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It should be taken as a draft of the final text, only supplied to facilitate the understanding of the final version in French.

BEST REGARDS:
NOTES ON PLURAL COMPARISON

1. INTRODUCTION

At first glance, it appears impossible to account for the plural superlatives in (1) by combining the standard semantics of the superlative morpheme with the standard semantics of plurals.

(1) **Context**: The Himalayas have eight of the 14 highest mountains in the world.
   a. Mount Everest and K2 are the highest mountains.
   b. Mount Everest, K2 and Kānchenjunga are the highest mountains.

The first problem, explored by Stateva 2005 and earlier work, is that a commonly assumed semantics for the superlative (Heim 1999), in combination with standard assumptions on plurality (Scha 1981, Link 1987, Landman 1989a, b, Lasersohn 1989, Schwarzschild 1996, etc.) would yield not the observed interpretation (Everest and K2 are higher than all mountains other than Everest and K2) but at best a contradictory one (Everest and K2 are each the highest mountain). We will argue here that Stateva's solution falls short, in that there exist a variety of additional verifying models for (1), which it fails to account for. We will argue in addition that the various readings available for (1) are also available for plural comparatives, suggesting a deeper generalization that is not captured by Stateva 2005 alternative semantics for the superlative.

The second problem, which we will touch on only briefly, is that despite the obligatory definite article, plural superlatives do not appear to satisfy uniqueness (maximality). The semantics of the definite article is such that the entire DP is supposed to pick out the maximal individual corresponding to the restrictor. Since both (1a) and (1b) can be felicitous and true in the same model, the definite description *the highest mountains* does not seem to denote the maximal (and therefore unique individual) corresponding to the restrictor *highest mountains* in (1a). The flip side of the problem is the fact that (plural) superlatives never appear with any but the definite determiner (though see Herdan and Sharvit 2005).

1.1. The superlative

We begin with introducing the semantics of the superlative morpheme due to Heim 1999, 2000. According to this view, the referent of a superlative description enters into a particular comparison relation with every entity in the relevant comparison set in the context. Thus in (2), the referent of the superlative *the most impressive* (i.e., Fred) enters into a relation with all other candidates, the relation of being *impressive* to a higher degree; the set of *these candidates* is the relevant comparison set.

(2) All of these candidates are acceptable. But Fred is the most impressive.

Heim's lexical entry for the superlative morpheme is given in (3):

(3) $[\![\text{-}st]\!] = \lambda C_{\langle e,t\rangle}\ \lambda R_{\langle d,\langle e,t\rangle\rangle}\ \lambda x_e\ .\ \forall z \in C\ [z \neq x \rightarrow \max(\lambda d.R(d)(x)) > \max(\lambda d.R(d)(z))]$
$[\![\text{-st}]\!](C)(R)(x)$ is defined only if $x \in C$ and $\forall y \in C\ \exists d\ R(d)(y)$

Following von Fintel 1994, Heim 1999 suggests that the superlative morpheme is like other quantifiers in that it contains a phonetically unrealized predicate variable C that receives a value from the context of utterance. This is the first argument, C, of the comparative operator, which introduces the comparison set:

(4) a. Fred is the [C-st] impressive
b. C = {x: x is one of these candidates}

The second argument, R, is the comparison relation, given here by the scalar adjective *impressive*. This semantics for the superlative presupposes that scalar adjectives denote monotone functions from degrees to sets of individuals, with monotonicity defined as in (5).

(5) A function $f_{\langle d, \langle e, t\rangle\rangle}$ is *monotone* iff $\forall x\ \forall d\ \forall d'$ [[f(d)(x) and d′<d] $\rightarrow$ f(d′)(x)]

For instance, *tall* denotes a function which assigns to every degree the set of individuals who are tall to that degree (or taller). The max-operator is then used in (3) to pick the highest degree from the set of degrees associated with an individual.

Putting these assumptions together, *(the) most impressive* is correctly interpreted as (6):

(6) $\lambda x_e.\forall z{\in}C\ [z \neq x \rightarrow \max(\lambda d.\text{impressive}(d)(x)) > \max(\lambda d.\text{impressive}(d)(z))]$

There are two presuppositions on the superlative description: (1) Its referent belongs to C, and (2) The property with respect to which the comparison is made applies to every individual in C. A violation of the first presupposition is provided in (7a) and of the second one, in (7b):

(7) a. #Of these boys, Eva is the smartest. $x{\in}C$
b. #Of these people and chairs, Fred is the most intelligent. $\forall y{\in}C\ \exists d\ R(d)(y)$

It is easy to see that the set corresponding to a superlative predicate only contains one member. For a singular superlative this member is a single individual. Matters are more complicated with plural superlatives.

1.2. The plurality problem for superlatives

It is common to distinguish at least two readings for plural NP arguments (Scha 1981, Link 1987, Landman 1989a, b, Lasersohn 1989, Landman: Jerusalem lectures, etc.):[1]

(8) a. These students are a good team. collective
b. These students are blond. distributive

The question is whether the plural superlative construction also allows these two readings, and what their truth conditions would be. Stateva 2005 (also Stateva 2002, chapter 3) claims that the compositionally obtained distributive (9a) and collective (9b) readings both yield incorrect truth-conditions. She feels the only reading available for (9) is (9c).

(9) Mount Everest and K2 are the highest summits.
a. #Mount Everest is the highest summit and K2 is the highest summit.
b. #Mount Everest and K2 taken as a group are higher than other summits.

[1] Like Stateva (2005), we will not consider the possibility of a cumulative reading. While a superlative DP in argument position may have a cumulative reading (*These scholarships will be given to the best seven students*), and a full treatment of plural superlatives must take cumulativity into account, this reading may be presumed absent in the structures under consideration, except on an identity reading for the copula. We restrict our attention here to predicative superlatives, and leave the issue of cumulativity aside.

c. Mount Everest and K2 are each higher that all mountains other than Mount Everest and K2.

We disagree with this assessment. As for the distributive reading, Stateva claims that since (9a) is a contradiction, it is not what (9) means. However, the fact that a reading is contradictory does not mean that it is not there. We feel that (9) does allow the interpretation in (9a); the reading is of course elusive for pragmatic reasons, but can be strengthened by a judicious choice of example:[2]

(10) a. Both Mount Everest and K2 are the highest summit.
b. Nell and Bill are the best students (in their category).

(10a) is contradictory, while (10b) has a *bona fide* distributive reading (with the comparison set C varying from one individual to the next). We conclude (contrary to Stateva) that the usual distributive reading is in fact available for superlative predicates, even though it is not the primary reading of (9).

