That's *all*

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1. Introduction

All has been the object of considerable attention from linguists, but their main (only?) focus has been on *all* as a modifier of plural NPs or DPs (Brisson 1998, 2003 a.o.):

(1) a. All *(the) girls jumped in the lake.
b. All the students gathered in the hall.
c. All dogs are mammals.
d. The girls all jumped in the lake.

In this context, the properties of *all* that most semantic and syntactic accounts consider to be primary explananda are: (i) the fact that it has a 'maximizing effect' ((1a) says that the predicate *jumped in the lake* is distributed over the set of girls without any exception), while still being compatible with collective predicates (1b) (Link 1983, Dowty 1987); (ii) the fact that it must combine with a definite DP in an episodic sentence ((1a) vs. (1c)) (Partee 1995); (iii) and the fact that it can float (1d).

This article is about a different kind of examples, where *all* is singular and combines with a relative clause in a copular sentence:[1]

(2) All (that) John ate for lunch was a banana.
Approximate paraphrase: The only thing that John ate for lunch was a banana.

What we see here is a different set of properties from the aforementioned ones. (2) conveys that what John ate for lunch wasn't much. This is what I call the smallness effect of *all,* and it is restricted to this particular syntactic environment. It also conveys that John didn't eat more than a banana. In such sentences, universal quantification seems to be lost. The same phenomenon recurs in language after language, with the equivalents of *all.*

This article argues that analyzing *all* as a quantity superlative accounts for the inferences triggered by a sentence like (2), one of which is the smallness inference, and also explains why these inferences only arise in specific syntactic configurations. The ambition of this article is to uncover the real nature of *all,* which I claim is best visible in such configurations.

2. Small *all*

2.1. Exhaustivity and smallness

What singles out (2), and will be essential to understanding its structure and meaning, is the inferences attached to it. Sentences like (2) (or its variant with a definite (4)) come with at least two distinct inferences, exhaustivity and smallness (the exact source and nature of which will be elucidated later).

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[1] There has been very little research on the construction, and only in the context of the classification of copular sentences according to the specification vs. predication divide. It has however received a name, '*all*-cleft', in the syntactic literature (Collins 1991); as will become clear in the article, I do not believe that the term 'cleft' is appropriate (or at any rate, it should not be taken to mean 'specificational pseudo-cleft').

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(3) All (that) John ate for lunch was a banana. (=(2)) SMALLNESS & EXHAUSTIVITY

(4) All (that) John ate for lunch was the banana. SMALLNESS & EXHAUSTIVITY

(3) conveys that John didn't eat anything more than a banana for lunch. Similarly, (4) conveys that John didn't eat more than the banana for lunch. This is the *exhaustivity* inference:

(5) All (that) John ate for lunch was a/the banana. #He also ate a strawberry. EXHAUSTIVITY

Regarding the *smallness* inference, it can be paraphrased as: what John ate for lunch wasn't much. The minimally different (6) helps bring out this inference: given world knowledge, the smallness inference attached to it makes the sentence sound *funny* (I will signal sentences that come out as funny due to the smallness inference with the ☺ symbol):

(6) All (that) John ate for lunch was a roasted pig. SMALLNESS ☺

The smallness inference is specific to the construction studied here: it doesn't arise in *wh*-pseudo-clefts, as illustrated below, while exhaustivity does:

(7) *Wh*-pseudo-clefts

a. What John ate for lunch was a banana. NO SMALLNESS
b. What John ate for lunch was a roasted pig. NO SMALLNESS
c. What John ate for lunch was a banana. #He also ate a strawberry. EXHAUSTIVITY

Smallness is further illustrated in (8) and (9). The latter also shows that the post-copular element need not be a DP (it can also be e.g. a VP):

(8) a. All (that) I can give you is ten dollars. SMALLNESS
b. All (that) I can give you is a million dollars. SMALLNESS ☺
c. What I can give you is a million dollars. NO SMALLNESS

(9) a. All (that) I have to do now is steam the broccoli. SMALLNESS
b. All (that) I have to do now is climb Mount Everest. SMALLNESS ☺
c. What I have to do now is climb Mount Everest. NO SMALLNESS

The smallness inference doesn't arise in *wh*-pseudo-clefts, and it also doesn't arise when *all* is replaced with *everything*[2] or *each thing,* despite well-known commonalities between the three expressions. The sentences in (10) only have a *distributive* meaning, which says that each of the things that John ate for lunch had the banana (or roasted pig) property:

(10) a. Everything/Each thing (that) John ate for lunch was a banana. NO SMALLNESS
Paraphrase: Each item that John ate for lunch was a banana.
b. Everything/Each thing (that) John ate for lunch was a roasted pig. NO SMALLNESS
Paraphrase: Each item that John ate for lunch was a roasted pig.

Under this reading, the property denoted by the post-copular element is *predicated distributively* of each thing in the restrictor of *every/each* (i.e. over the parts that make up John's lunch). With *everything/each thing,* this is the only available reading, as we can show by having the post-copular element denote an impossible property of individuals, e.g. being a banana and a strawberry (compare with (12)):

(11) #Everything/Each thing (that) John ate for lunch was a banana and a strawberry.

(12) All (that) John ate for lunch was a banana and a strawberry. SMALLNESS

[2] See 4.3 for a qualification of this statement.

From now on, I will use the name 'small *all*' to refer to *all* when it appears in a configuration that gives rise to the smallness effect: so for example, small *all* appears in (2). Small *all,* as we will demonstrate in the next subsection, is restricted to a *subclass* of copular sentences. I choose to focus on the smallness effect as a touchstone for the particular complex of syntactic and semantic properties I am interested in; but it should be kept in mind that when smallness obtains, exhaustivity does too (for reasons of space, I do not provide exhaustivity tests in the following subsection).

2.2. Distribution of small all

In the following sentences (13), an *all*-relative is a syntactic argument of a verb other than *be,* or of a preposition. In none of those sentences is small *all* available:

(13) a. I ate all that you cooked. NO SMALLNESS
b. You can read all that you want. NO SMALLNESS
c. All that you cooked made me happy. NO SMALLNESS
d. I thank you for all that you did for me. NO SMALLNESS

The above sentences exhibit a *distributive* reading, like (10a). We will thus need to explain why the same object (singular *all*-relative) gives rise to different inferences in different syntactic configurations.

It is, as far as I can tell, an exceptionless generalization that small *all* can only appear as one of the two elements around the copula *be.* We saw it in the pre-copular position in (2), but it can also appear after the copula (15):

(14) Pre-copular
All (that) John ate for lunch was a banana. (=(2)) SMALLNESS

(15) Post-copular
a. A banana was all (that) John ate for lunch. SMALLNESS
Approximate paraphrase: The only thing that John ate for lunch was a banana.
b. A roasted pig was all (that) John ate for lunch. SMALLNESS ☺

Small *all* is subject to an additional restriction, which appears to be semantic. For smallness to obtain, the denotation of the *all*-relative cannot be a semantic argument of the other element of the copular sentence: when the other element is itself a predicate, e.g. *tasty* in (16) — an uncontroversial unary predicate, of type $\langle e, t\rangle$ —, smallness disappears; this example also rules out the possibility for smallness to arise when the denotation of the *all*-relative is a universal generalized quantifier predicated of a property of individuals:

(16) All that John ate for lunch was tasty.[3] DISTRIBUTIVITY; NO SMALLNESS
Paraphrase: Each part of what John ate for lunch was tasty.
(N.B.: this reading is marked)

Summing up, we have the following generalizations, one about the distribution of small *all,* the other about the semantic restriction:

(17) a. **Generalization 1 (syntax):** Small *all* only appears as a pre-copular or a post-copular element.
b. **Generalization 2 (semantics):** The denotation of small *all* cannot be the argument of a property nor can it be a universal quantifier predicated of a property.

