Hoepelman & Rohrer 1980, Bach 1986, Krifka 1989, Borer 2005, a.o.). Of Vendler (1967)’s classes, *stative* and *activity* (or, *atelic*) predicates are mass-y, whereas *accomplishments* and *achievements* (*telic*) predicates are count-like.⁵

(If we may hold vagueness/granularity issues aside...:)

(20) **As for mass NPs, so for atelic VPs**

Two sub-portions of a quantity of *water* count as a quantity of *water*, just as two sub-intervals of a *running* event count as an interval of *running*

(21) **As for singular count NPs, so for (singular) telic VPs**

There’s no guarantee, apart from the trivial case, that sub-portions of a *boy* count as a *boy*, or that sub-events/intervals of a *kick the statue* event count as a *kick*.

Is there a parallel to grammatical number in the verbal domain, so that we can observe the verbal equivalent of plural count NPs? If so, can we observe parallels to (i) Hackl’s ‘plurality’ requirement, and (ii) constraints on the choice of measure function in this domain?

3.1 Verbal number

Number morphology has been seen to parallel grammatical aspect on VPs (Ferreira 2005, van Geenhoven 2005): perfective (PFV) involves singular events (which may be quantified over by adverbials like *always* to yield multiple events) and imperfective-habitual (IMPF-HAB) involves plural events.

⁴Nakanishi was discussing split measure phrases in Japanese, but the monotonicity constraint she discusses is similarly observed in other constructions, e.g. quantification at a distance in French (Burnett 2009), and constructions with verbal additive *more* (Greenberg 2009): in all of these cases, predicates of a ‘singular count’ variety are ruled out, while mass-like and plural-count-like predicates are acceptable.

⁵For reasons of time/space, we will discuss only activity, accomplishment, and achievement predicates.

VPs may describe a singular event or a plurality of events. We can see this in English by the interpretive effects of interactions between telic and atelic VPs with particular adverbial modifiers. (These examples adapted from van Geenhoven 2005.)

With an atelic predicate and a *for*-adverbial, the sentence allows two types of interpretations: one involving a durative, singular event (22a), and one involving a plurality of events (22b):

(22) **English Activity - Atelic**

John ran in the park for two days

- a. *For two days John ran in the park nonstop* *continuative*
- b. *For two days John ran in the park frequently* *frequentative*

In English, (non-durative) telic predicates with a *for*-adverbial are only acceptable to the extent they allow an iterated-event interpretation ([23b], but not [23a]):

(23) **English Achievement - Telic**

?The bomb exploded for a long time

- a. *#The bomb's (single) explosion went on and on* **continuative*
- b. *?The bomb exploded again and again for a long time* *?frequentative*

When these predicates are in a verbal comparative, this pattern reflects what scales are available.

(24) **English Activity - multiple scales**

John ran in the park more than Mary *measure: cardinality, duration, distance*

(25) **English Achievement - cardinality scale**

?John's bomb exploded more than Mary's bomb *measure: ?cardinality*

It appears that, so far, the choice of scale depends purely on the VP's 'lexical' properties. However, with the construction *used to* (which often expresses habitual aspect in English), some sensitivity emerges:

- (26) a. John used to run more than Mary, but Mary always ran farther
- b. #John used to run more than Mary, but Mary always ran more often

Since (26b) strikes informants as contradictory, whereas (26a) is fine; it appears that the measure in the first conjunct is by cardinality.

3.2 Grammatical aspect

We would like to expand on the parallels between the nominal/verbal domains, to see if it gives us a foothold on the interpretation of verbal comparatives.

(27) **Correspondences between NPs/VPs**

	<i>Nominal domain</i>	<i>Verbal domain</i>
'lexical'	mass/count	atelic/telic
'grammatical'	singular/plural	perfective/impf-habitual

If these parallels are on the right track, then we may construct three predictions based off of the generalizations we isolated for nominal comparatives:

(28)

Generalizations - determiner <i>more</i>		Predictions - adverbial <i>more</i>	
I	Singular count NPs do not combine with the determiner <i>more</i> .	I	Perfective telic predicates do not combine with adverbial <i>more</i> .
II	The scale for comparison of singular-marked mass NPs is underspecified .	II	The scale for comparison of perfective-marked atelic predicates is underspecified .
III	The scale for comparison of NPs marked with plural morphology is in terms of cardinality .	III	The scale for comparison of VPs with IMPF-HAB morphology is in terms of cardinality .

