Deriving *the most* internal relative reading[1]

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Abstract. Definite-marked constructions with adnominal quantity superlatives (*most, least, fewest*) give rise to both NP-external and NP-internal relative readings in English, while other adnominal superlatives allow only NP-external readings. Neither the movement approach to relative superlatives (Szabolcsi 1986, Heim 1999) nor Pancheva & Tomaszewicz's (2012) combined movement-and-*in-situ* approach can account for this pattern of available readings. To explain how it is derived, I propose a novel constituency for constructions with adnominal quantity superlatives, which is motivated by findings in the parallel domain of measure phrases.

Keywords: internal relative readings, pseudopartitives, superlatives, stratified reference

1. Introduction

Superlatives are famously ambiguous between the absolute reading and various relative readings that are sensitive to focus. Pitch accent on either *Anne* or *that bakery* in (1) makes salient the (NP-external) relative readings paraphrased in (1a,b) below, in contrast to the absolute (1c).

(1) *Anne gets the best cake from that bakery.*
   a. 'Anne gets better cake from that bakery than anyone else does.'
   b. 'Anne gets better cake from that bakery than from anywhere else.'
   c. 'Anne gets cake from the that bakery that is better than any other cake.'

Hackl (2009) treats the ambiguity between proportional and relative *most* analogously, decomposing it into *many* + *est*. The relative readings (2a,b) require the presence of the definite article, while the proportional reading (2c) requires its absence.

(2) *Anne gets (the) most cookies from that bakery.*
   a. 'Anne gets more cookies from that bakery than anyone else does.'
   b. 'Anne gets more cookies from that bakery than from anywhere else.'
   c. 'Anne gets the majority of cookies from that bakery.'

[1] I am grateful to Sam Al Khatib, Lucas Champollion, Marcel den Dikken, Bill McClure, Jon Nissenbaum, Roger Schwarzschild, & audiences at UConn, MACSIM 4, & Sinn und Bedeutung 20 for discussion. Any errors are mine.

A different kind of relative reading for *most* becomes possible if an element internal to the superlative NP is focused. To set the context for this reading, let me recount a memorable experience that I had when visiting friends in Berlin.

Clemens shares my love of sweets, and Füsun was 8 months pregnant at the time, so they were both eager to introduce me to the local *Kuchenbuffet* – a café where you can pay €5,50 for a cup of coffee and access to the three long tables laden with cakes and pastries of all varieties. We each filled our plates with a little of this and a little of that. Clemens had slivers of at least five different kinds of cakes. Recalling what he chose from the buffet, I might report that:

(3) *He ate the most CHOCOLATE cake.*

What I mean when I say this is that, of all the cakes he sampled, he ate more chocolate cake than he did any other kind. This is an **internal relative reading**, so called because the focus of comparison is an element internal to the superlative NP.[2] This use of *most* appears to be degraded for some speakers,[3] it is facilitated by appropriate prosody, with rise-fall intonation on *most* and pitch accent on *chocolate.* It is distinct from the more familiar **external relative readings** in (2a,b), or in (4) below. Indeed, if (4) happens to be false (Füsun or I ate more than he did), (3) may still be true, because the amount of chocolate cake eaten by anyone other than the subject is irrelevant for (3).

(4) *CLEMENS ate the most chocolate cake.*

What is interesting about the internal relative readings is that they are only available for the superlatives of quantity (Q-) adjectives, *many, much, few* and *little*. Even for speakers who dislike (3) there is a strong contrast between their judgment of this type of reading for a Q-superlative and their outright rejection of the reading for the superlative of other gradable adjectives. The internal relative reading is not available at all for (5). What comes through instead is the absolute reading, and a sense that the accent on *chocolate* is misplaced.

(5) *#He ate the tastiest/smallest CHOCOLATE cake.*

[2] Internal relative readings can also arise from focusing a PP or the noun itself as in, *He ate the fewest desserts from the THIRD table* or *He ate the least STRUDEL.*

[3] I leave the problem of inter-speaker variation with respect to this construction to future research. In the meantime, the fact that the internal reading is possible for some speakers with Q-superlatives (but is never possible with non-Q superlatives) requires explanation, which is the goal of this paper.