[3] Notice the significant degradation when the complementizer is dropped (and the other element is a predicate):

(i) ??All John ate for lunch was tasty.

On this, see below.

A possible hypothesis suggests itself: small *all* needs to appear in a *be*-of-identity frame (or a 'specificational copular sentence' in the sense of Higgins 1973). An example of a sentence with identity *be* is (19):

(18) What John ate for lunch was tasty. PREDICATION

(19) What John ate for lunch was a banana and a strawberry. IDENTITY

Under this hypothesis then, small *all* is constrained to only appear, for some reason, in copular sentences with a *be* of identity, linking two denotations of the same type (type e in the simple cases, e.g. (14)-(15)); this would explain why the denotation of small *all* cannot be the argument of a property (or a universal quantifier); but as we will see, I will argue in this article that small *all* doesn't require identity *be.*

At this point, some shortcoming of the identity *be* theory can already be put forth. This view indeed says that under the smallness reading, the denotation of the *all*-relative is equated with that of the other copular element. This predicts that we can have two *all*-relatives, of the same type α, one before and one after the copula, forming (20), in the same manner as the grammatical and felicitous (21):

(20) #All you ate is all I cooked.

(21) What you ate is what I cooked. IDENTITY

(20) not only doesn't exhibit smallness, it is irremediably odd, showing that the prediction of the identity approach is incorrect.

The alert reader may have noticed that in (20) the complementizer *that* was dropped. There is a reason for that. It turns out that it is convenient to use bare-*all* relatives (in which the complementizer is missing) whenever we want to maximize our chances to be dealing with small *all,* whose denotation gives rise to smallness. Bare-*all* relatives have a more restricted distribution than *all-that* relatives: to a large extent, they only appear in copular sentences where they are not the argument of a property; in these contexts, they give rise to a smallness reading; outside of these contexts, they are rarely acceptable, and when they are, they never give rise to a smallness reading (as the generalizations (17a)-(17b) lead us to expect). So they seem 'specialized' (again, not perfectly, for there are exceptions) in small *all* (22a):

(22) a. All you cooked is this soup. SMALLNESS
b. ??All you cooked is tasty.
Compare with:
c. All that you cooked is tasty. (cf. (16)) DISTRIBUTIVITY

(22b) is not a sentence where small *all* can appear (per Generalization 2 (17b)); the bare-*all* relative doesn't have a smallness reading in such a frame then, and in fact, it doesn't have any other reading either, for the sentence is out. *All-that* relatives on the other hand can yield a smallness reading in the environments that permit it (per (17a)-(17b)), but it seems that they are also generally compatible with other interpretations of *all* (such as what I described as the distributive reading of *all* earlier), hence the acceptability of (22c) under a distributive reading.

The effect of *that*-dropping seems quite robust across speakers. I further illustrate the limitations on the distribution of bare-*all* relatives:

(23) a. ??I ate all you cooked. (comp. (13a))
b. ??All you cooked made me happy. (comp. (13c))

I was not able to determine why dropping *that* has such an effect on acceptability; I therefore cannot explain why the effect is sometimes absent, for example in (24b), which is perfect and apparently minimally different from (24a) (but does not have a smallness reading, in line with Generalization 2):

(24) a. ??All you cooked is in the kitchen.
b. All you need is in the kitchen. DISTRIBUTIVITY
(B. Dillon, p.c.)

One possible ameliorating factor seems to be anaphoricity, as suggested to me by Barbara Partee:

(25) A: You didn't eat much oatmeal.
B: Well, I ate all you cooked! DISTRIBUTIVITY
Only possible with the meaning: I ate all the oatmeal you cooked. (B. Partee, p.c.)

To sum up, this section has provided a description of two inferences attached to small *all,* smallness and exhaustivity, and established some distributional criteria. In the next section, a third inference, membership, is introduced; membership is a hallmark of superlative definite descriptions, and thus motivates the hypothesis that small *all* is a superlative morpheme, developed in Section 4.

3. Superlatives

3.1. A third inference: Membership

Focusing on copular sentences, as small *all* only occurs there, we examine the effect of negation. Negation, I contend, offers essential clues to the nature of small *all,* because as we will see now, it causes exhaustivity and smallness to be lifted, while another inference, which I label *membership,* arises.

Building upon the observation from the previous section on the difference between bare-*all* relatives and *all-that* relatives, I use bare *all* in order to rule out a potential ambiguity:

(26) Negative copular sentences
a. A banana was not all John ate for lunch. NO SMALLNESS
b. The banana was not all John ate for lunch. NO SMALLNESS
$\rightsquigarrow$ John ate a/the banana for lunch and something else.

(26a) and (26b) do not convey that what John ate for lunch wasn't much. They also do not convey exhaustivity: they actually say that John ate *more than* a/the banana (27a). And they entail that John ate a/the banana (see the continuation in (27b)):

(27) a. A/The banana was not all John ate for lunch. Indeed he also ate a strawberry.
NO EXHAUSTIVITY
b. A/The banana was not all John ate for lunch. #In fact, he didn't eat a/the banana.[4]
MEMBERSHIP

Note that the fact that the two inferences that we have been investigating so far (smallness and exhaustivity) do not survive under negation suggests that they are not presuppositions. What about the inference drawn from (26a)-(26b) that John's lunch included a/the banana? This inference passes the *Hey! Wait a minute!* test (von Fintel 2004) for presupposition:

(28) A: A banana was not all John ate for lunch.
B: Hey! Wait a minute! I didn't know John ate a banana for lunch!

(29) *Control with a* wh-*pseudo-cleft*
A: A banana was not what John ate for lunch.
B: #Hey! Wait a minute! I didn't know John ate a banana for lunch!

It also passes another test for presupposition: in the following dialogue, the question shows that it is not part of the common ground that John ate a banana for lunch; as a result, the answer is odd:

(30) A: What did John eat for lunch?
B: #A banana was not all John ate for lunch.

[4] The oddness of the continuation shows that the inference that the banana is part of what John ate ($\approx$ some of it) is not a scalar implicature triggered by *all* in a downward-entailing context.

(31) *Control with a* wh-*pseudo-cleft*
A: What did John eat for lunch?
B: A banana was not what John ate for lunch.

Let's call this presupposition a *membership presupposition.* This pattern, whereby (i) *all*-relatives give rise to an apparent identity statement in positive copular sentences, and (ii) under negation, a *more than that* inference and a membership presupposition become detectable, is not unheard of. It is actually reminiscent of the behavior of the definite descriptions *the only NP* and *the A-est NP:*

(32) John is the only architect that Bill likes.
⇝ There is exactly one architect that Bill likes, and John is that person.

(33) John is not the only architect that Bill likes.
a. Can mean: 'MORE THAN THAT' & MEMBERSHIP
There is more than one architect that Bill likes, and John is one of them.
Allows the continuation: There are more architects that Bill likes.
b. Can also mean:
There is exactly one architect that Bill likes, and John is not that person.
Allows the continuation: He is not the architect that Bill likes!