As for the collective reading (9b), Stateva 2005, section 5 supposes that it requires that the sum of the heights of Mount Everest and K2 exceeds the height of other mountains. This is clearly not a reading that (9) has (for one thing, it predicts that no subset of mountains can be the highest, because any set would be lower than the same set augmented by any other mountain). It is easy to see that comparison relative to height is not based on anything like this:

(11) #The house and the chimney are higher than the house.

We will argue below that the collective reading must not be restricted to such "summation"; Stateva however concludes that the single reading she allows for (9), (9c), cannot be collective, as it does not involve "summation," hence must be the distributive one after all; in order to make distributivity result in (9c), she changes Heim's semantics of the superlative so as to avoid the contradiction (9a).

We feel that Stateva's account is incomplete, in that it allows too few verifying models for (9). First, we believe there is a distributive interpretation, resulting in (9). Secondly, if the distributive reading is the contradictory one, the reading that is true in the situation (9c) must be the collective one;[3] the collective reading therefore cannot be restricted to "summation" cases. And even leaving (9c) aside, "summation" does not yet exhaust the possibilities for the collective reading; to obtain some indication of the wider range of verifying situations possible for plural superlatives, consider (12):

(12) The boys on the soccer team are the heaviest.

(13) Model A : boys on soccer team: 100kg, 60kg, 40kg, 20kg;
boys on wrestling team: 120kg, 80kg

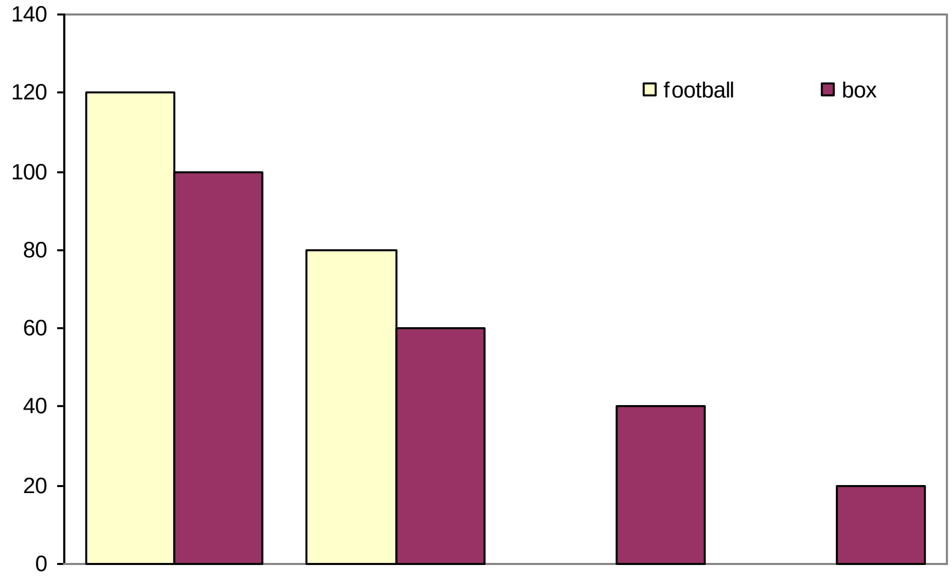
(14) Model B: boys on the soccer team: 120kg, 80kg ;
boys on wrestling team: 100kg, 60kg, 40kg, 20kg

The purely distributive (contradictory) reading is false in both models, and so is Stateva's distributive (9c) reading (which we take to be a collective one). Nevertheless, (12) can be judged true in models A and B as well. (12) is true in A because *heavy*, as an "additive" predicate, allows summation of individual weights (this is the single

[2] We remove the plural marking on the superlative in (10a), so as to force the distributive reading, resulting in a contradiction (unless K2 = Mount Everest). Absence of plural marking should not change the semantic analysis for Stateva, as plurality on the noun plays no role in her semantics – unless one assumes that the singular noun forces the construction into an identity reading, not discussed by Stateva, and also not discussed here.

[3] An alternative option is that (9c) reflects a second distributive reading, resulting from different scope relations between the superlative and distributive operators, as proposed in Stateva (2000); we will leave this option aside; see Stateva (2005) for some discussion.

"collective" reading Stateva seems to allow). In addition, we judge (12) true in model B, a type of situation not previously discussed and illustrated below (we will bolster the intuition with further examples shortly). We conclude that there is a wide range of models that verify (the collective reading of) (9) and (12); sections 2 and 3 below are devoted to a first exploratory inventory and an attempt at a generalizing description.



There is an additional generalization that we aim to substantiate below. The classes of situations that verify plural superlatives appear to be matched exactly for plural comparatives. Thus, (15):

(15) The boys on the soccer team are heavier than the boys on the wrestling team.

allows a distributive reading (each of the soccer players outweighs each of the wrestlers), and is also true in both model A and model B. If this generalization holds, an account that addresses only superlatives, not comparatives, will be insufficiently general.

For simplicity's sake, we begin in section 2 with an inventory of the "comparison conditions" that hold for plural comparatives; the corresponding observations for plural superlatives are discussed in section 3. Section 4 briefly explores how the generalization we propose might be implemented in the framework of Heim (1999); section 5 returns to the question of definiteness with plural superlatives.

2. PLURAL COMPARATIVES

As noted by Scha and Stallard 1988 and Schwarzschild 1996:87, (16) can be true if in each relevant area the frigate(s) in that area were faster than the carrier(s) in that same area, regardless of speed relations obtaining between ships across different areas:

(16) The frigates were faster than the carriers.

Scha and Stallard 1988 suggest that the truth-conditions on a plural comparative can be derived from a conjunction of singular comparatives. One such conjunction is a universal-universal one:

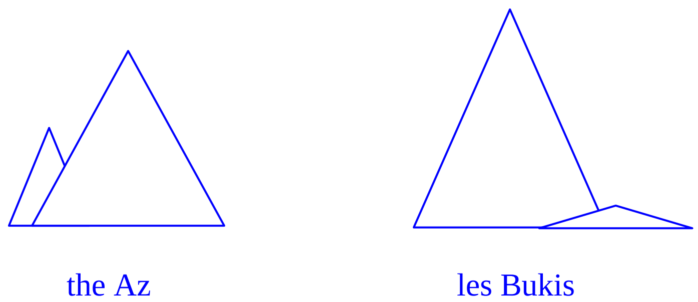
(17) A is R-er than B if $\forall a \Pi A\ \forall b \Pi B$ [a is R-er than b] universal-universal
where Π is Link's (1983) *atomic part* operator.