Let us summarize the judgments. There is a contrast between Q-superlatives, which give rise to both internal (3) and external (4) relative readings, and non-Q-superlatives, which do not give rise to internal readings (5), but only to external readings (1b&c).

	Proportional/absolute	External relative	Internal relative
Q-superlatives (*most, fewest, least*)	✓	✓	✓
Non-Q-superlatives (*tastiest, smallest, etc.)*	✓	✓	✗

The contrast between Q-adjectives and non-Q-adjectives with respect to the internal relative reading is a problem for an analysis that treats *most* straightforwardly as a superlative adjective. On the movement approach that Hackl favors (Szabolcsi 1986, Heim 1999), the internal relative reading of Q-superlatives (3) and non-Q-superlatives (5) are predicted to be equally good. On Pancheva and Tomaszewicz's (2012) movement-and-*in-situ* account they are predicted to be equally bad. I demonstrate the problems of each approach in section 2. In section 3, I present an analysis of *the most* as a constituent – specifically, a measure phrase headed by a silent measure noun. In section 4, I show how this allows us to derive the NP-internal relative reading. In section 5, I discuss constraints on this measure pseudopartitive construction, which begin to explain why it is not a possible parse for superlatives of quality. Section 6 concludes.

2. The Problem of the NP-internal reading

2.1. The movement approach overgenerates

The movement approach is so called because it derives relative readings by covert movement of the superlative morpheme out of the definite-marked noun phrase. In its raised position, [est-C] takes as its external argument whatever individual is being compared – either the external argument of the verb, or some other constituent that has also covertly raised. As P&T show, a problem with this approach is that it overgenerates. The LF for (5), *He ate the tastiest chocolate cake*, is shown in (6). On this approach it is possible to derive the NP-internal relative reading for any adjective by first raising the superlative morpheme and then extracting the NP-internal constituent that is contrasted. This extraction is possible because the definite article is treated as vacuous (indicated in (6) by the strikethrough). The resulting truth conditions are given in (7).

(7) [chocolate]$_1$ 1 [est-C]$_2$ λdλP [he ate [~~the~~ d-tasty t_1 cake]

(8) ∃d[he ate d-tasty chocolate cake] ∧ ∀P∈C[P≠chocolate→¬[he ate d-tasty P cake.]]

"There is some degree of tastiness of chocolate cake that he ate, and for no other relevant kind is it the case that he ate cake of that kind that reaches that degree of tastiness."

This is the internal relative reading. Since this reading is in fact not available for (5), this approach is not constrained enough. Following P&T, we turn therefore to the *in situ* approach.

2.2. The *in situ* approach

Heim (1999) applies Roothian focus semantics to superlative constructions to show how an external relative reading can be derived without extracting the superlative morpheme from a definite-marked noun phrase. This approach also requires some movement; the definite-marked DP must raise and adjoin to the clause in order for a covert focus operator (~) to scope over the appropriate constituent. Because this movement is obligatory, I assume that the definite-marked DP is forced to move by a type mismatch. Coppock and Beaver (2014) (henceforth C&B) argue that relative superlative DPs are definite but indeterminate, denoting an existential quantifier of type $\langle\langle e,t\rangle,t\rangle$[4]. The LF in (8) illustrates how the external relative reading is derived "*in situ*".

(8) [[the [est-C] d-tasty chocolate cake] ~S 1[[Clemens]$_F$ ate t_1]]]

The ~ operator introduces the presupposition that S consists of things that Clemens ate and things that were eaten by relevant alternative people. The comparison class argument, C, is valued by focus-association as the union of the set, S, introduced by the focus operator.

