Measuring and Comparing Individuals and Events

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Abstract

This squib investigates parallels between nominal and verbal comparatives. Building on key insights of Hackl (2000) and Bale & Barner (2009), we show that *more* behaves uniformly when it combines with nominal and verbal predicates: (i) it cannot combine with singular count NPs or perfective telic VPs; (ii) grammatical properties of the predicates determine the scale of comparison—plural marked NPs and habitual VPs are compared on a scale of cardinality, whereas mass NPs and perfective (atelic) VPs are (often) compared along non-cardinal, though monotonic, scales. Taken together, our findings confirm and strengthen parallels that have independently been drawn between the nominal and verbal domains. In addition, our discussion and data, drawn from English, Spanish, and Bulgarian, suggest that the semantic contribution of *more* can be given a uniform analysis.

1 INTRODUCTION

The literature on comparatives has focused almost exclusively on ad–jectival comparatives, as in (1). Much less attention has been extended to nominal and verbal comparatives, as in (2) and (3).

(1) **Adjectival comparative**

   The student is **more** intelligent than the professor.

(2) **Nominal comparative**

   More students than professors came to the party.

(3) **Verbal comparative**

   The student ran **more** than the professor did.

  By broadening the discussion to nominal and verbal comparatives, we can ask whether *more* has a uniform semantics across different

predicate types. Specifically, we can investigate how *more* interacts with the singular/plural and count/mass distinctions on the one hand and with perfective/imperfective viewpoint aspect and telic/atelic aktionsart on the other and see whether formal similarities between these phenomena extend to comparison as well.

Building on key insights of Hackl (2000) and Bale & Barner (2009), we show that *more* behaves in a uniform way when it combines with nominal and verbal predicates, in that it does not compose with singular count NPs or perfective telic VPs, and grammatical properties of the predicates it composes with determine the scale of comparison—plural marked NPs and imperfective-habitual VPs are compared on a scale of cardinality, whereas mass NPs and perfective (atelic) VPs are (often) compared along non-cardinal scales, so long as these are monotonic (Schwarzschild 2002, 2006) with respect to the predicate.

Taken together, our findings confirm and strengthen parallels that have independently been drawn between the nominal and verbal domains: mass corresponds to atelic, count to telic and semantically plural to imperfective-habitual. In addition, our discussion and data, drawn from English, Spanish and Bulgarian, will suggest that the semantic contribution of *more* can be given a uniform analysis.

In one of the earliest formal accounts of nominal comparatives, Hackl (2000, 2001) adopts an important idea from the semantics of adjectival comparatives, proposing that the determiner *more* incorporates a measure function. In the adjectival domain, such measure functions relate individuals and degrees in an order-preserving way (von Stechow 1984; Kennedy 1999; Bale 2008, among others). The (totally ordered) set of degrees forms a scale, so that if *John is happier than Mary*, a measure function maps *John* to a higher degree on the scale associated with *happy* than it does *Mary*. Hackl (2001) argues for a similar analysis of nominal comparatives based partially on the distribution of determiner *more*: it combines with plural count (or mass NPs), to the exclusion of singular count. This, Hackl argues, is the result of *more*'s decomposition into the measure function MANY and a quantifier *-er*. A second important generalization observed by Bale & Barner (2009) is that the scale of comparison for nominal comparatives with plural marked NPs is always in terms of cardinality, whereas it is idiosyncratic to mass NPs when not plural marked. Measurement here is not unconstrained: any measure chosen must be monotonic with respect to the NP, as Schwarzschild (2006) observed for *much*.

We consider these three generalizations about nominal comparatives and show that correlative facts obtain for verbal comparatives: *more* does not combine with singular count NPs nor perfective telic VPs; the scale

of comparison depends on (i) the mass/count and singular/plural status of the argument NPs and (ii) the telic/atelic and viewpoint aspect of the VP: and measurement in the nominal domain must be monotonic, i.e. in terms of cardinality for plurals and for imperfective-habituals and other monotonic measures for masses and atelics.

2 NOMINAL COMPARATIVES

Hackl (2000) considers a paradigm like (4a–b) as evidence that the determiner *more* requires semantically plural arguments.

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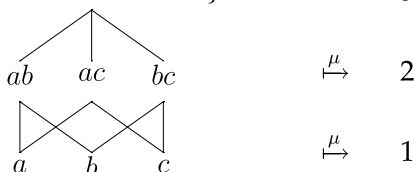
b.#There was more student than professor at the party.