Scha and Stallard 1988 argue that the universal-universal conjunction (17) is too strong because it does not allow for the fact that (16) is true in the situation described above, where some frigates are slower than some carriers, but not within the same area. They therefore propose instead the weaker universal-existential conjunction:

(18) A is R-er than B if $\forall a \Pi A\ \exists b \Pi B$ [a is R-er than b] $\wedge$ $\forall b \Pi B\ \exists a \Pi A$ [a is R-er than b]

Importantly, neither (17) nor (18) is a biconditional – they state that a comparison relation can be established between two pluralities if certain comparison relations hold between the singularities composing these pluralities. They therefore leave open the possibility that comparison between pluralities is not always possible. An example of this impossibility is provided by the model in (19):

(19) Mountain chains on Hain



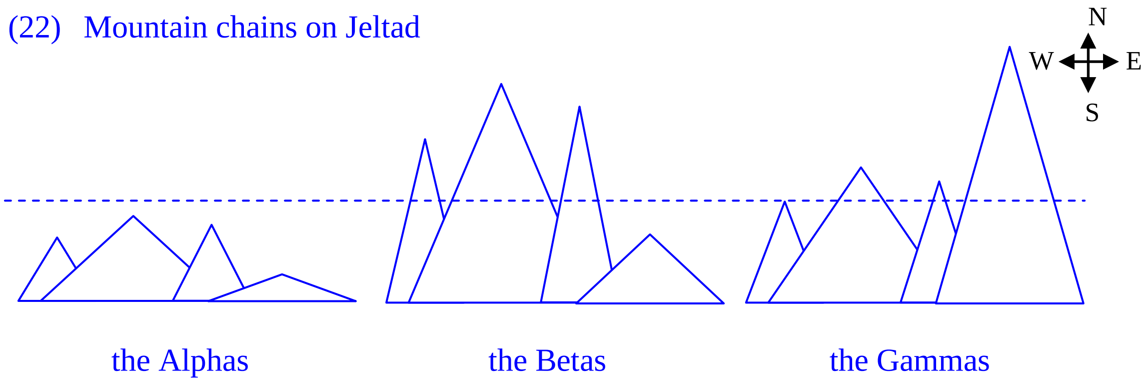
We agree that comparison between the Az and the Bukis in (19) fails: we judge both (20a) and (20b) false in (19).

(20) a. The righthand mountains are higher than the lefthand mountains.
b. The lefthand mountains are higher than the righthand mountains.

However, we feel that the universal-existential conjunction (18) is too weak. Consider sentence (21) in model (22):

(21) The righthand mountains are higher than the middle mountains.

(22) Mountain chains on Jeltad



(18) incorrectly predicts that (21) should be true in this model, since all mountains in the Gammas are higher than the rightmost Beta, and all mountains in the Betas are lower than the rightmost mountain in the Gammas. Our intuition is, however, that (21) is false in the model (22) (comparison fails once again), indicating that (18) is too weak.

What's more interesting is that, if the context provides additional information, comparison can succeed. Imagine that the judgment (21) is made for the purposes of deciding which mountain chain is a better candidate for an astronomy lab; or imagine that the context requires that we fly across the mountains east to west, or north to south.

In such contexts, a judgment relative to (15) is possible. Furthermore, it may not yield the same truth value in each context, suggesting that pluralities can be measured in different ways depending on context.

It would be tempting to conclude from this that comparison between pluralities cannot be reduced to a conjunction of comparisons between the singularities they consist of, were it not for the fact that (23), where the universal-universal condition in (17) holds, is true in the model (22) independently from context, and no additional information can force it to be false:

(23) The rightmost mountains are higher than the leftmost mountains.

We conclude that under certain conditions, plural comparison is not sensitive to the context. What are these conditions?

2.1. Plural comparison conditions

It is easy to see that one special case where plural comparison is not context-sensitive is the universal-universal conjunction in (17), reducing comparison between pluralities to a context-independent conjunction of comparisons between their atomic parts:

(17) A is R-er than B if ∀aΠA ∀bΠB [a is R-er than b] universal-universal

(17) correctly predicts that (23) is true in the model (22) above: since all Gammas (the rightmost mountains) are higher than all Alphas (the leftmost mountains), (23) is true and no contextual information can change this fact.

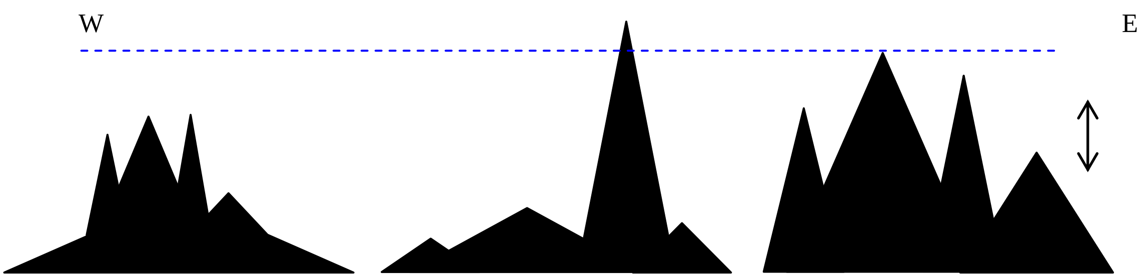
(24) The rightmost mountains are higher than the leftmost mountains.

Another special case of reducing comparison between pluralities to a context-independent conjunction of comparisons between the singularities composing them is where a bijection can be established between the two pluralities (which therefore have to be of equal size):

(25) A is R-er than B if bijection
there exists a bijective function f from {a: aΠA} to { b: bΠB } such that ∀aΠA [a is R-er than f(a)]

(25) correctly predicts that (23) is true in the model (26):

(26) Mountain chains on Trantor



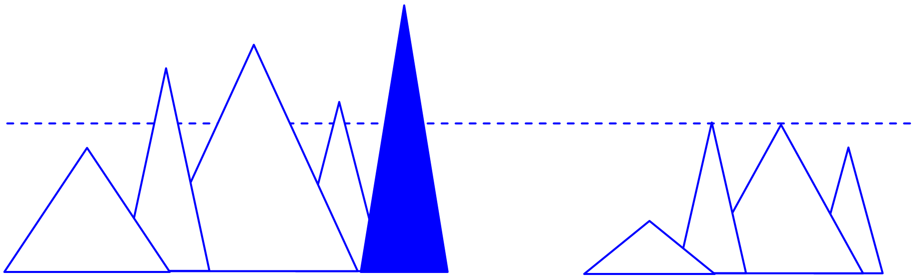
the Alephs the Beths the Gimels

We will now show that besides these two conditions, there are others, governing the combination of the two.