(34) *Control with a definite description not containing* only
John is not the architect that Bill likes.
Cannot mean:
There is more than one architect that Bill likes, and John is one of them.
Doesn't allow the continuation: There are more architects that Bill likes.

Let's test for the membership presupposition:

(35) A: John is not the only architect that Bill likes.
B: Hey! Wait a minute! I didn't know John was an architect that Bill likes! MEMBERSHIP

As indicated by the underline in (33a) and confirmed by the *Hey! Wait a minute!* test (35),[5] the definite description can give rise to a membership presupposition. The sentence is ambiguous but it has an LF to which the presupposition is attached, as diagnosed by the test. The denotation of the first copular element (John) is presupposed to be a member of the set denoted by the NP following *only* (here, the set of architects that Bill likes). And under the same reading, the sentence says that there is more than one architect that Bill likes (the *more than that* inference).

We observe a similar pattern with *the A-est NP* (the same presupposition is evidenced in (38)):

(36) John is the tallest journalist.
⇝ There is exactly one journalist who is taller than all other journalists, and John is that person.

(37) John is not the tallest journalist.
a. Can mean: 'MORE THAN THAT' & MEMBERSHIP
John is a journalist who is tall to a certain degree *d,* and there are journalists who are tall at degrees of tallness greater than *d.*
Allows the continuation: There are taller journalists.
b. Can also mean:
There is exactly one journalist who is taller than all other journalists, and John is not that person.
Allows the continuation: He is not a journalist!

[5] The other test (30), where the context set up by a question doesn't support the presupposition, is not shown here, because of the ambiguity of sentence (33). On the reading (the identity *be* reading, see below) which presupposes that there is a unique architect that Bill likes, the sentence can be used felicitously (if it is part of the common ground that there is a unique architect that Bill likes) as an answer to the question 'Can you fill me in on John, who I don't know?'. The test could still be applied, but would require additional adjustments.

Let's test for the membership presupposition:

(38) A: John is not the tallest journalist.
B: Hey! Wait a minute! I didn't know John was a journalist! MEMBERSHIP

In this case it is presupposed that the set denoted by the NP following the adjective (here the set of journalists; more precisely it is the set of journalists who are tall to some degree) contains the denotation of the other copular element (here, John). And under the same reading, it is said that there are journalists who are taller (the *more than that* inference).

Note that the membership presupposition, evidenced with *all* and with *the only/A-est NP,* can also be detected in questions (one of the environments that make up the family-of-sentences test of presuppositions):

(39) A: Was a banana all John ate for lunch?
B: Hey! Wait a minute! I didn't know John ate a banana for lunch! MEMBERSHIP

(40) *Control with a* wh*-pseudo-cleft:*
A: Was a banana what John ate for lunch?
B: #Hey! Wait a minute! I didn't know John ate a banana for lunch!

(41) A: Is John the only architect that Bill likes?
Can mean: Are there no other architects that Bill likes besides John?
Can also mean: Is John identical to the only architect that Bill likes?
B: Hey! Wait a minute! I didn't know John was an architect! MEMBERSHIP

(42) A: Is John the tallest journalist?
Can mean: Is John not surpassed in height by other journalists?
Can also mean: Is John identical to the tallest journalist?
B: Hey! Wait a minute! I didn't know John was a journalist! MEMBERSHIP

(43) *Control with a definite description without* only *or* A-est*:*
A: Is John the architect that Bill likes?
Cannot mean: Are there no other architects that Bill likes besides John?
B: #Hey! Wait a minute! I didn't know John was an architect!

While I insist on the membership presupposition, previous researchers have highlighted, in their description of the facts about *the only/A-est NP,* the presence vs. absence of definiteness (i.e the availability of two readings, one in which the definite description is semantically definite, and one in which it is not). Sharvit (2015) credits Higgins (1973) for being the first author to make the observation. She offers a unified analysis for *the only NP* and *the A-est NP,*[6] under which adnominal *only* is a superlative morpheme. She describes the two readings, e.g. (33a) and (33b) ((37a) and (37b)), as being distinguished by the interpretation of the article *the.* In (33a) and (37a), the article is not interpreted: it undergoes *the*-deletion, and what is apparently a definite description is interpreted as a property (type $\langle e, t\rangle$), with a predication *be* linking the two copular elements. It is this LF that also gives rise to the membership presupposition. In (33b) and (37b), the article is standardly interpreted as definite (in a Fregean fashion), with an existence and a uniqueness presuppositions, and the definite description receives a type e interpretation; the copula is identity *be*.[7] We thus have two options, as shown in Table 1.

[6] Coppock & Beaver (2012, 2015) propose an analysis of *the only NP* definite descriptions, but do not analyze them on a par with superlative definite descriptions.

[7] This means that the complement of the copula gets type-shifted by Partee's IDENT, see 3.2.

John e	is	~~the~~ only architect that Bill likes $\langle e,t\rangle$	`Predication`
John e	is	the only architect that Bill likes e	`Identity`

Table 1: Two LFs

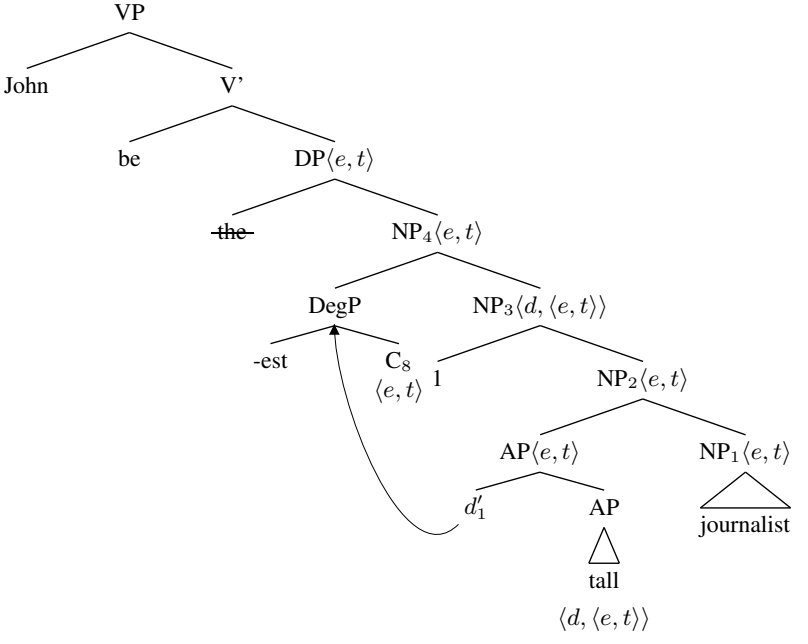
Let's now see whether the parallel with superlatives can help us explain the three inferences exhibited by small *all, viz.* exhaustivity, smallness and membership. The hypothesis that we are going to explore is that the membership presupposition, which seems to be a shared feature, is not an accidental commonality between *all* and superlatives, but rather, that small *all* ought to be analyzed as a superlative. In order to do so, we need an analysis of superlatives, which is provided in the next subsection. This analysis will then serve as a basis for the analysis of *all* in the following section.

3.2. Analysis of superlatives

I am following here a standard analysis, inherited from Heim 1999, 2000, and ultimately inspired by Szabolcsi 1986. I begin with the derivation of the predication reading, and illustrate it with *the tallest journalist*:[8]

(44) John is the tallest journalist.