(9) $C \subseteq \bigcup S = \{x: \exists y \in \{\text{Clemens, Füsun, Emily}\} \wedge y \text{ ate } x\}$

(10) $\lambda x \exists d[\text{d-tasty-choc-cake}(x)] \wedge \forall y \in C[y \neq x \rightarrow \neg[\text{d-tasty-choc-cake}(y)]]$

This is the property of being (out of all the things that my friends and I ate) something that is chocolate whose degree of tastiness exceeds that of any other chocolate cake. Following C&B (although see footnote 4), the definite article introduces the (somewhat redundant) presupposition that the property in (10), if not empty, is a singleton set, and shifts it to a higher

[4] Translating Coppock & Beaver's ∂ and EX into more familiar/compact terms, I take the definite article in relative superlative DPs to denote the definite/indeterminate function which is given in (11) below. In C&B this denotation results from the application of a partiality operator followed by a type shift. I leave the details aside here, but note that my execution of existential closure in (24) and elsewhere relies on a similar indefinite/indeterminate function which I identify with the silent D of bare plurals and mass nouns: $\lambda P.\lambda Q.\exists x[P(x) \wedge Q(x)]$. While I adopt Coppock & Beaver's ideas about definiteness, I continue to assume Heim's denotation for the superlative morpheme itself.

type. The superlative DP has the denotation in (12). From its raised position, this takes the ordinary value of the clause as its argument, creating the proposition in (13).

(11) $[\![\text{the}]\!] = \lambda P{:}|P|\leq 1.\lambda Q.\exists x[P(x) \wedge Q(x)]$

(12) $\lambda Q \exists x \exists d[\text{d-tasty-choc-cake}(x)] \wedge \forall y \in C\ [y \neq x \rightarrow \neg[\text{d-tasty-choc-cake}(y)]] \wedge Q(x)$

(14) $\exists x \exists d[\text{d-tasty-choc-cake}(x) \wedge \forall y \in C[y \neq x \rightarrow \neg[\text{d-tasty-choc-cake}(y)]] \wedge$ Clemens ate x]

This is the proposition that the unique entity that is the tastiest chocolate cake (out of all the things that my friends and I ate) was eaten by Clemens. As Sharvit and Stateva (2002) point out, an additional effect of focus on the subject is to assert the negation of the sentence with any other person as subject – it is *only* Clemens who ate the tastiest chocolate cake.

2.3. The *in situ* approach undergenerates

P&T observe that NP-internal relative readings are available in Slavic for superlatives of adjectives inside indefinite noun phrases. They apply the movement approach to derive internal relative readings in the absence of definite marking, but they argue that whenever an overt definite article introduces a DP, movement of the degree morpheme out of that constituent is barred. They assume that the external relative reading can be derived only by the *in situ* approach in these cases. And on this approach it is not possible to derive the internal reading, as we will see below. This is a desirable result, for non-Q-superlatives in English. We saw that the internal reading is unavailable for (5). But it is problematic for Q-superlatives, which do allow the internal reading when (and only when) the DP is introduced by the definite article, as in (3). Let us see why the *in situ* approach cannot generate the internal reading for our cake examples. Following the assumptions we adopted in the previous section, the superlative DP (bracketed in (14)) is existentially quantified and must QR. This gives rise to the LF in (15).

(14) He ate [the tastiest/most CHOCOLATE cake].

(15) [$(\sim S)_A$ [the [est-C] $(\sim S)_B$ 1 [d_1-tasty/much [chocolate]$_F$ cake]] 2 He ate t_2]

For focus association to succeed, the ~ operator must scope over the focused constituent, but it must also be discontinuous with C. If the operator is inserted in a high position $(\sim S)_A$, then the derivation will crash because it contains a loop of infinite regress. The identity of the alternative set, S, depends on the focus value of a constituent that contains C. But the value of C depends on

the identity of S. Inserting it in a lower position $(\sim S)_B$ creates different problems. Here, the focus operator's requirement for alternatives conflicts with the presupposition of [est]. The superlative morpheme requires that everything in the comparison class belong to the set denoted by its sister node, i.e. the set of degrees of tastiness of chocolate cake. But the operator requires that degrees of tastiness of at least one alternative to chocolate cake be included in that set.
Assuming, with P&T, that definite-marked DPs are islands for degree-extraction makes it possible to explain why internal relative readings are unavailable for non-Q-superlatives. Only external relative readings are available because only these can be derived using the *in situ* approach. But this approach undergenerates, predicting that (3) should be as bad as (5).