The -*s*-marking on NPs with *more* is interpreted 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 ⊕). Atoms are retained in the denotation of NP+-*s*. This analysis of number morphology is crucial for Hackl's argument that *more* decomposes into a measure function MANY and the comparative quantifier -*er*: MANY involves a non-trivial, orderly mapping of individual sums to degrees of cardinality and -*er* compares the maximal degrees of each NP.

(5)   **Link/Hackl-style interpretation of number morphology**[1]

a. $[\![\text{NP}]\!] = \{a, b, c\}$

b. SG($[\![\text{NP}]\!]$) = $[\![\text{NP}]\!]$ = { a b c } $\overset{\mu}{\mapsto}$ 1

c. PL($[\![\text{NP}]\!]$) = *$[\![\text{NP}]\!]$ = { abc } $\overset{\mu}{\mapsto}$ 3

Following Hackl, the lexical semantics for MANY and -*er* are given in (6), where x ranges over entities of type e, and D, D' over predicates of type dt.[2]

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[1] For 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).

[2] This interpretation (essentially a formalization of Bresnan 1973) is adopted by Hackl (2000) and Nakanishi (2004). Hackl (2000) later argues for a 'parameterized determiner' analysis which takes the NP and VP as arguments in addition to a degree variable, but this is not important for our purposes.

(6)   a. $[\![\text{MANY}]\!] = \lambda d \lambda x.|x| = d$
        b. $[\![\text{-er}]\!] = \lambda D \lambda D'.max(D') > max(D)$

We obtain the LF and truth conditions for (2) as in (7).

(7)   a. [$\lambda d.d$-MANY students came to the party] [**-er** [than
           [$\lambda d.d$-MANY professors ~~came to the party~~]]]
        b. The students that came to the party outnumber the
           professors that came to the party

Hackl formalizes the plurality requirement on *many* as a definedness condition on its degree argument, ensuring that it ranges over degrees of cardinality. Such an account naturally captures the distribution of *more* as excluding combination with singular count NPs: the measure function that *more* incorporates maps all the individuals in this denotation to the trivial degree of one. Triviality, then, excludes assigning a cardinality interpretation to a sentence like (8).

(8) #More student than professor was at the party.   *(#cardinality reading)*

We adopt this proposal, conceptually appealing as it is, but are wary that Hackl's evidence for a plurality requirement on the count determiner *more* is essentially limited to the paradigm in (4). It is unclear how good this evidence is, as it has been repeatedly debated whether the *-s* marking in English in fact tracks semantic plurality (Krifka 1989, 1995; Schein 1993; Borer 2005; Sauerland et al. 2005, among others). For example, *-s* appears on NPs that most certainly do not denote pluralities:

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

Yet, it is premature to conclude that *-s* does not mark semantic plurality. In Bulgarian, the marker that appears on NPs with numerals is different from that which appears on NP arguments to *more*, as in (10), and it is this latter marker that appears on bare plurals as in (11) and (12).[3]

(10) **Bulgarian – two plurals**
        a. *osem **stola***   **osem **stolove***
            eight chair-PL1   eight chair-PL2
            'eight chairs'

        b. *poveče **stolove***   **poveče **stola***
            more chair-PL2   more chair-PL1
            'more chairs'

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[3] This paradigm is limited to masculine nouns.

(11) **Bulgarian – bare plurals**

> *Kupih* **stolove**.　　　　　*Kupih* **stola**.
> bought–I.SG chair–PL2　　bought–I.SG chair–PL1
> 'I bought chairs.'　　　　*'I bought chairs.'

(12) **Bulgarian – bare plurals in existential constructions**

> *V stajata ima* **stolove**.　　　　　**V stajata ima* **stola**.
> in the–room has chair–PL2　　　in the–room has chair–PL1
> 'There are chairs in the room.' *'There are chairs in the room.'

A similar pattern occurs in Finnish, where NPs with numerals bear partitive singular case, whereas bare plurals occurring with *more* and in existential constructions bear partitive plural case:

(13) **Finnish – two plurals**

> kahdeksan tuolia　　　enemmän tuoleja
> eight chair–PART.SG　more chair–PART.PL
> 'eight chairs'　　　　　'more chairs'

(14) **Finnish – bare plurals**

> Huoneessa on tuoleja.　　　　　Ostin tuoleja.
> room–INESSIVE is chair–PART.PL　bought–I.SG chair–PART.PL
> 'There are chairs in the room.'　'I bought chairs.'