(45)



(46) **Assumption 1:** *the* can be semantically vacuous in superlative DPs, and it is here.

It is commonly assumed, since Szabolcsi 1986, that *the* can be eliminated in superlatives; specifically in relative superlatives:

(47) John climbed the highest mountain.
Relative superlative reading: John climbed a mountain that was higher than any mountain climbed by any other mountain-climber.

[8] Although I used *the only NP* for illustration purposes, I do not discuss Sharvit's (2015) superlative analysis of it in great detail, for this analysis contains some assumptions that will not play any role in my account of *all.*

We thus know that *the*-elimination (loss of definiteness) can occur in non-copular sentences; the theory generally admitted is that DegP movement out of DP (required for a relative reading) is needed for *the*-elimination. With regard to copular sentences, it is fair to say that we don't know if movement is required or not for *the*-deletion; I'm going to remain agnostic about this and let DegP movement remain DP-internal (on this, see Sharvit 2015, which argues that *the*-elimination doesn't require DP-external movement).

(48) **Assumption 2:** $[\![\text{be}]\!]^g$ is a cross-categorial identity function (of type $\langle\langle e,t\rangle,\langle e,t\rangle\rangle$ in (45)).

I now turn to the superlative morpheme *-est:*

(49) $[\![\text{-est}]\!]^g$ has three arguments:[9]

a. A contextually supplied comparison set C (typically a set of individuals, as shown here); focus plays a role in determining C:
$g(\text{C}_8) = \{x|\exists d[x \text{ is a } d\text{-tall journalist}]\}$
- It is of type $\langle e,t\rangle$

b. A gradable predicate R, i.e. a relation between degrees and individuals, e.g. *tall:*
$[\![\text{tall}]\!]^g = \lambda d_d.\lambda x_e.$ True *iff* $\text{TALLNESS}(x) \geq d$
- It is of type $\langle d,\langle e,t\rangle\rangle$

c. An individual x (of which it is said that it is R to a degree that is unsurpassed by any other element in C)
- It is of type *e*

(50) **Assumption 3:** DegP undergoes QR and leaves behind a trace of type *d.*

The truth-conditional content and the presuppositions of *-est* are as follows:

(51) For any $C \subseteq D_e$, $R \in D_{\langle d,\langle e,t\rangle\rangle}$ and $x \in D_e$, $[\![\text{-est}]\!]^g(C)(R)(x)$ is defined only if:
(i) $\underline{x{\in}C}$; Membership presupposition
(ii) $\exists y[y \neq x \ \wedge \ y{\in}C]$; Diversity presupposition
(iii) $\forall y{\in}C\ \exists d{\in}D_d[R(d)(y) = \text{True}]$.
If defined, $[\![\text{-est}]\!]^g(C)(R)(x) = \text{True}$ *iff*
$\exists d{\in}D_d[R(d)(x) = \text{True} \wedge \forall y{\in}D_e[y{\in}C \ \wedge \ y \neq x \rightarrow R(d)(y) = \text{False}]$

The presupposition that the individual argument of $[\![\text{-est}]\!]^g$ is an element of the comparison set is underlined, as it is the membership presupposition detected e.g. in (37). The second presupposition guarantees that there is more than one element in the comparison set; it accounts for the oddness of a statement like (52):

(52) #You are the best mother I have. [D. Fox, credited in Hackl 2009]

(53) Predication 'be' LF
$[\![$John is ~~the~~ [-est C_8] 1 [[d'$_1$ tall] [journalist]]$]\!]^g$ is defined only if
John$\in g(\text{C}_8)$, i.e. <u>John is a journalist tall to some degree</u> and
the comparison set includes at least one person other than John.[10]
If defined, $[\![$John is ~~the~~ [-est C_8] 1 [[d'$_1$ tall] [journalist]]$]\!]^g$ = True *iff*
$\exists d{\in}D_d[[\![1\ d'_1 \text{ tall journalist}]\!]^g(d)(j) = \text{True} \wedge$
$\forall y{\in}D_e[y{\in}g(\text{C}_8) \ \wedge \ y \neq j \rightarrow [\![1\ d'_1 \text{ tall journalist}]\!]^g(d)(y) = \text{False}]$

This LF asserts that John surpasses in height all other members of the comparison set, the set of journalists tall to some degree. It is worth noticing that the semantics provided above holds that in simplex positive declarative sentences, the membership presupposition is *entailed* by the assertive content of the sentence.

[9] I do not discuss an alternative entry considered by Heim (1999), where $[\![\text{-est}]\!]^g$ has two arguments.
[10] The third presupposition is not shown, for brevity.

(54) A: John is the tallest journalist.
B: #Hey! Wait a minute! I didn't know John was a journalist! NO MEMBERSHIP

Whether this might explain why the membership presupposition is not detectable in simplex positive declarative sentences, as indicated by the failure of the test in (54),[11] is a non trivial matter, which I leave for future research. Other known cases of entailed presuppositions, e.g. the presupposition of *stop,* as diagnosed by Sudo (2012) using non-monotonic quantifiers, seem to be detectable by usual presupposition tests.

Turning to negative sentences, where membership is detectable:

(55) Predication 'be' LF for the negative sentence
$[\![$not John is ~~the~~ [-est C_8] 1 [[d'$_1$ tall] [journalist]]$]\!]^g$ is defined only if
John$\in g(C_8)$, i.e. John is a journalist tall to some degree and
the comparison set includes at least one person other than John.
If defined, $[\![$not John is ~~the~~ [-est C_8] 1 [[d'$_1$ tall] [journalist]]$]\!]^g$ = True *iff*
$\neg\exists d{\in}D_d[[\![1\ d'_1$ tall journalist$]\!]^g(d)(j) =$ True $\wedge$
$\forall y{\in}D_e[y{\in}g(C_8)\ \wedge\ y \neq j \rightarrow [\![1\ d'_1$ tall journalist$]\!]^g(d)(y) =$ False$]$

This LF presupposes that John is a journalist tall to some degree, and asserts that one can find journalists different from John with a degree of tallness d greater than any degree of tallness d' that John has. We are thus able to locate the source of the membership presupposition detected in negative sentences, and also to account for the *more than that* inference.

To appreciate the difference between the predication 'be' reading, to which membership is attached, and the identity 'be' reading, which doesn't yield membership, I briefly show how the latter is derived. In the identity 'be' LF of (44), *the* is not semantically vacuous, but instead is interpreted as in (56); it requires type-shifting the complement of the copula, using the IDENT type-shifter from Partee 1986:

(56) Fregean *the* (type $\langle\langle e,t\rangle,e\rangle$)
$[\![$ the $]\!]^g(f)$ is defined only if $|\{x{\in}D_e\colon f(x) =$ True$\}| = 1$;
If defined, $[\![$ the $]\!]^g(f) =$ the unique y such that $f(y) =$ True

(57) $[\![$ IDENT $]\!]^g = \lambda x_e.\lambda y_e.$ True *iff* $x = y$

(58) Identity 'be' LF
$[\![$John is [IDENT the [-est C_8] 1 [[d'$_1$ tall] [journalist]]]$]\!]^g$ is defined only if
there is a journalist who is taller than any other journalist.
If defined, $[\![$John is [IDENT the [-est C_8] 1 [[d'$_1$ tall] [journalist]]]$]\!]^g$ = True *iff*
John is identical to the unique individual y such that y is a journalist taller than any other journalist.