In the next section, we will see that there is reason to believe that the syntax of Q-superlatives is different from that of other superlatives. The measure pseudopartitive structure that I will argue *the most* (and other Q-superlative phrases) are merged in, makes it possible to generate the internal relative reading for them using the *in situ* approach. We can have *the most chocolate cake*, and rule out *the tastiest*, too.

3. *The most* as a measure phrase

Schwarzschild (2006) notes that Q-adjectives have semantic properties in common with the measure phrases that appear in pseudopartitive constructions. Indeed, he suggests that they are also merged in a pseudopartitive structure. I will begin by proposing a simple implementation of Schwarzschild's ideas, based on what I consider the null hypothesis, that measure phrases are full DPs of type e or $\langle\langle e,t\rangle,t\rangle$. I will then argue for an expansion of his typology of measure phrases and suggest how this can apply to Q-adjectives and Q-superlatives.

3.1. The MonP projection

Schwarzschild observes that there are two sub-types of measure phrases that can modify nouns. Attributive measure phrases (bolded in the examples in (16)) consist of a number and a bare measure noun representing some type of unit. They can modify mass nouns or singular/plural count nouns. The other type of measure phrase appears in pseudopartitive measure constructions, as in (17). They consist of a weak quantifier, and a measure noun that is inflected for number.

(16) a. She used **one-inch** plywood.
b. He ate a **500-calorie** cookie.
c. I bought some **three-pound** lobsters.

(17) a. She used **a square foot** of plywood.
b. He ate **several handfuls** of nuts.
c. I bought **three pounds** of lobster(s).

The measure phrases that appear in pseudopartitive constructions seem to have a larger syntactic structure than attributive measure phrases. Taken at face value, this type of measure phrase is

simply an indefinite DP. Attributive measure phrases intersectively modify the substance nouns that follow them. *One-inch plywood* describes a substance that is uniformly both plywood and one inch (thick). Pseudopartitive measure phrases have a slightly different mode of modification. *A square foot of plywood* describes something which is plywood and which occupies an area of a square foot. This modification is mediated by a functional element pronounced *of*. Schwarzschild labels this functional head Mon^0 and proposes that it introduces the measure phrase as an additional thematic argument of the noun.

(18) $[_{\text{MonP}}\ [_{\text{MeasP}}$ a square foot$]\ [_{\text{Mon'}}\ [\ \text{of}_{\text{Mon}}\ ]\ [_{\text{NP}}$ plywood$]]]$

It is often assumed that measure nouns and measure phrases belong to different types than common nouns and NPs, although there is much debate as to what those types are. Kennedy (2001) treats measure phrases as instances of *d*. Champollion (2010) considers measure nouns to be functions from numbers to intervals (type $\langle n,\langle d,t\rangle\rangle$) and full measure phrases to denote intervals. Schwarzschild (2006) refers to measure phrases as predicates of intervals. I am going to pursue the null hypothesis, which is that all nouns are of type $\langle e,t\rangle$ and all DPs either type *e* or type $\langle\langle e,t\rangle,t\rangle$. For example, *square foot* denotes the set of objects that are one square foot in area. Importantly, the dimension AREA is a part of the semantic information that this lexical item brings with it. Two portions of matter that are each a square foot cannot be counted as separate individuals in the domain of *square foot* if they overlap in area.

(19) a. $[\![\text{square foot}]\!] = \lambda y.\text{square-foot}'_{\text{AREA}}(y)$

b. $[\![\text{a square foot}]\!] = \lambda P \exists y.\text{square-foot}'_{\text{AREA}}(y) \wedge P(y)$

How does Mon^0 relate this new argument to the NP, which is a property of individuals? It does so by introducing the additional predication that this argument is **coextensive** with the external argument of the substance noun along a particular dimension. Two individuals are coextensive if each is a material part of the other. Let us assume, as does Schwarzschild, that Mon^0 is parameterized for a particular dimension (indicated by subscript). The equals sign in its denotation is also subscripted to remind us that it stands for "is coextensive" on that dimension.