Indeed, the crosslinguistic facts are suggestive at least that the *-s* marking on NPs in English may spell out two underlyingly different functional categories: that appearing on arguments to *more* signals semantic plurality and the other marks morphosyntactic agreement.

Hackl's analysis of determiner *more* took into account combination with plural marked NPs, but his proposal may be extended to mass NPs. In this case, *more* decomposes into *much* plus *-er*, given facts like those in (15).

(15)　much coffee　　　　　many coffees　　　　#much coffees
　　　#many coffee

We may assume, following Link (1983) and Chierchia (1998) among others, that mass NPs also denote join semi-lattices.[4] Then Hackl's 'plurality' requirement becomes a requirement for structured domains. In the case of mass NPs, the comparative is usually evaluated in terms of portions of matter that are compared on a non-cardinal scale, e.g. by volume as in (16).

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[4] Bale & Barner (2009) write that *furniture* may have a denotation like the NP in (5); other nouns may denote 'limited' semi-lattices, whose minimal parts are not necessarily atoms, e.g. *succotash*, or perhaps even 'continuous' semi-lattices, which have no minimal parts at all, e.g. *space*, but which are mathematically well-defined.

(16) More beer than wine was drunk.

Given this, we may posit a denotation for *much* in (17) and give the LF and truth conditions for (16) as in (18).

(17) $[\![much]\!] = \lambda d\lambda x.\mu(x) = d$

(18)   a. [$\lambda d.d$-MUCH beer was drunk] [**–er** [than [$\lambda d.d$-MUCH wine ~~was drunk~~]]]

    b. The amount of beer that was drunk exceeded the amount of wine that was drunk

Interestingly, the scale of comparison is allowed to vary when the comparees are not plural marked, as Bale & Barner (2009) observe: in (19) with the mass NPs *luggage* and *furniture*, it is typically the number of individuals satisfying each NP's description that is compared along a cardinal dimension. Bale and Barner conclude from facts like these that the absence of plural morphology underdetermines the scale, so that it is idiosyncratic to the NP's 'lexical' properties.[5]

(19) Mary has more luggage than furniture.

Regardless of the type of NP, adding plural *-s* obligatorily requires comparison in terms of cardinality: (20) is compared in terms of number of servings or kinds or of some other individuated quantity [see Barner & Snedeker (2005) for an experimental demonstration].

(20) Mary brought more waters than coffees.

It is clear (see e.g. Gillon 1992) that the denotation of a given NP depends on 'lexical', like whether the NP is mass or count,[6] and 'grammatical' factors, whether the NP bears singular or plural morphology. In nominal comparatives, the choice of scale depends at least on the interaction of these factors.

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[5] It is not clear that NPs like *furniture*, *cattle*, *luggage*, etc., are not accompanied by more functional structure that then triggers combination with MANY+*er* rather than MUCH+*-er*. We leave this an open question, although see below for more discussion in this domain and parallel discussion in the domain of events.

[6] It 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 (4b) 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', though our use of 'lexical' should not be taken as an endorsement that the count/mass distinction is not derived grammatically.

(21)   a. I have more coffee than Mary does.   *measure: weight/volume/…*

        b. I have more coffees than Mary does.   *measure: cardinality (servings/kinds/…)*

        c.#I have more toy than John does.   *measure: ??*

        d. I have more toys than John does.   *measure: cardinality (objects)*

While plural morphology forces comparison by cardinality, mass NPs vary considerably more in their dimension of measurement. However, this variety is constrained to dimensions that are (still) monotonic with respect to the NP: as an anonymous reviewer notes, (21a) cannot describe that my coffee is stronger than Mary's, only that I have a greater quantity of it.[7] We take such a requirement [see Schwarzschild (2002, 2006) for many cases where this generalization applies] to relate to the definedness condition on *much/many*, which requires domains that can only be ordered non-trivially by the part-of relation.[8]

These interactions have truth-conditional effects: consider the pattern of judgments for English speakers in a scenario where Mary has three (100 ml) bottles of water and John two big (5000 ml) bottles.