2.2. Recursion

Consider the situation in (27), where the As are clearly higher than the Bs, but neither (17) nor (25) alone yields the desired outcome.

(27) Mountain chains on Werel



Indeed, (17) does not apply because the leftmost A mountain is lower than some B mountains. On the other hand, (25) does not apply because the number of mountains in the two pluralities is not the same.

However, we note that if the rightmost A mountain didn't exist, our intuitions about (27) would have been accounted for by (25). Likewise, the rightmost A mountain itself *is* higher than all B mountains, so it can be accounted for by (17). In other words, we need a combination of the two conditions, as in (28):

(28) A is R-er than B if there exists a partition of A into A_1, A_2 such that A_1 is R-er than B $\wedge$ A_2 is R-er than B

In (27), the rightmost A mountain makes up the A_2 of (28), and the relation between it and the Bs is described by the universal-universal condition in (17). The rest of the As can be compared to the Bs using the relation in (25).

Speaking more generally, (28) provides us with a recursive method of construing comparison in cases where one plurality is larger than the other. The relations between A_1 and B and between A_2 an B in (28) can in turn be verified using (17) (universal-universal comparison), (25) (bijection), or by applying (28) once again, taking the recursion one step further.

Naturally, (28) has a flip side, allowing for the second plurality to be larger than the first one (a sample application will be given for (15) below):

(29) A is R-er than B if there exists a partition of B into B_1, B_2 such that A is R-er than B_1 $\wedge$ A is R-er than B_2

Importantly, none of (17), (25), (28) and (29) are biconditionals. If none of them applies, comparing pluralities cannot be reduced to comparing their atomic parts, and other comparison criteria, such as the purpose of comparison, may come into play in order to permit determining the truth value of a sentence.[4] We believe that in this case, comparison takes place between complex homogeneous entities consisting of many parts (most likely, groups) rather than pluralities (sums).

We return briefly to some earlier examples.

(16) The frigates were faster than the carriers.

(16) is judged true in Scha and Stallard's (1988) context (several races, each involving frigates and carriers; in each race the frigates are faster) because the context provides the partition, and in each partition (race), (17), (25), or their combination as in

[4] We are not claiming that we have identified all the conditions under which comparison between pluralities is possible without additional comparison criteria.

(28) or (29) applies.[5] For the case of more than two races, recursive partitioning obtains.[6]

(30) The boys on the soccer team are heavier than the boys on the wrestling team.

(14) Model B: boys on the soccer team: 120kg, 80kg ;
boys on wrestling team: 100kg, 60kg, 40kg, 20kg

(30) can be judged true in model B, because we can partition the wrestlers into $B_1 = 100 \oplus 60$ and $B_2 = 40 \oplus 20$; the soccer boys are heavier than B_1 by bijection (25), and heavier than B_2 by (17) (universal-universal).

3. PLURAL SUPERLATIVES

Let us consider now how the comparison conditions identified above for plural comparatives apply to superlatives. We must consider the distributive reading (which involves distribution to atoms) and the collective reading (which involves comparison of pluralities). While the former should be derivable directly, the latter will be seen to depend on the conditions on comparing pluralities discussed above.

3.1. Distributive readings

Since the topic of this paper is plural comparison, we shall be very brief about the distributive reading on plural superlatives. As noted by Stateva 2005, with the lexical entry for -*st* in (3), the distributive reading of a superlative is contradictory:

(31) a. Mount Everest and K2 are the highest summits.
b. #Mount Everest is higher than any other summit in C and K2 is higher than any other summit in C

Stateva proposes to remove the contradiction by excluding all atoms in the plural subject (both K2 and Everest) from the comparison set C. As explained above, we feel the contradictory reading is not in fact blocked. Furthermore, we demonstrated that this reading ceases to yield a contradiction when the comparison set C is not the same for all the singularities to which we distribute. If the distributive operator applies at the level of the predicate (as standardly assumed), the comparison set C can vary with each singularity under consideration, like it does in (32a):

(32) a. Alice and Beth are the best students (in their classes).
b. Alice and Beth went to the local cinema.

An implementation might involve allowing the distributive operator to bind a subscript variable on C, much as it binds a variable on *local* in (32b) (Heim et al. 1991) (see Herdan and Sharvit 2005 for some discussion of such distribution). Once this is taken into consideration, the distributive reading of a plural superlative, whether it is contradictory (when C is shared) or not, can be derived compositionally.

3.2. Collective readings

The collective reading of a plural superlative involves comparison between pluralities. It is by no means logically necessary, however, that the same conditions will hold for

[5] Note that we can construct models that show that comparison is not just on the basis of averages: there might be a race where one extremely fast frigate outpaces a large number of very fast carriers, which together lift the across-race average carrier speed above the average frigate speed.

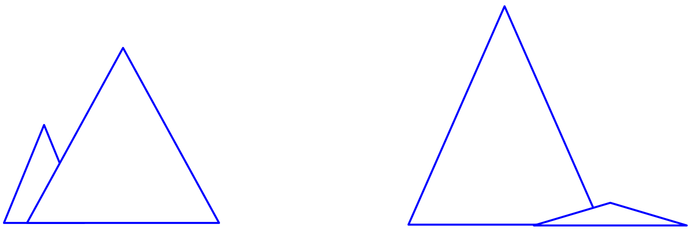
[6] Non-binary partitioning into more than two cells would provide a more perspicuous connection with the context; since the end result is the same, we will leave the definitions as they stand.

plural comparatives and plural superlatives: even if comparatives and superlatives ultimately involve comparison of degrees on the same scales, as arguments to the same scalar predicates, the pluralities related to those degrees enter into the interpretation in different ways in comparative and superlative constructions. Nonetheless, for as far as we can tell, we do find the same patterns with plural superlatives that we found with plural comparatives. We will briefly illustrate this finding.

First of all, the models where comparison between pluralities failed also do not give truth conditions for superlative predication over a plurality: relative to model (210), we do not accept (212a), and relative to model (15), we do not accept (212b) (unless, as above, the context provides additional information on how or why the measurement takes place):

(33) a. The righthand mountains are the highest summits.
b. The Gammas are the highest summits.