(20) $[\![\text{Mon}]\!]_{\text{DIM}} = \lambda P \lambda y \lambda x.\ P(x) \wedge y =_{\text{DIM}} x$

Let me illustrate how we should understand MonP to compose in sentence (17a). Initially, the measure phrase *a square foot* merges in the specifier of MonP, as shown in (21). But since the measure phrase is an indefinite DP, it has to QR, leaving behind a trace that saturates Mon^0's

external argument. MonP itself must merge with a D head to form a DP (22). I will assume it is the silent indefinite D of bare plurals and mass nouns.

(21) [$_{MonP}$ [$_{MeasDP}$ D= *a* [$_{MeasNP}$ *square foot*]] Mon^{0}=*of* [$_{NP}$ *plywood*]]

(22) [$_{DP}$ D=$\varnothing_{SOME}$ t [$_{Mon'}$ *of plywood*]

The LF of the sentence with all indefinites QRed is given in (23), followed by the derivation.

(23) [$_{MeasDP}$ *a square foot*]$_1$ 1 [$_{IP2}$ [$_{DP}$ $\varnothing_{SOME}$ [$_{MonP}$ t$_1$ Mon'=*of plywood*]]$_2$ 2 [$_{IP1}$ *Anne used* t$_2$]]

(24) $[\![Mon]\!]_{AREA} = \lambda P \lambda y \lambda x.P(x) \wedge y =_{AREA} x$

$[\![Mon']\!]_{AREA} = \lambda x.[plywood'(x) \wedge x =_{AREA} t_2]$

$[\![DP]\!] = \lambda Q \exists x.[plywood'(x) \wedge x =_{AREA} t_2 \wedge Q(x)$

$[\![IP_1]\!] = \lambda x.[used\ (x)(a)]$

$[\![DP]\!]([\![IP_1]\!]) = \exists x.[plywood'(x) \wedge x =_{AREA} t_2 \wedge used'(x)(a)]$

$[\![IP_2]\!] = \lambda y \exists x.[plywood'(x) \wedge x =_{AREA} y \wedge used'(x)(a)]$

$[\![MeasDP]\!] = \lambda P \exists y.square\text{-}foot'_{AREA}(y) \wedge P(y)$

$[\![MeasDP]\!]([\![IP_2]\!]) = \exists y \exists x.square\text{-}foot'_{AREA}(y) \wedge [plywood'(x) \wedge x =_{AREA} y \wedge used'(x)(a)]$

"There is a sq. foot, and it is coextensive with something Anne used that is plywood"

3.2. Adjectivally modified measure phrases

Though Schwarzschild does not discuss these cases, it seems possible to extend his typology to include measure phrases that contain adjectival modification of the measure noun. Examples are given in (25a-c). The *it*-clefted versions in (d-f) verify that the bolded strings are in fact constituents.

(25) a. She used **a *generous* amount** of plywood.
b. He ate **several *small* handfuls** of Brazil nuts.
c. I bought **an *expensive* quantity** of lobsters.
d. It was a generous amount that she used of plywood.
e. It was several small handfuls that he ate of Brazil nuts.
f. It was an expensive quantity that I bought of lobsters.

Importantly, in each of the sentences in (25), the adjective serves to specify the size of the unit somehow. Even *expensive* is understood to be a quality that reflects size, since the expense of something purchased at a 'per pound' rate is in direct proportion to its quantity. If these adjectives are replaced by different ones that specify properties of the substance instead of the measurement, the results are a little odd. They become much worse when we try to move the bolded strings as in the *it*-cleft construction:

(26) a. ?She used **a smooth amount** of plywood.
b. ?He ate **several crunchy handfuls** of Brazil nuts.
c. ?I bought **a delicious quantity** of lobsters.
d. *It was a smooth amount that she used of plywood.
e. *It was several crunchy handfuls that he ate of Brazil nuts.
f. *It was a delicious quantity that I bought of lobsters.