(22)   a. Mary has more **waters** than John does.   *measure: cardinality*

        b. Mary has more **water** than John does.   *measure: volume*

English informants judge (22b) with *water* to be false in this situation since the total quantity that Mary possesses is less than the quantity John possesses. However, (22a) with *waters* is judged true since the number of *units* possessed by Mary is greater than the number possessed by John.[9]

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[7] Another anonymous reviewer points out that the monotonicity requirement cannot be attributed to *more* when it combines with adjectives and the same is true when *more* combines with adverbs (e.g. *more loudly*). In these cases, the adjective and adverb incorporate measure functions which themselves impose the relevant ordering. We take this difference to show that the monotonicity requirement is associated with the measure functions MANY/MUCH that combine with NPs and VPs.

[8] The same reviewer points out that since monotonicity is not restricted to *many*'s interpretation but applies to expressions like *lots of* as well, the monotonicity requirement may not *strictly* be due to *much/many*'s definedness condition. Rather, it may be due to the nature of measurement in the nominal (and verbal) domains more generally.

[9] The 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.

Taking together the proposal of Hackl (2001), the observations of Bale & Barner (2009) and the monotonicity requirement of Schwarzschild (2006), we isolate four generalizations that hold for nominal comparatives.

(23) **Generalizations – nominal comparatives**

     I Singular count NPs do not combine with the determiner *more. (e.g. #more student)*

     II The scales of comparison for NPs are necessarily monotonic (in terms of cardinality or otherwise).

     III The scale for comparison of non-plural marked mass NPs is **variable**, i.e. determined by properties of the nominal predicate. *(e.g. more furniture, more water)*

     IV The scale for comparison of plural marked NPs is in terms of **cardinality** only.[10] *(e.g. ?more furnitures, more waters, more toys)*

Next, we show that correlative generalizations hold for verbal comparatives.

3 VERBAL COMPARATIVES

3.1 *English*

In this section, we ask whether measure functions are relevant for the interpretation of verbal comparatives like (24a–c).

(24)   a. Mary ran more than John did.

       b. Mary reached the top more than John did.

Intuitively, (24a) can be true if the distance or duration such that *Mary ran* that distance was greater than that run by *John* and (24b) can be true if *Mary*'s reachings of the top were more numerous than *John*'s.

There are precedents in the literature for positing measure functions in the verbal domain, and these have been shown to demonstrate certain

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[10] Satoshi Tomioka (personal communication) points out that this generalization would seem to face a class of counterexamples, considering sentences with what appear to be plural marked NPs like *beans* that seem to call for a comparison by quantity, e.g. *more beans*. We have no analysis of this, except to say that whatever allows *beans* to combine with *much* as in *how much beans do you want?* despite the plural marking is presumably also present when *much beans* appears in the comparative. This expression is compared by some quantity measure; in contrast, *-er many beans* requires comparison by cardinality.

distributional constraints of the kind Hackl observed for nominal comparatives. Nakanishi (2004) proposes a measure function like Hackl's MANY that associates degrees with events and later (Nakanishi 2004, 2007b) discusses constraints on such functions: they are defined only for domains that may be non-trivially ordered by the part-of relation, and their measurements are monotonic.[11]

Nakanishi cites compatibility with 'repeatable', stage-level and distributive predicates, but incompatibility with 'once only', individual-level or collective predicates, as evidence for such a measure function. We observe that this distributional pattern is reproduced with verbal comparatives in English, as in (25a–f).

(25)
  a. John hit the rabbit more than Mary did.
   'repeatable'
  b. #John killed the rabbit more than Mary did.
   'once only'
  c. Mary is available more than John is.
   S-level
  d. #Mary is a superstar more than John is.
   I-level
  e. The girls raised their hand more than the boys did.
   distributive
  f. #The girls formed a circle together more than the boys did.
   collective

In (25a,b), the comparison is acceptable only to the extent that the VP can be interpreted as denoting a plurality of events. Intuitively, in (25c,d), the comparison is acceptable only if *Mary* and *John* can satisfy the predicate more than once. In (25e,f), the comparison is only acceptable when the predicate receives a distributive interpretation. We think that these data provide our first hint that adverbial *more* incorporates a measure function akin to MANY/MUCH, just like nominal *more*.