(19) Mountain chains on Hain



the Az les Bukis

If it were true – as suggested by Stateva (2005) – that only a distributive reading, and a "summation"-type collective reading, are available for plural superlatives, that would account for (212) just as well: in the relevant models, Stateva's distributive readings (as adapted for (8c)) on (212a), (212b) are false, and *high* does not allow "summation" (see (10) above). However, on this approach, we would also not expect truth for plural superlatives in those contexts which allow plural comparison on the basis of the comparison conditions (17), (25), (28) and (29), contrary to fact.

Secondly, in contexts which verify Scha and Stallard's (1988) (16) (various races, with a frigate the winner in each race), we also judge (35) true:

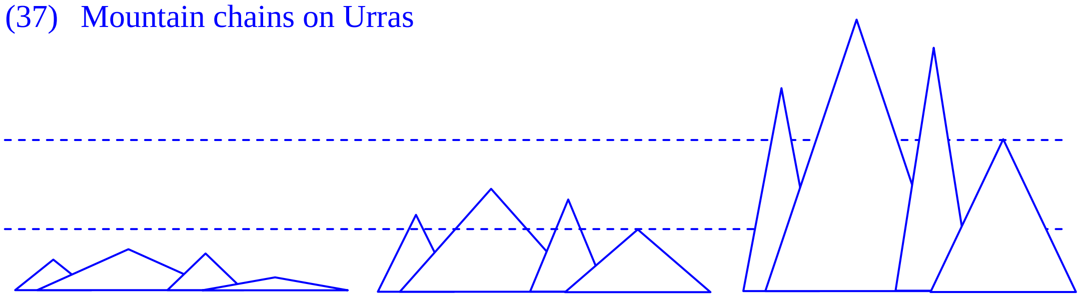
(34) The frigates were faster than the carriers.

(35) The frigates were the fastest.

Thirdly, the comparative and the superlative in (36) are judged true in model (37), revealing a universal-universal pattern (17); and it is judged true in model (38), revealing a bijective pattern (24):

(36) a. The rightmost mountains are higher than the leftmost mountains.
b. The rightmost mountains are the highest.

(37) Mountain chains on Urras



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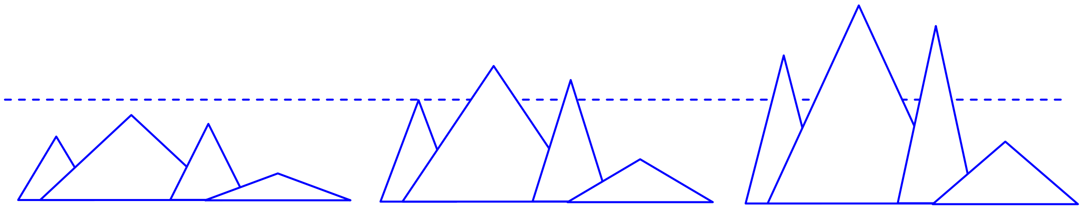
(38) Mountain chains on Gethen



Finally, we have already discussed (12), true on model B, apparently by recursive application of (17) and (25) to partitions:

(12) the boys on the soccer team are the heaviest

(14) Model B: boys on the soccer team: 120kg, 80kg ;
boys on wrestling team: 100kg, 60kg, 40kg, 20kg

The examples in this section suggest strongly, that the same principles underlie plural comparison with comparatives and superlatives. However, given that the comparative constructions under discussion contain two plural DPs, whereas the superlative constructions contain but one, the question arises how the parallelism we have revealed may be formally captured. This is the topic of the next section.

4. THE SOURCE OF COMPARISON CONDITIONS

Let us consider now how the findings of the previous two sections can be implemented in a compositional account of comparative and superlative constructions. One possibility that seems to present itself when we consider comparatives with two plural DPs, such as (12) (repeated):

(12) The boys on the soccer team are heavier than the boys on the wrestling team.

(39) Model A : boys on soccer team: 100kg, 60kg, 40kg, 20kg;
boys on wrestling team: 120kg, 80kg

(40) Model B: boys on the soccer team: 120kg, 80kg ;
boys on wrestling team: 100kg, 60kg, 40kg, 20kg

is that its various types of verifying models correspond to different construals of the DPs involved. One might naturally suppose that a collective (say: group) reading for both DPs would be what renders it true in model A. Its truth in model B, which we captured by means of our plural comparison conditions, might then result from a cover reading on both DPs, and those conditions might be taken as a description of how the predicate can relate the cells of two covers (cf. Schwarzschild 1996).

However, given the findings of the previous two sections, such an implementation does not seem to provide the required degree of generality. We have seen that the various comparison procedures that may be applied to comparatives also exist for superlatives. For instance, (12) (repeated)

(12) The boys on the soccer team are the heaviest.

has the same types of verifying models, but (12) does not contain two DPs whose various construals can serve to derive the required readings. The truth of (12) in model A might still be achieved through a collective reading for the boys on the soccer team, as in (15). But the truth of (12) in model B, which depends on our comparison conditions, cannot be derived in the manner suggested above for (15): comparison in (12) is not between two DP denotations. At best, comparison is between the cells of the cover denotation of the subject DP on the one hand, and (all) the members of a contextually determined comparison set C, on the other; we see no way to guarantee that this will yield just the same pairings as when two DP-denotations are related on their cover readings.

While we do not exclude that various readings of the DPs in (15), or examples such as (11) (*the frigates were faster than the carriers*), are partly responsible for the comparison effects observed in section 2, we want to explore the option that a unified account of the comparison conditions for comparatives and superlatives as described in sections 2 and 3 is possible. This appears to entail that the source of these conditions is not to be found at the level of DP denotations, but at some deeper level which is shared by comparatives and superlatives: that of the comparison relation itself.