(59) Identity 'be' LF for the negative sentence
$[\![$not John is [IDENT the [-est C_8] 1 [[d'$_1$ tall] [journalist]]]$]\!]^g$ is defined only if
there is a journalist who is taller than any other journalist.
If defined, $[\![$not John is [IDENT the [-est C_8] 1 [[d'$_1$ tall] [journalist]]]$]\!]^g$ = True *iff*
It is not the case that John is identical to the unique individual y such that y is a journalist taller than any other journalist.

No membership presupposition here (and no *more than that* inference), as desired. This completes the analysis of *the A-est NP.*

A few words are in order about how Sharvit (2015) derives the two readings (predication and identity) of *John is (not) the only architect that Bill likes* ((32)-(33)) in a similar fashion. Sharvit offers an

[11] That the presupposition doesn't seem to be there in simplex positive declarative sentences can also be shown for *all:*

(i) A: A banana is all John ate for lunch.
B: #Hey! Wait a minute! I didn't know John ate a banana for lunch!

analysis of adnominal *only* as a superlative (inspired by Bhatt 2002, 2006): adnominal *only* is actually, according to her, the form that *-est* takes when its gradable predicate argument is a count noun ('we assume that LF-PF mapping rules dictate that *-est* is pronounced *only* when it "binds" a noun'). Under this analysis, $[\![$ boy $]\!]^g$ is of type $\langle d, \langle e, t\rangle\rangle$: the degree argument is a number, which is 1 in the case of a singular count noun. $[\![$ ~~the~~ only boy $]\!]^g$, used in the predication 'be' LF, is thus a property which is true of an individual x just in case there are no individuals in the comparison set (male individuals) other than x who are boys reaching cardinality 1. With a slightly different set of presuppositions than the ones used here, Sharvit arrives at a comparison set consisting only of individuals to which the attribution of a degree of the gradable predicate (here, *boy*) is defined, in this case male individuals (furthermore it is presupposed that the gradable predicate is true of the individual argument of the superlative morpheme). The identity 'be' reading follows when the definite article is non-vacuous, and the complement of the copula is type-shifted by IDENT.

I will close this section with one more observation about superlatives, which will carry over to small *all.* I have argued that definite descriptions of the *the A-est NP/the only NP* form can be interpreted as properties in copular sentences, that are predicated of the other copular element. The evidence I gave for this came from sentences where the definite description is the post-copular element, e.g. (33). But the same semantic effects (non-definiteness and membership presupposition) obtain when it is in the pre-copular position (the facts are clearest with *the only NP*):

(60) Negation
I don't think that the only architect that Bill likes is John.
a. Can mean: `Predication`
There is more than one architect that Bill likes, and John is one of them.
Allows the continuation: There are more architects that Bill likes.
b. Can also mean: `Identity`
There is exactly one architect that Bill likes, and John is not that person.
Allows the continuation: He is not the architect that Bill likes!

(61) Questions
Do you really think that the only architect that Bill likes is John?
a. Can mean: `Predication`
Do you really think that there are no other architects that Bill likes besides John?
b. Can also mean: `Identity`
Do you really think that the only architect that Bill likes is identical to John?

These examples with a superlative definite description in pre-copular position have embedding; in fact, embedding is necessary for the predication reading; without it, a uniqueness inference obtains, which could (but need not) signal definiteness and identity 'be':

(62) a. The only architect that Bill likes is not John.
b. Is the only architect that Bill likes John?
$\rightsquigarrow$ There is a unique architect that Bill likes.

Sharvit (2015) offers an explanation (for reasons of space, I will not discuss it) of the appearance of a uniqueness inference, which has to do with the presence of an exhaustifier and the subject island constraint, resulting in obligatory wide scope of the superlative morpheme, together with an existential closure, over a clausemate negation (in these examples, the uniqueness inference is not a product of an identity statement).

Despite the complication related to embedding, we have evidence that the pre-copular position can be one where *the only/A-est NP* is not a definite DP but a property ($\langle e, t\rangle$). This in turn suggests that a syntactic operation of predicate raising *à la* Moro (1997) is needed to derive the surface order.[12]

[12] The hypothesis that a property denoting expression occupies the pre-copular position is at odds with some well-known facts:

In the next section, I propose an analysis of small *all* as a superlative morpheme, building upon the analysis of this section.

4. *All* as a superlative

The main point of the superlative analysis proposed here is that the *all*-relative that gives rise to the smallness reading is *predicated* of the other copular element, like the superlative definite descriptions which get turned into properties.

4.1. A close parallelism

Small *all* only occurs in pre- and post-copular positions, where superlative definite descriptions can be interpreted as properties. One effect of the property interpretation of superlative definite descriptions is the detectability of the membership inference under negation and in questions. In this respect, the parallel with small *all* is striking. The membership presupposition obtains with *all* under negation and in questions ((27b)-(39)), and moreover, it is not just triggered when *all* appears in the post-copular position: we can now show that it also obtains from the pre-copular position (63b)-(64b):

(63) Negation

a. A banana is not all John ate for lunch. (cf. (27b)) MEMBERSHIP

b. I don't think that all John ate for lunch is a banana. MEMBERSHIP
Both sentences can mean: John ate a banana for lunch and he ate something else for lunch in addition to a banana.
Both sentences make the following response appropriate:
Hey! Wait a minute! I didn't know John ate a banana for lunch!
Presupposition test

(64) Questions

a. Is a banana all John ate for lunch? (cf. (39)) MEMBERSHIP

b. Do you really think that all John ate for lunch is a banana? MEMBERSHIP
Both sentences can mean: Were there no other things that John ate for lunch in addition to a banana?
Both sentences make the following response appropriate:
Hey! Wait a minute! I didn't know John ate a banana for lunch!
Presupposition test

Furthermore a constraint applies, which is strongly reminiscent of the embedding constraint on superlatives (62) we observed earlier: a bare-*all* relative (which delivers small *all* and, under negation and in questions, the membership presupposition) is not acceptable in pre-copular position in a simplex matrix negative sentence or a simplex matrix question:

(65) a. *All John ate for lunch is not a banana.
b. *Is all John ate for lunch a banana?

The source of the restriction will have to remain unexplained. But the parallelism lends further support to the claim that small-*all* relatives denote properties predicated of the other copular element, similarly to superlative definite descriptions. We can now push the analogy further, and propose an analysis of small *all* as a superlative, more specifically a quantity superlative.

(i) a. Mary is a doctor.
b. ??A doctor is Mary.

The apparent unavailability of indefinite property denoting expressions in surface subject position has been used as an objection against the view that specificational copular sentences are the result of inverted predication. But the restriction on indefinite subjects is not a real ban. See Mikkelsen 2005.

4.2. Proposal

4.2.1. A precedent: Hallman 2016

Hallman (2016) was first, to the best of my knowledge, to make the claim that I am making here, namely that *all* is a quantity superlative. Hallman did not consider the same data though: he focused on *all* followed by plural NPs/DPs. His claim rests on a parallelism between the distribution of plural *all* and that of a known superlative, namely (plural) *most* (after Hackl 2009). The distribution of plural *all* indeed resembles that of plural *most:* the particle *of* is possible with *all,* as it is with *most; all* and *most* must combine with a definite DP in episodic sentences; and they are both compatible with collective predicates of the *gather*-type:

(66) Possibility of the particle *of* [examples taken from Hallman 2016]

a. All (of the) swans are white.
b. Most (of the) swans are white.
c. *Every (of the) swans are white.