In particular, we want to see whether Hackl's/Nakanishi's requirement holds here, and whether choice of aspectual morphology can grammatically determine the relevant scale for comparison.

We turn to Bulgarian, Spanish, and Hindi to check these predictions.

3.2.1 PERFECTIVE - Bulgarian, Spanish, Hindi

Prediction I: Telic predicates marked perfective will not combine with the comparative *more*, paralleling the unacceptability of the determiner *more* with singular count NPs.

(29) ***Bulgarian - Accomplishment** - PFV

**Minalata sedmica Ivan izkaçi vrâh Musala poveče ot Maria*
 last week Ivan climb-PFV.PAST top Musala more from Maria
 *'Last week, Ivan climbed Musala more than Maria'

(30) ***Spanish - Accomplishment** - PFV

**La semana pasada Juan subió al Mt.Tom más que María*
 the week past Juan climbed-PFV the Mt.Tom more than María
 'Last week, Juan climbed Mt.Tom more than María'

(31) ***Hindi - Achievement** - PFV

**John uupar-tak Mary-se zyaadaa pahunc-aa*
 John top-till Mary-than more reach-PFV
 'John reached the top more than Mary'

Indeed, in all three languages, telic predicates with PFV are unacceptable.

Our second prediction is that the scale for comparison of atelic predicates with perfective morphology is not grammatically restricted.

(32) **Bulgarian - Activity - PFV**

Minalata sedmica Ivan igra poveče ot Maria
last week Ivan play-PFV.PAST more from Maria
'Last week, Ivan played more than Maria'

(33) **Spanish - Activity - PFV**

La semana pasada Juan corrió más que María
the week past Juan run-PFV more than María
'Last week, Juan ran more than María'

(34) **Hindi - Activity - PFV**

John Mary-se zyaadaa dauR-aa
John Mary-than more run-PFV
'John ran more than Mary'

Informants judge the comparative with an activity predicate in terms of either cardinality, temporal duration, or spatial distance, depending on preference: thus the analogy between perfective-marked telic predicates with singular-marked mass NPs is observed to hold.

3.2.2 IMPERFECTIVE-HABITUAL - Bulgarian, Spanish, Hindi

Our third prediction is that the scale for comparison of atelic and telic predicates with imperfective-habitual morphology is (obligatorily) in terms of cardinality. For telic predicates, informants confirm this is the case:

(35) **Bulgarian - Accomplishment - IMPF**

V onezi dni Ivan izkačvasê vrâh Musala poveče ot Maria
in those days Ivan climb-IMPF.PAST top Musala more from Maria
'In those days, Ivan climbed Musala more than Maria'

(36) **Spanish - Accomplishment - IMPF**

En esos días Juan subía al Mt.Tom más que María
in those days Juan climbed-IMPF the Mt.Tom more than María
'In those days, Juan climbed Mt. Tom more than María'

(37) **Hindi - Accomplishment - HAB**

Ram yeh film Sita-se zyaadaa dekh-taa hai
Ram this film.F Sita-than more see-HAB be.PRS
'Ram watched this film more than Sita'

For our Bulgarian and Spanish informants, judgments for activity predicates are not as sharp as for the analogous cases in the nominal domain (*water* v. *waters*), although they are **preferentially** evaluated in terms of cardinality:

(38) **Bulgarian - Activity - IMPF**

V onezi dni Ivan igraeše poveče ot Maria
in those days Ivan play-IMPF.PAST more from Maria
'In those days, Ivan played more than Maria'

(39) **Spanish - Activity - IMPF**

En esos días Juan corría más que María
in those days Juan run-IMPF more than María
'In those days, Juan ran more than María'

(40) **Hindi - Activity - HAB**

John Mary-se zyaadaa dauR-taa hai
John Mary-than more ran-HAB be.PRES
'These days, John runs more than Mary'

Prediction III is (mostly) confirmed: both activities and accomplishments/achievements are compatible with IMPF-HAB, and the (preferred) dimension of comparison is in terms of numbers of events.