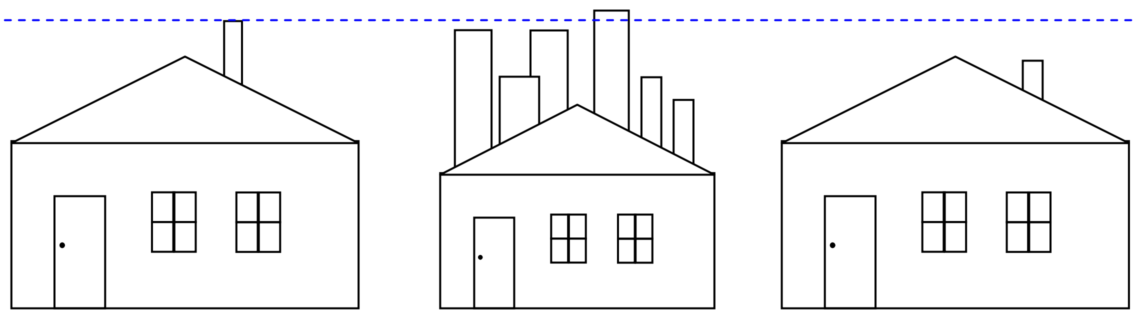
Several possibilities again present themselves. Since our comparison conditions (12),(18)-(22) describe comparison of plural individuals, not degrees, a theory of comparatives without degrees (see for instance {Heim, 1985 #305}) might provide the most straightforward starting point. Within a degree-based theory, the proposal of {Kennedy, 1997 #389} might also provide a natural basis for an implementation. This is not the place to explore these various options and weigh their pros and cons, however, and we will confine ourselves to a brief exploration of what might be required to implement our findings in the framework laid out in section 1 -- that of Heim (1999).

Since comparison in this framework, both in comparatives and superlatives, is between degrees, not between individuals or pluralities, our various comparison conditions must be reinterpreted as methods for relating degrees to individuals and pluralities; that is, as "methods of measuring". We may then achieve truth of (15) in model A by allowing some measuring method (a "collective" one) which assigns the boys on the soccer team to a higher degree than the boys on the wrestling team in A, and we may obtain truth for (15) in model B by also allowing some other method of measuring (one along the lines of (12),(18)-(22)) which relates the soccer team to a higher degree than the wrestling team in B. We will not attempt a definition of a measuring method; the intuition we are pursuing can be explained by means of the examples in (41) and (42):

(41) a. These rulers are 500 metres long, when placed end to end.
b. These rulers are 250 metres long, when tiled at half length.

(41) illustrates how the measurement assigned to a plural object can be manipulated by specifying different methods of measuring it, especially when we are dealing with a not strictly additive predicate such as *long*. Different methods are also available when we want to measure complex singular objects. Consider the question in (42):

(42) Which house is the tallest?



Computing the answer is not at all straightforward, because if a complex object is not homogeneous, its height is not predicted by the heights of its component parts. Instead, we must choose some method determined by the context of utterance: do we want to know the tallness of the house for the purposes of planting a flag, or climbing it, jumping over it front to back, or side to side, etc.?

Let us suppose then, that a gradable adjective like *tall* denotes a function from degrees to sets of individuals only relative to some appropriate measurement method *m*, contextually determined (we want to eschew discussion here of the properties of these measurement methods, but we may assume that adjectives such as *tall* make one associated default method salient, which is appropriate for singular, non-complex individuals). This means that we let *tall* combine first with a free variable ranging over measuring methods; [[tall]]([[m]]) then yields a function of type <d, <e,t>> (or a function from noun denotations to functions of that type: see Heim (1999: footnote 6)). The semantics for *-er* and *-est* can remain unchanged, but *Jessamine is taller than Peter* will now come out as ((43)) :

(43) $\max(\lambda d.\ tall(m)(d)(j)) > \max(\lambda d.\ tall(m)(d)(p))$

How can we now implement our comparison conditions (17), (25), (28) and (29)? We have observed that, when these conditions do not apply, comparison between pluralities is possible only if the context supplies some instruction as to how to compare them: some method *m* must be salient. We have also observed that, independently from context, we always succeed in comparing pluralities when our conditions do apply. In present terms: these conditions supply a guarantee that an appropriate measurement method, which will yield of the result of the conditions, exists, even if the context does not provide it. We can state these guarantees as meaning postulates.

An implementation of our comparison conditions can thus be provided by means of the following meaning postulate:

(44) Meaning postulate 1

$\forall R \forall x \forall y\ [\exists m\ [x \text{ is R-er than } y \text{ by } m] \rightarrow$
$\exists m'\ [\max(\lambda d.R(m')(d)(x)) > \max(\lambda d.R(m')(d)(y))\ ]]$

where for two pluralities x and y and a measuring method m, x is R-er than y by m if (45) applies:

(45) A is R-er than B by m if

a. $\forall a \Pi A\ \forall b \Pi B\ [\max(\lambda d.R(m)(d)(a)) > \max(\lambda d.R(m)(d)(b))]$, *or*

b. $|A|=|B|=n \wedge$ there exists a one-to-one correspondence $\langle a_1, b_1\rangle \ldots \langle a_n, b_n\rangle$ such that $\forall \langle a_i, b_i\rangle\ [a_i$ is R-er than $b_i\ ]$, *or*

c. (46)

(46) repeats our recursive methods:

(46) A is R-er than B by m if

a. there exists a contextually determined partition of A into A_1, A_2 such that A_1 is R-er than B by m $\wedge$ A_2 is R-er than B by m, *or*

b. there exists a contextually determined partition of B into B_1, B_2 such that A is R-er than B_1 by m $\wedge$ A is R-er than B_2 by m

Assume that one possible denotation for a DP like the boys on the soccer team is a plural individual. Then, as we translate (15) as (47):

(47) max(λd.heavy(m)(d)(σ(*soccerplayers))) > max(λd.heavy(m)(d)(σ(*wrestlers)))

(44) guarantees that, if our comparison conditions hold, there is some value for m in (48) which will render it true. Since this is the case in model B (our comparison conditions rate the soccer players heavier than the wrestlers on the basis of the default method for measuring the weight of individuals), we are allowed to judge (15) true in B. We can think of the meaning postulate as "adding" to the set of salient measuring methods, a method for measuring plural individuals, constructed from an existing (salient) method for measuring singular individuals.

For the interpretation that renders (15) true in A, we can assume that the boys on the soccer team either denotes the same plural individual as in (47), or the group projected from that plural individual, and that for additive predicates, some appropriate measurement method is available that allows addition of the degrees related to atomic members of a sum or group.

How about superlatives? We will see in the next section that there are reasons to assume that superlative predicates apply to groups, not sums, so that an additional meaning postulate is required that extends the meaning postulate in (44) to groups. For simplicity's sake, we want to illustrate at this point how the approach we have adopted provides the generalization over superlatives and comparatives, as required. Assuming then, for the moment, that superlatives do apply to sums, (12) comes out as:

(48) max(λd.heavy(m)(d)(s(*Soccerplayers))) >
max(λd.∃y[x≠y ∧ y∈C ∧ heavy(m)(d)(y))

Again, if our comparison conditions (17), (25), (28) and (29) rate the sum of the soccer players as heavier, by any measuring method, than all members of the comparison set C, then the meaning postulate in (44) guarantees that there is a method which can be the value of m in (48), that will render (48) true.