(67) Episodic sentences

a. *The bus nearly left behind all students.
b. *The bus nearly left behind most students.

(68) Generic contexts

a. Julie admires all linguists.
b. Julie admires most linguists.

(69) Collective predicate of the *gather*-type

a. All of the students gathered in the hall.
b. Most of the students gathered in the hall.
c. *Every student gathered in the hall.

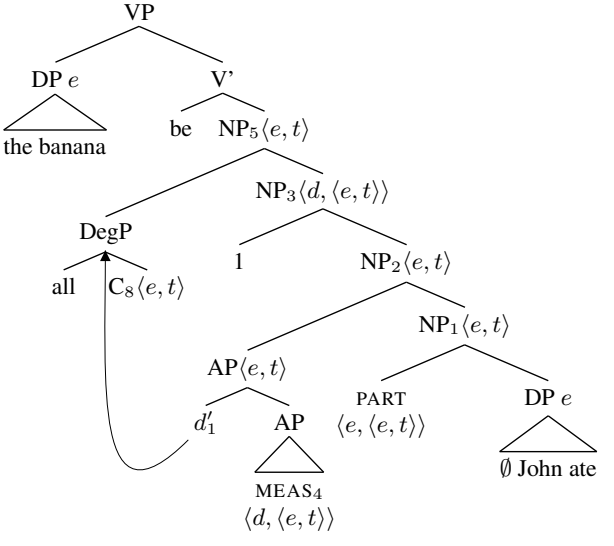
4.2.2. Small all *as a quantity superlative*

Despite their different empirical foundations, my analysis and Hallman's are to a large extent the same. In the following, I derive the truth-conditions of (70).

(70) The banana is all John ate. SMALLNESS

For simplicity, I use a sentence in which the *all*-relative comes after the copula, with a definite subject. The LF for this small-*all* sentence is shown in (71): it is a predicative structure, in which the *all*-relative is predicated of the subject (and of course no *the*-elimination is needed):

(71)



I assume that the relative clause in *the banana is all that John ate* or *the banana is all John ate* is syntactically a free relative, despite the absence of *what,* and as such its denotation is of type e (Caponigro 2003): it denotes the sum of parts that John ate:

(72) $[\![$ that/$\emptyset$ John ate $]\!]^g = \iota x.\ [$*ate'$(x)(j)\ \wedge\ \forall y($*ate'$(y)(j) \rightarrow y \sqsubseteq x)]$ (abbreviated as 'ιJ')

There is some support for this syntactic stipulation from other languages, such as French, where *ce que* is used to form free relatives:

(73) a. *Une banane, c'est ce que Jean a mangé.*
a banana it-is this that Jean has eaten
'A banana is what Jean ate.' NO SMALLNESS

b. *Une banane, c'est tout ce que Jean a mangé.*
a banana it-is all this that Jean has eaten
'A banana is all Jean ate.' SMALLNESS

The constant PART function collects the parts of its argument, here the set of parts of the stuff eaten by John:

(74) $[\![$ PART $]\!]^g = \lambda x_e.\lambda y_e.\ [y \sqsubseteq x]$

The semantics of *all* parallels that of *-est* (see (51)):[13]

(75) For any $C \subseteq D_e$, $R \in D_{\langle d,\langle e,t\rangle\rangle}$ and $x \in D_e$, $[\![$all$]\!]^g(C)(R)(x)$ is defined only if:
(i) $\underline{x \in C}$; Membership presupposition
(ii) $\exists y[y \neq x\ \wedge\ y \in C]$. Diversity presupposition
If defined, $[\![$all$]\!]^g(C)(R)(x) =$ True *iff*
$\exists d \in D_d[R(d)(x) =$ True $\wedge\ \forall y \in D_e[y \in C\ \wedge\ y \neq x \rightarrow R(d)(y) =$ False$]$

All is a *quantity* superlative. The MEAS_4 variable of type $\langle d,\langle e,t\rangle\rangle$ (from Solt 2015) ranges over measure functions; it seems that the QUANTITY dimension is the only relevant one for *all.* In Tree (71), $g(\text{MEAS}_4)$ is a measure relation between a degree of QUANTITY and an entity (a part of stuff in the case at hand):

(76) $[\![\ \text{MEAS}_4\ ]\!]^g = \lambda d_d.\lambda x_e.\ [\text{QUANTITY}(x) \geq d]$

Importantly, I assume with Hallman that the distinctness condition ('$\neq$') applied to entities (parts of stuff) by *all* is one of non-identity rather than disjointness, so it allows for overlaps:[14] so a and $b \sqcup c$ are distinct (no overlap), but so are $a \sqcup b$ and $a \sqcup c$ (overlap but no identity).

(77) $g(\text{C}_8) = \{x | \exists d[x \sqsubseteq \iota\text{J} \wedge \text{QUANTITY}(x) \geq d]\}$ ('ιJ' stands for what John ate)

(78) $[\![$ (71) $]\!]^g$ is only defined if ('b' stands for the banana)
(i) $\underline{\text{b} \in \{x | \exists d[x \sqsubseteq \iota\text{J} \wedge \text{QUANTITY}(x) \geq d]\}}$; Membership presupposition
(ii) $\exists y[y \neq \text{b}\ \wedge\ y \in \{x | \exists d[x \sqsubseteq \iota\text{J} \wedge \text{QUANTITY}(x) \geq d]\}$. Diversity presupposition
If defined,
$[\![$ (71) $]\!]^g =$ True *iff*
$\exists d[[\text{b} \sqsubseteq \iota\text{J}\ \wedge\ \text{QUANTITY}(\text{b}) \geq d]\ \wedge$
$\forall y[[\exists d'[y \sqsubseteq \iota\text{J} \wedge \text{QUANTITY}(y) \geq d'] \wedge y \neq \text{b}] \rightarrow \neg[y \sqsubseteq \iota\text{J}\ \wedge\ \text{QUANTITY}(y) \geq d]]]$

[13] The third presupposition about the comparison set is suppressed because it doesn't play an important role in my discussion of *all.*

[14] Things are (potentially) different in the case of *most,* for which Hackl 2009 and Kotek et al. 2011 assume the following notion of distinctness:

Plural individuals X and Y are distinct *iff* they are disjoint, i.e. *iff* $\neg(X \circ Y)$,
equivalently *iff* $\forall x \sqsubseteq X\ \forall y \sqsubseteq Y$[x and y are distinct] ($\approx$ no parts in common)

Which can be simplified as:
If defined, $[\![(71)]\!]^g =$ True *iff*
$\exists d[[\mathrm{b} \sqsubseteq \iota \mathbf{J} \wedge \textsc{quantity}(\mathrm{b}) \geq d] \wedge$
$\forall y[[\exists d'[y \sqsubseteq \iota \mathbf{J} \wedge \textsc{quantity}(y) \geq d'] \wedge y \neq \mathrm{b}] \rightarrow \neg[\textsc{quantity}(y) \geq d]]]$

The (entailed) membership presupposition is that John ate the banana; and the assertion is that the banana is greater in quantity than any distinct part of what John ate. This excludes any parts of stuff at least as big as the banana and different from it. These cannot be parts of what he ate. So a pizza is excluded, as it is bigger than the banana. But a strawberry, which is not bigger, is also excluded. This is because it is implied that John ate the banana and if he ate a strawberry too, then what he ate is the mereological sum of the strawberry and the banana, which is bigger in quantity than the banana and distinct from it, a situation which is excluded.