If such an analysis for adverbial *more* exists, we should see the distribution of adverbial *more* as parallel to that of determiner *more*, and aspectual properties should conspire to determine the scale of comparison, in

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[11] We note that this constraint may be observed at work in other constructions and across languages, e.g. quantification at a distance in French (Burnett 2009), and constructions with verbal additive *more* (Greenberg 2010). In much of these cases, predicates of a 'singular count' variety are ruled out, while mass- and plural-count-like predicates are acceptable.

a fashion similar to what Bale and Barner observed for nominals. To see if this is the case, we first consider some parallels between the nominal and verbal domains that have been proposed by many researchers.

The count/mass distinction is often said to parallel telicity in the verbal domain (e.g. Mourelatos 1978; Hoepelman & Rohrer 1980; Bach 1986; Krifka 1989; Rothstein 2004; Borer 2005, among others). It has been observed that, of Vendler's (1967) classes, stative and activity (or *atelic*) predicates are mass-like, whereas accomplishments and achievements (*telic*) predicates are count-like.[12] To the extent that we may hold vagueness/issues of granularity aside, mass and atelic terms display a characteristic homogeneity that singular count and telic predicates typically lack. In particular, two portions of a quantity of *water* each count as a quantity of *water*, just as two intervals of a *running* event may each count as an interval of *running*. Yet there is no guarantee, apart from the trivial case, that two portions of *a boy* count as *a boy* or that sub-events/intervals of a (single) *kick the statue* event count as a *kick the statue* event.

In terms of the verbal equivalent of plural count predicates, number morphology on NPs has been seen to parallel grammatical aspect on VPs (Ferreira 2005; van Geenhoven 2005): perfective (PFV) and progressive (PROG) involve **singular** events (which may be quantified over by adverbials like *always*, *whenever* or *frequently* to yield multiple events)[13] and imperfective-habitual (IMPF-HAB) involves **plural** events. In English, the simple past is underspecified for viewpoint aspect: it is compatible with a perfective and a imperfective-habitual interpretation with a default preference for the former. In languages like Bulgarian or Spanish (as we will see in the next section), imperfective morphology can express either a habitual or progressive interpretation; following Ferreira (2005), we assume that these arise via combination of an imperfective operator with a plural or singular VP [cf. Nakanishi (2007b), who assumes that VPs are pluralized using Link's *-operator].

We can see these contrasts in English with different VP and adverb combinations: with an atelic predicate and a *for*-adverbial, the sentence allows two types of interpretations: one involving a durative, singular event (26a) and one involving a plurality of events (26b) (these examples adapted from van Geenhoven 2005).

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[12] Consideration of stative predicates is beyond the scope of this paper.

[13] To be more precise, we assume that viewpoint aspect locates events in temporal intervals. The adverbials quantify over times containing (PFV) or contained in (PROG) the event time.

(26) John ran in the park for two days.

    a. *For two days John ran in the park nonstop*   single event -
       continuative

    b. *For two days John ran in the park frequently*   multiple
       events - frequentative

(26a) describes a single event, while in (26b) *frequently* quantifies over times containing singular events to yield a plurality of events. The progressive behaves similarly in this respect. Consider (27a,b).

(27) John was running in the park for two days.

    a. *For two days John was running in the park non-stop*
       continuative

    b. *For two days John was running 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 ([28b], but not [28a]):

(28) ?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 we put these predicates into a verbal comparative, we see precisely the same pattern of possibilities of single/multiple event interpretations, and correspondingly, in what scales for comparison are available.

For atelic predicates like *run* in the comparative (29), the measure may be by cardinality, temporal duration or length of spatial path, which are all monotonic with respect to the VP. This sentence cannot be used to convey, for example, that John ran *faster* than Mary did.

(29) John ran in the park more than Mary.

In contrast, for telic predicates like *explode* in (30), the comparison may only be by cardinality.

(30) ?John's bomb exploded more than Mary's bomb.

Thus, in the simple past in English, it may appear that the choice of scale depends on the aktionsart properties of the VP.[14] Like (24b), (30) is only acceptable to the extent that it may be interpreted iteratively; while the English past may preferentially get a perfective interpretation, the only way of making sense of the comparative with *explode* is to give it a habitual interpretation. Thus, the oddness of (30) is due to the fact that a bomb can only explode once and not repeatedly/habitually.

Taken together, these facts suggest that viewpoint aspect contributes to the choice of scale available to verbal comparatives, in much the same way that number-marking does in nominal comparatives. The correspondences we have discussed are summarized in (31).