Further technical elaboration of these sketchy remarks would certainly be required, but would lead us too far afield. Also, we do not have space here to compare the approach to possible alternatives. Instead, we return in the final section to superlatives, and consider how we might deal with the obligatory choice for the definite article with superlatives.

5. DEFINITENESS

In this final section we address the question of definiteness in plural superlatives. Recall (1):

(1) **Context**: The Himalayas have eight of the 14 highest mountains in the world.
a. Mount Everest and K2 are the highest mountains.
b. Mount Everest, K2 and Kānchenjunga are the highest mountains.

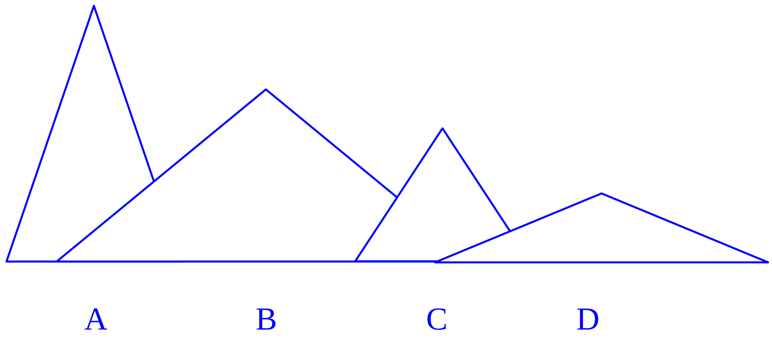
Since both (1a) and (1b) can be felicitous and true, the description *highest mountains* does not seem to pick out a unique maximal plural individual. But that being so, the definite article is unexpected, and we expect instead that other determiners should be allowed, contrary to fact:[7]

(49) *Mount Everest and K2 are some/two highest mountains.

[7] Herdan and Sharvit 2005 claim that indefinite superlatives are in fact grammatical, but only in situations where C varies, as in (32a) above.

Before we address this question, let us consider first how it is possible that (1a) or (1b) are true at all. To simplify the examples, consider (51), in the following model:

(50) The Ramtops



(51) a. A and B are higher than C and D.
b. A and B are higher than A, B and C.
c. A, B and C are higher than A and B.
d. A and B are the highest.

The comparatives (51a)-(51c) behave according to the generalizations outlined in previous sections. We judge (51a) true; this may for instance be due to a distributive reading. We strongly tend to judge (51b) and (51c) false.[8] This is as expected, as none of our plural comparison conditions allow comparison of overlapping pluralities.

In view of these facts, (51d) seems to be highly problematic for our approach. We easily judge (51d) true, in the same way we judge (1a) and (1b) true. However, assuming that this judgment involves comparing A⊕B to all other pluralities, including A⊕B⊕C, we would expect the judgment to fail just like (51b) fails. Not only do we appear to have found a counterexample to our comparison conditions (12),(18)-(22), we appear to have found a counterexample to our basic claim that plural comparison in comparatives shows the same patterns as plural comparison in superlatives. The problem is especially striking in that the case we fail to account for, (51d), and equivalently (1a) and (1b), is exactly the plural superlative case recognized by Stateva (2005), which prompted these investigations.

One potential solution for this problem might run as follows. We might revise Heim's (1999) semantics for *-st* as (3'):

(3') $[\![\text{-}st]\!] = \lambda C_{\langle e,t\rangle}\, \lambda R_{\langle d,\langle e,t\rangle\rangle}\, \lambda x_e\, .\, \forall z \in C\, [\neg\exists \mathbf{y}[\mathbf{y \sqcap x} \wedge \mathbf{y \sqcap z}] \rightarrow \max(\lambda d.R(d)(x)) > \max(\lambda d.R(d)(z))]$

$[\![\text{-st}]\!](C)(R)(x)$ is defined only if $x \in C$ and $\forall y \in C\ \exists d\ R(d)(y)$

(3') states that the superlative is true of any (plural) individual x which is R-er than all (plural) individuals y *which do not overlap with x*. As a result, in evaluating (51d), A⊕B is compared only with those individuals it is disjoint from: C, D and C⊕D; (51d) then comes out as true, as required.

We do not adopt this solution, as there are two problems with it. First, (3') not only (correctly) rules (51d) true in (50), it also (correctly, but problematically) rules (51e) true in (50): as A⊕B⊕C is not compared with overlapping A⊕B, (51e) is true in the model in (50).

(51) e. A, B and C are the highest.

[8] Again, as before, comparison can be made possible by an appropriate context which allows us to consider the pluralities involved as complex singular (group) individuals for which contextual purposes provide a measuring method. Without context, (51b) and (51c) fail.

We are thus still left with our original question, i.e., why both A⊕B⊕C and A⊕B can be ruled *the* highest mountains.

The second problem with (3') is this. The idea behind the solution is that comparison conditions in comparatives and superlatives are identical, as argued before. The contrast between (51d) and (51b) is attributed to the fact that in superlative (51d), overlapping individuals are not compared but ignored, whereas in comparative (51b), an overlapping individual is explicitly indicated for comparison and is not ignored. Now what happens if we explicitly state the candidates for comparison (the comparison set C) in a superlative, as in (51f)?

(51) f. Out of A, B and C, and A and B, A and B are the highest

We feel that (51f) is false. But (3') would predict it to be true: if the comparison set for A⊕B consists only of A⊕B⊕C and A⊕B itself, then (3') should ignore both members of the comparison set as cases of overlap, and the superlative should come out as trivially true. (51f) thus shows that (3') does not provide a correct solution. But more importantly, it vindicates our approach: comparatives and superlatives again behave alike, in that overlapping pluralities cannot be compared: for this reason, comparison fails in (51b) and (51c), and in (51f). The question remains, why comparison does not fail in (51d).

The alternative solution we propose is that comparison in (51d) does not fail on overlapping pluralities in the comparison set, because superlative predicates apply only to groups, not to sums; also, the comparison set C is a "partitioning" of the contextually relevant individuals into contextually relevant groups, where groups are not identical to mere sums of individuals, but atoms in their own right, related to sums by the group-formation operation (↑) (see Landman all refs for discussion).