For a negative sentence like (79), we straightforwardly derive that the sentence presupposes that John ate the banana and asserts that he ate some more stuff:

(79) The banana is not all John ate.

(80) $[\![(79)]\!]^g$ is only defined if
(i) $\underline{\mathrm{b} \in \{x | \exists d[x \sqsubseteq \iota \mathbf{J} \wedge \textsc{quantity}(x) \geq d]\}}$; Membership presupposition
(ii) $\exists y[y \neq \mathrm{b} \wedge y \in \{x | \exists d[x \sqsubseteq \iota \mathbf{J} \wedge \textsc{quantity}(x) \geq d]\}$. Diversity presupposition
If defined,
$[\![(79)]\!]^g =$ True *iff*
$\neg\exists d[[\mathrm{b} \sqsubseteq \iota \mathbf{J} \wedge \textsc{quantity}(\mathrm{b}) \geq d] \wedge$
$\forall y[[\exists d'[y \sqsubseteq \iota \mathbf{J} \wedge \textsc{quantity}(y) \geq d'] \wedge y \neq \mathrm{b}] \rightarrow \neg[\textsc{quantity}(y) \geq d]]]$

We indeed get the result that there is a part of stuff that is distinct from the banana and at least as big (in quantity) as the banana and John ate it. Under negation it is still presupposed that John ate the banana. So the mereological sum of the banana and the strawberry (or anything else, small or big) can be a part of stuff, distinct from the banana, and eaten by John, that verifies the statement.

With this semantics, we set up comparisons between parts of stuff that John ate, and we say, in this particular instance, that the banana is biggest among them. Now, *the banana* and *what John ate* are extensionally equivalent; we have an operator, PART, which collects parts, and we maintained the diversity presupposition of superlatives, which ensures that there is more than one part in the comparison set. This set of assumptions raises an issue, because the denotation of singular count DPs, for example *the banana,* is in traditional Link-style semantics an atom in a Boolean domain; by definition, atoms do not have parts. We in fact need to assume some version of Landman's (2016) 'Iceberg Semantics', in which the relation between individual entities (e.g. bananas) and their mass parts is no longer indirect: in traditional Link-style semantics, the mass parts of individual entities form a separate domain (or separate 'mountain'). In Iceberg semantics, mass parts, and not a set of atoms, are what forms the base of a plural domain (an 'iceberg'). In this system, counting no longer rests on atomicity; instead, it is disjointness that guarantees correctness of counting. There is some empirical motivation for wanting to have ways of dealing with sub-atomic parts. In effect, it seems to be a distinguishing property of *all* that it has access to parts, even at the sub-atomic level:[15]

(81) a. All of the table is dirty.[16] (≈ each part is dirty)
b. The table is dirty. (doesn't require that each part is dirty)

[15] The examples that follow do not bear on small *all.* One thus needs to exercise caution here, since one cannot exclude that the access to sub-atomic parts is a property that only characterizes what I called 'distributive *all*'.

[16] In fact, a similar observation about access to sub-atomic parts was already made by Morzycki (2002), about *whole:*

(i) a. The whole ferret is submerged. (≈ each part is submerged)
b. The ferret is submerged.

I do not pursue the exploration of *whole* here, but I note that the hypothesis developed in this article should be tested on *whole* as well.

To maximize the effect, this test uses the partial predicate *dirty* (Yoon 1996), i.e. a predicate that holds of parts of individuals (*wet* and *touch* are other partial predicates). Compare with a (putative) universal quantifier like *each:*

(82) *Each (of) the table is dirty.

Similar effects obtain in French, where the particle *de* 'of' is not required:

(83) *Tout le livre est taché.*
all the book is stained
'All of the book is stained.' (≈ each part is stained)

4.3. A note about every

The properties that led me to the superlative hypothesis about *all* are not observed with *each,* which is robustly quantificational, even in copular sentences:

(84) a. Each thing John ate for lunch is a banana. DISTRIBUTIVITY
Paraphrase: Each item that John ate for lunch is a banana.
b. ?*A banana is each thing John ate for lunch.

Things are a bit more complex with *every,* for it can under some circumstances show the hallmarks of small *all:*

(85) a. Everything John ate for lunch is a banana. (cf. (10a)) DISTRIBUTIVITY
b. %A banana is everything John ate for lunch. SMALLNESS
c. ?*The banana is everything John ate for lunch.

Smallness only arises when *every* is post-copular (sentence (85b) is marked for some speakers); and the other element must be indefinite (85c). Hallman (2016) actually argues that *every* is a quantity superlative derived from *all* (the output of combining *every* with all its arguments is a property of sets, not a property of individuals). I must leave for future research the explanation of *every*'s behavior, and the assessment of Hallman's specific hypothesis.

To summarize what I have established in this section so far, my analysis, in which the *all*-relatives that give rise to smallness are treated as denoting superlative properties predicated of the other copular element, accounts for the membership presupposition that we observed with small *all.* Showing that the other two inferences, exhaustivity and smallness, can also be explained by the semantics proposed here will lend strong support to the superlative hypothesis.

4.4. Exhaustivity and smallness

As far as exhaustivity is concerned, it is part of the truth-conditional meaning of *all* given above, as the alert reader must have noticed. I will just briefly highlight which part it is. An equivalent way of spelling out the truth-conditions of (71) is (by contraposition and quantifier movement in conjunction):

(86) If defined,
$[\![$ The banana is all John ate $]\!]^g$ = True *iff*
$\exists d[[\mathrm{b} \sqsubseteq \iota \mathrm{J} \ \wedge \ \textsc{quantity}(\mathrm{b}) \geq d] \ \wedge$
$\forall y[[\textsc{quantity}(y) \geq d] \rightarrow \neg[y \sqsubseteq \iota \mathrm{J} \ \wedge \ \exists d'[\textsc{quantity}(y) \geq d'] \wedge y \neq \mathrm{b}]]]$

In words, the sentence asserts that John ate the banana and that anything bigger than the banana is not something he ate, in other words, he ate the banana *and nothing more.* Because it is an assertion, the exhaustivity inference is not preserved under negation, and we indeed observed non exhaustivity in (27a) and (79):

(87) If defined,
$[\![$ The banana is not all John ate $]\!]^g$ = True *iff*
$\neg\exists d[[\text{b}\sqsubseteq\iota\text{J} \wedge \text{QUANTITY}(\text{b})\geq d] \wedge$
$\forall y[[\text{QUANTITY}(y)\geq d] \rightarrow \neg[y\sqsubseteq\iota\text{J} \wedge \exists d'[\text{QUANTITY}(y)\geq d'] \wedge y\neq\text{b}]]]$

This asserts that John ate *more than* the banana. Note that the *more than that* inference we observed under negation with *the only/A-est NP* in Section 3.1 has the same explanation. The superlative analysis thus makes the right prediction about the exhaustivity inference and its availability.