(31)

	Nominal domain	*Verbal domain*
'lexical'	**mass – count**	**atelic – telic**
'grammatical'	**singular – plural**	**perfective/progressive – impf–habitual**

If these parallels are on the right track, we may construct four predictions for verbal comparatives based on the generalizations we outlined for nominal comparatives.

(32)

	Generalizations – determiner *more*		**Predictions – adverbial** *more*
I	Singular count NPs do not combine with the determiner *more*.	I	Perfective telic predicates do not combine with adverbial *more*.
II	The scales of comparison for NPs are necessarily monotonic (in terms of cardinality or otherwise).	II	The scales of comparison for VPs are necessarily monotonic (in terms of cardinality or otherwise).
III	The scale for comparison of non-plural marked mass NPs is **variable**.	III	The scale for comparison of perfective- and progressive-marked atelic predicates is **variable**.
III	The scale for comparison of NPs marked with plural morphology is in terms of **cardinality** only.	III	The scale for comparison of VPs with IMPF-HAB morphology is in terms of **cardinality** only.

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[14] This does seem to hold of deverbal nominals when they appear in comparatives with mass morphology (Barner *et al*. 2008): with a durative, atelic verb-like *dance*, experimental participants judge six brief dances to be *more dances* but *less dancing* than two long dances; in contrast, for the punctual, telic verb *jump*, six small jumps count as both *more jumps* **and** *more jumping* than two long jumps.

To test these predictions, we must look at languages that overtly mark the relevant distinctions in their aspectual morphology. We hypothesize that the ability of English speakers to construe examples like (29) along both cardinal and other dimensions is precisely the result of the morphological underspecification of viewpoint aspect marking. If this is so, then in Bulgarian, Spanish and Hindi, we should see a difference in the scale of comparison with atelic predicates overtly marked in the perfective, progressive (where possible) and imperfective-habitual. In general, we will check whether Hackl's requirement holds in the verbal domain and whether grammatical context mediates what scales of comparison are available here. If so, we will take this as constituting evidence that adverbial *more* also decomposes into a measure function MANY/MUCH plus *-er*.

We expect that comparisons of singular events (i.e. PFV, PROG) will only be possible with an atelic VP and the comparison will be along some quantity dimension,[15] e.g.:

(33) a. [λd. John ran d-MUCH] [**–er** [than [λd. Mary ran d-MUCH]]]

  b. The amount that John ran is greater than the amount that Mary ran

whereas comparison of plural events (i.e. habitual) will be possible with both telic and atelic VPs, and the comparison will be in terms of cardinality, e.g.:

(34) a. [λd. John reached the top d-MANY (times)] [**–er** [than [λd. Mary reached the top d-MANY (times)]]]

  b. The number of events of John reaching the top is greater than the number of events of Mary reaching the top

(35) a. [λd. John ran d-MANY (times)] [**–er** [than [λd. Mary ran d-MANY (times)]]]

  b. The number of running events by John is greater than the number of running events by Mary.

3.2 *Bulgarian, Spanish, and Hindi*

Our first prediction is that telic predicates marked perfective will not combine with the adverbial comparative *more*, paralleling the unacceptability of the nominal determiner *more* with singular count NPs. In all

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[15] Consideration of the precise mechanisms by which such dimensions are accessed is beyond the scope of this paper, although see Nakanishi (2007a,b) and Greenberg (2010) for some suggestions.

three languages, this prediction is borne out, as the examples in (36)–(38) show.[16] Telic predicates like *climb the mountain* and *reach the top* are unacceptable with perfective morphology in the verbal comparative construction.[17]

(36) ***Bulgarian – Accomplishment –** PFV

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

(37) ***Spanish – Accomplishment –** PFV

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

(38) ***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.'

Our second prediction concerns the availability of scales for atelic predicates with perfective morphology. Given that the choice of scale for mass NPs was variable in the absence of plural morphology—with non-cardinal scales for nouns like *water* and either cardinal or non-cardinal scales for nouns like *furniture*—we predict that perfective atelics should also involve variable scales of comparison.

This prediction, too, seems to be borne out: the atelic predicate *play* in (39) is preferentially compared in terms of duration, and (40)–(41) with atelic *run* are preferentially in terms of spatial distance or temporal duration.