First of all, if plural superlatives involve comparison between groups, the appearance of the definite article in (1) is no longer problematic: the uniqueness presupposition can be satisfied as in singular superlatives by the fact that the external argument of a plural superlative is the maximal contextually defined group. (1a) will be applicable if the context provides a comparison set containing the group corresponding to Mount Everest and K2, but *not* containing the group corresponding to Mount Everest, K2 and Kanchenjunga (or if such a comparison set can be accommodated); conversely, (1b) can be true, and satisfy uniqueness, if the group corresponding to Mount Everest and K2 is not in C.

Secondly, we can now understand how (51d) can be felicitous and true. If the set of contextually salient groups happens to contain, say, the groups ↑(A⊕B) and ↑(C⊕D) (but crucially not ↑(A⊕B⊕C)) then (51d) can come out as true: *A and B* denotes the group ↑(A⊕B), which is the highest of all members of the comparison set -- provided of course that we find a way of comparing groups. Comparison does not need to fail on overlapping members of C, since there is no reason why C must contain overlapping groups: but if it does (as in (51f)) then comparison does fail, as expected.[9]

This means we must define how comparison between groups is done. One possibility is that groups can be viewed as complex singular objects. We have already discussed this option in the context of example (301) above: we have seen that, if a complex object is not homogeneous, its height is not predicted by the heights of its component parts, but some appropriate measurement method must be inferred. Is the same true for such complex objects as mountain chains and other contextually defined

[9] We suspect that this also provides the reason *why* superlatives apply only to sums. The intuition is that the comparison set C, if it contains a particular salient sum S, will also contain all sub-sums of S as equally salient, whereas a group formed from a plurality can be salient by itself without the members of the corresponding sum being individually salient as well. Hence, if a sum S is to be a value for x in (3), S and its sub-sums must be members of C, but then S cannot be a value of x as it does not compare to its sub-sums in C.

groups of mountains? The answer must be no. Since we have seen that plural superlatives can be evaluated in just those cases where plural comparatives can be evaluated, namely when our plural comparison conditions (17), (25), (28) and (29) apply, it has to be the case that the comparison between groups A and B can (and must) be reduced to the comparison between the pluralities ↓A and ↓B corresponding to A and B. Thus we add the comparison condition (52):

(52) The group A is R-er than the group B if ↓A is R-er than ↓B

In other words, two groups can be compared to each other with respect to a particular scalar relation if the pluralities corresponding to them can be so compared. For the implementation of section 4, this means that we need to add a meaning postulate that has the effect of (52):

(53) Meaning postulate 2

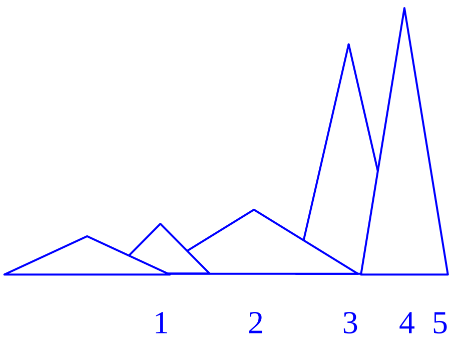
$\forall R \forall x \forall y$ [$\exists m$ [x is R-er than y by m] $\rightarrow$
$\exists m'$ [$\max(\lambda d.R(m')(d)(\uparrow x)) > \max(\lambda d.R(m')(d)(\uparrow y))$]]

If pluralities corresponding to groups cannot be compared (none of our conditions apply), we hypothesize that the groups are viewed as pragmatically complex singularities. Such is the case in (54), where none of our conditions apply, and empirically, no comparison between singularities is done to establish the truth of (54).

(54) The Himalayas are the highest mountains in the world.

Prediction: when the context supplies a group, the plural superlative picks it out:

(55) Gertrude climbed the highest mountains.



(55) is most naturally interpreted to mean that Gertrude climbed mountains 4 and 5, but not 3 (unless further information is provided).

6. Conclusion

The plural superlative can be interpreted compositionally on the basis of Heim's standard semantics for the superlative and the usual assumptions about plurals.

Under certain conditions, comparison between pluralities can reduce to comparison between their singular components – otherwise, comparison between pluralities is context-dependent (a possible comparison between groups).

The discussion of plural comparison is independent from the discussion of plural superlatives where it comes to the obligatoriness of a group-based semantics for the latter.

Plural superlatives are undefined unless we view them as groups. This assumption explains the use of the definite article and the impossibility of other determiners simultaneously.

Comparison between groups can be reduced to comparison between pluralities corresponding to them *if these pluralities can be compared* using the rules given in (17), (25), (28) and (29). Otherwise, groups are compared as complex singularities, and such comparison is necessarily context-dependent.

7. BIBLIOGRAPHY

von Fintel, Kai. 1994. Restrictions on Quantifier Domains, Doctoral dissertation, University of Massachusetts, Amherst: GLSA.

Heim, Irene. 1999. Notes on superlatives. Ms., MIT.

Heim, Irene. 2000. Degree operators and scope. In *Proceedings of SALT X*, 40-64. Ithaca, New York: Cornell Linguistics Club.

Heim, Irene, Howard Lasnik, and Robert May. 1991. Reciprocity and plurality. *Linguistic Inquiry* 22:63-101.

Herdan, Simona, and Yael Sharvit. 2005. Definite and nondefinite superlatives and NPI Licensing. *Syntax* 9:1-31.

Landman, Fred. 1989a. Groups, I. *Linguistics and Philosophy* 12:559-605.

Landman, Fred. 1989b. Groups, II. *Linguistics and Philosophy* 12:723-744.

Lasersohn, Peter. 1989. On the readings of plural noun phrases. *Linguistic Inquiry* 20:130-134.

Link, Godehard. 1987. Generalized quantifiers and plurals. In *Generalized Quantifiers*, ed. by P. Gärdenfors, 151-180. Dordrecht: D. Reidel.

Scha, Remko. 1981. Distributive, collective and cumulative quantification. In *Formal Methods in the Study of Language*, ed. by Jeroen Groenendijk, Martin Stokhof and Theo M. V. Janssen. *Mathematical Centre Tracts*, 483-512. Amsterdam: Mathematisch Centrum, University of Amsterdam.

Scha, Remko, and David Stallard. 1988. Multi-level plurals and distributivity. In *Proceedings of the 26th Annual Meeting of the ACL (June 1988), Buffalo, New York*.

Schwarzschild, Roger. 1996. *Pluralities*. Studies in the Linguistics and Philosophy 61. Dordrecht: Kluwer.

Stateva, Penka. 2002. How Different are Different Degree Constructions?, Doctoral dissertation, University of Connecticut.

Stateva, Penka. 2005. Presuppositions in superlatives. Ms., Humboldt University, Berlin.