Much less straightforward is the explanation of the smallness inference. What is its source and nature? Recall that the smallness effect is clearly felt in positive declarative sentences:

(88) a. A roasted pig is all John ate for lunch. SMALLNESS ☺
b. A tiny carrot is all John ate for lunch. SMALLNESS

It is also there (maybe not as strongly) in questions:

(89) a. Is a roasted pig all John ate for lunch? SMALLNESS ☺
b. Is a tiny carrot all John ate for lunch? SMALLNESS

But in negative sentences, as we saw earlier, if there is an effect, it is not a smallness effect (therefore smallness is not a presupposition):

(90) a. A roasted pig is not all John ate for lunch. NO SMALLNESS
b. A tiny carrot is not all John ate for lunch. NO SMALLNESS

What it means to be 'not much' is, perhaps unsurprisingly, context-dependent. The following sentence doesn't have the same funny effect:

(91) A roasted pig is all Shrek ate for lunch. SMALLNESS

The ultimate source of the inference is to be found in the *no more* component of the assertion. For similar smallness effects arise in sentences that contain *no more*/*not more* explicitly:

(92) a. John didn't eat more than a banana. SMALLNESS
b. John ate no more than a banana. SMALLNESS

Nouwen (2008) documents the effect in relation to *no more* in modified numerals:

(93) Cody found no more than sixteen marbles. SMALLNESS
[Nouwen 2008]

He observes that the inverse effect also exists:

(94) Cody found no less than sixteen marbles. BIGNESS

Equatives also give rise to smallness/bigness:

(95) a. as many as ten marbles *flavor:* that's a lot [I. Heim, credited in Nouwen 2008]
b. as few as ten marbles *flavor:* that's not a lot

In fact, similar effects were already noted by Jespersen (1909–1949):

(96) The victorious emperor remained at Rome no more than three months.

Since Jespersen claims that *no more* is different from *not more* in this respect (the latter not giving rise to the effect reliably), I provide data from French, which doesn't have this distinction: the smallness effect is also present:

(97) *Cody n'a pas trouvé plus de seize billes.*
Cody NEG-has NEG found more of sixteen marbles
'Cody didn't find more than sixteen marbles.' SMALLNESS

My intuition is that an inference attached to a statement of the form *John didn't eat more than a banana* (which is the truth-conditional meaning that our semantics predicts for the original example (2)) is a counterfactual inference of the form:

(98) He could have eaten more.

The combination of negation with *more* evokes alternative situations that were not realized; this doesn't give us an account of smallness, but it seems to me that the nature of the mechanism is pragmatic: I propose tentatively that the inference is a conversational implicature. It can be 'defeated' or 'reinforced' (using the terminology of the Gricean theory of implicatures):

(99) A banana is all John ate for lunch. He didn't eat much. `Reinforcement`

(100) *Forensic context* `Defeasibility`
A: The victim ate a roasted pig for lunch, sir.
B: Anything else you maybe forgot to mention?
A: No, all he ate for lunch was a roasted pig. NO SMALLNESS

There is of course a tantalizing analogy at hand, with *only* and its *mirative* effect ('less than expected') (Klinedinst 2005, Zeevat 2009 a.o.):

(101) I only won a hundred million dollars at the lottery. SMALLNESS ☺
[Winterstein 2011]

Actually it is not just an analogy. Our semantics for *all* has the two components that are usually attributed to *only* (under the strong presupposition hypothesis of Horn 1969), an exclusion component and a membership component:

(102) Only Mary came.
Asserts: No one who is not Mary came. EXCLUSION
Presupposes: Mary came. MEMBERSHIP

The explanations offered for *only*'s mirative effect cannot be straightforwardly ported to *all. All* in my analysis is not a propositional operator: so it cannot rank propositions in terms of informativity (following Coppock & Beaver 2011 for example), or in terms of height on another scale (following Klinedinst 2005), the way a propositional operator could. And the smallness inference caused by *all* is not a presupposition, so attaching it to a particular lexical item is not very promising anyway. It comes from the combination of a negative 'part' of meaning with a *more* 'part' of meaning, as the *no more* examples suggested; and in the case of *all,* these meanings are not encoded in dedicated morphemes.[17]

5. Conclusion

The availability of three inferences, a membership presupposition, an exhaustivity entailment and a smallness implicature, forms the basis of the hypothesis that *all* is a quantity superlative. The deep nature of *all,* what we called small *all,* shines through only in predicational copular sentences. The other copular element is then the argument of the property denoted by the *all*-relative; this entails that it must be the kind of element that corresponds semantically to the gap in the (free) relative clause. In (2), it is an entity (type e). It could also be a property, as in (103):

[17] It is not clear to me that smallness is presupposed with *only* either (despite some claims to the contrary). See Winterstein 2011, which derives the 'mirative effect' as the product of a 'superweak' presupposition and the fact that the alternatives considered are all higher than the prejacent.

(103) All John is is an assistant professor. SMALLNESS

Here, the *all*-relative is a property of sets (type $\langle\langle e,t\rangle,t\rangle$), not of individuals. On the other hand, in (16), what is attempted is a predication of *tasty* to the denotation of the *all*-relative (this leads to ungrammaticality when the complementizer is dropped):

(104) a. All that John ate for lunch was tasty. (=(16)) DISTRIBUTIVITY
b. ??All John ate for lunch was tasty.

Copular sentences are special in that they permit the kind of predication that gives rise to the set of inferences tied under the 'small *all*' label: the pre-copular and the post-copular positions are positions where a property denoting expression can appear. What is *all* when it is not small *all?* I suggest that the basic meaning, the superlative property, is closed by a covert operator, either ι or $\exists$ (whose insertion interacts with the presence of a complementizer, cf. (104b)), so as to fit semantically in all the positions where the predication required by small *all* cannot obtain (this, presumably, covers all non-copular sentences). With the *-est* and *only* superlatives, a mechanism of *the*-deletion yields a property meaning in copular sentences; with *all,* which is born bare so to speak, an opposite process of encapsulation under a covert operator is needed in non-copular sentences, and possible in some copular sentences (where it leads to the distributive reading, e.g. (104a)).

A number of difficult puzzles await us. First, where does distributivity with *all* come from? Whether the covert closure operator is ι or $\exists$, I do not have an explanation for why an obligatory distributive reading arises, e.g. in (104a). Adding the closure should just give us a description of a maximal part of stuff; why the distribution over the subparts? This, in fact, is the old puzzle that any theory in which *all* is not a quantifier faces (for example, Brisson's cover approach to plural *all*).

Second, if *all* is a superlative morpheme, why don't we observe relative superlative readings?

(105) John ate all that I cooked.
Cannot mean: John ate a greater part of what I cooked than anyone else.

The availability of relative readings seems to vary across superlative morphemes. Ordinals, which have been analyzed as superlatives by Bhatt (2006) and Sharvit (2010), do not, as shown by Bylinina et al. (2014), lend themselves to relative readings either. And neither does English *most* (as opposed to *the most*). With *the only NP* (Sharvit 2015), relative readings are sometimes observed (*Anna didn't give the only good talk at SALT*), but not always: for example, there seems to be no upstairs *De Dicto* reading; the facts are actually hard to establish, because of interspeaker variation.

Lastly, I have not talked about plural *all.* Can we probe the presence of an underlying superlative here as well? The facts seem to be complicated:

(106) a. #All the girls in the class are Mary, Sue and Denise.
b. %Mary, Sue and Denise are all the girls in the class. SMALLNESS

The speakers I polled find (106a) strange: it seems to only have a distributive reading, where it is said of each girl that she has multiple identities; (106b), with post-copular *all,* seems to be better, at least for some speakers, and appears to have a smallness reading. I also leave this question for future research.

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