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[16] If the equivalent of *times* or *often* accompanies the verbal comparative, the result is in fact acceptable. We see addition of such lexical items as a way of meeting the comparative's plurality requirement that the sentence, without such items, lacks.

[17] Here, an anonymous reviewer notes that a prediction of our account is that adding a modfier such as *three times* should not improve the status of (36); we note that the only reading possible with such a modifier seems to be an additive one—it can only mean that the number of times Ivan climbed exceeds the number of times that Maria climbed by 3. This appears to be a different construction entirely, involving a complex measure phrase; this is an important question that we leave for future research.

(39) **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.'

(40) **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.'

(41) **Hindi – Activity –** PFV

> *John   Mary-se   zyaadaa dauR-aa.*
> John Mary-than more   run–PFV
> 'John ran more than Mary.'

The analogy between perfective-marked predicates with mass NPs is observed to hold. Since perfective morphology involves singular events [as Ferreira (2005) pointed out], Hackl's requirement here is met as long as the comparisons are interpreted along a dimension like temporal duration. However, an interpretation of the comparison in terms of a cardinal scale is also available; we assume that this reading involves a null adverbial similar to *frequently*, *generally* or *always*, in a structure parallel to that of (26b) and (29) above. The presence of this null adverbial individuates multiple sub-events of an otherwise atelic event description.

Our third prediction was that the scale for comparison of atelic and telic predicates with imperfective-habitual morphology is (obligatorily) in terms of cardinality. It proves somewhat more difficult to evaluate. For telic predicates, informants overwhelmingly confirm that this prediction is met since the only available comparison for telic predicates marked imperfective-habitual is in terms of cardinality:

(42) **Bulgarian – Accomplishment –** IMPF

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

(43) **Spanish – Accomplishment –** IMPF

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

(44) **Hindi – Accomplishment –** HAB

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

Yet, judgments for activity predicates are not as sharp as for the analogous cases in the nominal domain (e.g. *water, waters*). It appears that, in these languages, both comparison by cardinality and comparison by duration are possible. Significantly, however, the former is preferred.

(45) **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.'

(46) **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.'

(47) **Hindi – Activity –** HAB

John Mary-se   zyaadaa dauR-taa hai.
John Mary-than more   run-HAB be.PRES
'John runs more than Mary.'

Consider for the moment Hindi judgments for PFV versus HAB with the activity predicate *run*. According to our informants, the sentence in (47) with HAB is judged to be true in a situation where John's running

events are more numerous than Mary's, but the individual duration of any given running event (and the summed duration of all running events) is less for John than for Mary. In contrast, in the same situation, (41) with PFV is judged false. In the reverse situation, where John's running events are less numerous than Mary's, but the individual duration of any of his running events is greater than those of Mary, (47) with HAB is judged false and (41) with PFV is judged true. Hence, we see that unlike PFV, HAB induces a comparison by cardinality and not by duration.[18]

Turning to Spanish and Bulgarian, since both activities and accomplishments are only *preferentially* compared in terms of numbers of events in these cases, we face a puzzle: Bulgarian and Spanish speakers admit comparisons that are not strictly by cardinality when atelic predicates appear with imperfective morphology. Has the correspondence between nominal and adverbial *more* broken down?

Bearing on this question is the observation that IMPF in Romance and Slavic is ambiguous between a habitual and progressive aspectual meaning: according to Ferreira (2005), both involve an imperfective operator, the difference being that progressive aspect involves singular events and habitual a plurality of events. Since singularity and plurality in the verbal domain are not here marked overtly, we cannot control precisely the structures that our Bulgarian and Spanish informants are interpreting.

For the reading where the duration of individual events is compared, we assume that there is a covert universal quantification over events [represented in (48b) as EVERY TIME] along with a progressive meaning. Thus, (45) and (46) can be interpreted analogously to two structures:

(48) **Two readings with** IMPF

    a. In those days [[more than [HAB Mary runs]] [HAB John runs]]

          i.e., in those days, the plurality of events of John running had a cardinality greater than that of the plurality of events of Mary running

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[18] That is, as these contrasting scenarios show, it does not induce comparison by duration of the individual events quantified over. It seems that Hindi allows a reading of these comparatives where what is compared is the total (summed over events) duration, which is the preferred reading of the pure progressive in this language. The LF would be something like (48b) below but without EVERY TIME, as if what is measured is a single discontinuous event. We leave this difference between Hindi on the one hand and Bulgarian and Spanish on the other for future research.