3.3 The influence of aspect

We are faced with a puzzle: Bulgarian and Spanish speakers admit comparisons that are not strictly by cardinality when atelic predicates appear with IMPF morphology. Has the correspondence between nominal and adverbial *more* broken down?

According to Ferreira (2005), IMPF in Romance underdetermines habitual and progressive (PROG) aspect. Since for him the former involves singular events and the latter plural, it may be that our informants are getting interference from a PROG interpretation.

We require a finer-grained test of the influence of aspect: in Hindi, the distinction between HAB and PROG is morphologically unambiguous, so we will use this as our illustrative language to truly test Prediction III.

(41) *Context for interpretation*

When they were in college, each week John ran n times for x distance each time, Mary ran m times for y distance each time, consequently John ran $n * x$ each week and Mary ran $m * y$ each week. In this situation, can it be true that [sentence]?

The sentences show *zyaadaa* (to run) +HAB and +PFV, for each $John > Mary$, $Mary > John$.

(42) **Situation A: John more events, less (individual event & total) distance**

	<i>John</i>	<i>Mary</i>
# of events	4	2
duration each	2	5
total duration	8	10

(43) **Hindi - Situation A judgments**

Gloss: x y -than more run+ASP AUX	true- \top , false- \perp ?
<i>John Mary-se zyaadaa dauR-taa_{hab} hai</i>	\top
<i>John Mary-se zyaadaa dauR-aa_{pfv} hai</i>	\perp
<i>Mary John-se zyaadaa dauR-tii_{hab} hai</i>	\perp
<i>Mary John-se zyaadaa dauR-ii_{pfv} hai</i>	\top

In A, run+HAB is true whenever x (the non-*se*-marked argument) ran more times than that of the than-clause subject y , and PFV x 's (individual event) running time was greater than y 's.

(44) **Situation B: John less events, more (individual event) distance**

	John	Mary
# of events	2	3
duration each	5	4
total duration	10	12

(45) **Hindi - Situation B judgments**

<i>John Mary-se zyaadaa dauR-taa_{hab} hai</i>	\perp
<i>John Mary-se zyaadaa dauR-aa_{pfv} hai</i>	\top
<i>Mary John-se zyaadaa dauR-tii_{hab} hai</i>	\top
<i>Mary John-se zyaadaa dauR-ii_{pfv} hai</i>	\perp

In situation B, the same pattern obtains. Prediction III is confirmed.

3.4 Conclusions & generalizations

Adverbial comparatives are very similar in their distribution, and in the way grammar constrains the choice of scale, to nominal comparatives. Thus we restate our predictions for adverbial *more* as descriptive generalizations.

(46)

Generalizations - determiner <i>more</i>	Generalizations - adverbial <i>more</i>
I Singular count NPs do not combine with the determiner <i>more</i> .	I Perfective telic predicates do not combine with adverbial <i>more</i> .
II The scale for comparison of singular-marked mass NPs is underspecified .	II The scale for comparison of perfective-marked atelic predicates is underspecified .
III The scale for comparison of NPs marked with -s is in terms of cardinality .	III The scale for comparison of VPs with IMPF-HAB morphology is (mainly) in terms of cardinality .

Our data and discussion suggest the desirability of a common, comparative semantics for *more* across its nominal and verbal occurrences. This semantics must capture *more*'s anti-singular requirement, and how the grammar determines the dimension for comparison.

If the measure and comparison of VP denotations is dependent on the possibility of an orderly mapping of events to positions on different scales, then a decompositional account in terms of measure functions is desirable, perhaps along the lines of Hackl (2001).

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