b. In those days EVERY TIME [there is an event of John and Mary running] [[more than [PROG Mary runs]] [PROG John runs]]

> *i.e., in those days, whenever there was an event of John and Mary running, the duration/etc. of that event was greater for John than for Mary*

That is, (48a) represents the comparison by cardinality of events reading and (48b) a comparison by the duration of each of the relevant events. We find support for this conclusion in the fact that the second kind of meaning can be constructed in English and Hindi, which have distinct *progressive* operators. (49) and (50) are naturally interpreted as involving comparison by duration of individual events:

(49) In those days, whenever John and Mary were running, John was running more than Mary.

(50) **Hindi – Activity** - *whenever*-clause + PROG

un   dinon, jab-bhii   ve   ek-saath   dauR rahe
those   days   when-ever they   together   run   PROG
the,   John Mary-se   zyaadaa dauR rahaa   thaa.
be.PAST John Mary-than   more   run   PROG be.PAST
'In those days, whenever they were running together, John was running more than Mary.'

However, a puzzle remains. While Hindi comparatives with HAB as in (47) strongly resist the individual event duration reading, this reading is available in the presence of an overt *whenever*-clause with HAB as well:

(51) **Hindi – Activity** - *whenever*-clause + HAB

un   dinon, jab-bhii   ve   ek-saath   dauRte,   John
those   days   when-ever they   together   run.HAB   John
Mary-se   zyaadaa   dauR-taa.
Mary-than   more   run–HAB
'In those days, whenever they used to run, John used to run more than Mary.'

This suggests that Hindi HAB is more like Bulgarian and Spanish IMPF than it would at first seem—that is, Hindi HAB and PROG are not in complementary distribution. Indeed, this is the case, as (52) illustrates:

(52) **Hindi** – HAB > PROG

> *In   garmiyonN-meN jab-bhii   mEN John-ko   phone*
> these summer-in   when–ever I   John–DAT phone
> *milaa-taa,   vo apnaa ghar   saaf   kar rahaa   hotaa.*
> connect–HAB he self's   home clean do PROG be.HAB
> 'Whenever I called on him last summer, John was cleaning his house.'

For our purposes, what matters is that whatever operator is responsible for generating *habitual* readings (regardless of its morphological expression) is responsible for comparisons by cardinality. Whether the same operator can yield additional meanings (or alternatively, the same aspectual morphology can reflect different operators) is an interesting but secondary question. Thus, we take prediction IV to be confirmed, acknowledging that verification is complicated by the fact that aspectual morphology often encodes more than one aspectual meaning distinction.

4   CONCLUSIONS

We have shown that the distribution of nominal and verbal comparatives as well as the grammatical constraints on the available scales for comparison across these domains are quite similar, although not perfectly so. We thus restate our predictions for verbal comparatives as descriptive generalizations, with the added caveat that prediction IV is a more complicated case.

That these generalizations hold provides further support for the intuition that there are deep parallels in the representations (both syntactic and semantic) manipulated across the nominal and verbal domains. In particular, they suggest the viability of a common decompositional semantics for *more* that can capitalize on such representational similarities. A uniform account would predict *more*'s 'allergy' to singular count-like predicates and the ways in which scales of comparison are (under-)determined grammatically, regardless of whether *more* occurs as a nominal determiner or as an adverb. These similarities between the nominal and verbal domains further hint at the cross-categorial nature of measurements and scales more generally (Krifka 1989; Kennedy & Levin 2008; Nakanishi 2004, 2007b; Pinon 2005; Rappaport Hovav 2008, among others).

(53)

Generalizations – determiner *more*		Generalizations – adverbial *more*	
I	Singular count NPs do not combine with the determiner *more*.	I	Perfective telic predicates do not combine with adverbial *more*.
II	The scales of comparison for NPs are necessarily monotonic (in terms of cardinality or otherwise).	II	The scales of comparison for VPs are necessarily monotonic (in terms of cardinality or otherwise).
III	The scale for comparison of non-plural marked mass NPs is **variable**.	III	The scale for comparison of perfective- and progressive-marked atelic predicates is **variable**.
III	The scale for comparison of NPs marked with plural morphology is in terms of **cardinality** only.	III	The scale for comparison of VPs with IMPF–HAB morphology is in terms of **cardinality** only.

Acknowledgements

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