What (26d-e) shows us is that the sentences in (26a-c) are only acceptable if the objects are parsed as in (27). The constituent that the adjective modifies must contain the substance noun:

(27) a. a **smooth** [amount of plywood]
b. several **crunchy** [handfuls of Brazil nuts]
c. a **delicious** [quantity of lobsters]

Whatever the relationship is between the pairs of nouns in (27), these are not true measure pseudopartitive constructions. We can see that the article, if present, does not form a sub-constituent with the measure noun, and we may assume that *of* is not the spell out of Mon^0.

But we have admitted some adjectives into the measure pseudopartitive structure, so we can consider the possibility that superlative forms of those adjectives are admissible as well. Szabolcsi (1986) was one of the first to observe that, unlike other definite-marked DPs, those containing superlatives pass the diagnostics for weakly quantified DPs. One diagnostic is illustrated in (28), where the object of inalienable possession cannot be a strongly quantified DP, but definite-marked superlative DPs are acceptable.

(28) a. *Clemens has **the** small appetite.
b. *Clemens has **all** children.
c. Clemens has **the** small**est** appetite/**the** few**est** children.

Since measure phrases in the pseudopartitive can include weak quantifiers, it is to be expected that once adjectives are admitted to the structure, superlative marking and the definite article that comes with it should be possible as well. We predict that the superlative versions of (25) will be acceptable. This seems to be the case (29a-c), but there is a problem with the *it*-clefts (29d-f):

(29) a. She used **the most generous amount** of plywood.
b. He ate **the smallest handfuls** of Brazil nuts.
c. I bought **the most expensive quantity** of lobsters.
d. ??It was the most generous amount that she used of plywood.
e. ??It was the smallest handfuls that he ate of Brazil nuts.
f. ??It was the most expensive quantity that I bought of lobsters.

I submit that the failure of clefting here is due to information structure rather than non-constituency of the bolded phrases. It makes sense that a relative superlative DP should fail to denote inside of an *it*-cleft, where it receives focus. As we saw in section 2, it is necessary for focus to be assigned to some constituent external to the superlative-marked DP in order for a covert focus operator to be merged. Topicalization, as in (30), is a more appropriate constituency test because it has the right kind of information structure. The following sentences confirm the constituency of the definite-marked superlative measure DPs in (29a-c).

(30) a. The most generous amount, she used of plywood.
b. The smallest handfuls, he ate of Brazil nuts.
c. The most expensive quantity, I bought of lobsters.

Not only are the sentences in (30) felicitous, they lend themselves to a reading where the substance noun, or a lower modifier thereof, receives focus. (30a) could mean that the person in question used a more generous amount of plywood than of any other material. Pitch accent on *Brazil* in (30b) gives it a similar ring to the chocolate cake example (3) in the *Kuchenbuffet* scenario. Considering *The smallest handfuls of Brazil nuts* as the extended substance NP, we could call this an NP-internal relative reading of the superlative, since *Brazil* is internal to this larger constituent. What makes it possible is the fact that *smallest* is not directly modifying *Brazil nuts*. Instead, it is modifying the measure noun, *handfuls.*

What I want to suggest is that the internal relative reading of quantity superlatives is based on the same structure, but with a silent measure noun. Let us take a closer look at the pseudopartitive structure and how it applies to Q-adjectives in order to understand this hypothesis.

3.3. Q-adjectives in the pseudopartitive structure.

Schwarzschild describes the semantic difference between Q-adjectives and other gradable adjectives as analogous to the difference between the measure phrases in pseudopartitive measure constructions and attributive measure phrases. The examples from (16) and (17) are repeated in (31) and (32) with their adjectival counterparts.

(31) a. She used **one-inch** plywood.
b. He ate a **500-calorie** cookie.
c. I bought some **three-pound** lobsters.
d. She used **thick** plywood.
e. He ate a **fattening** cookie.
f. I bought some **huge** lobsters.

(32) a. She used **a square foot** of plywood.
b. He ate **a few handfuls** of nuts.
c. I bought **three pounds** of lobster(s).
d. She used **a little** plywood.
e. He ate **so few** nuts.
f. I bought **that much/many** lobster(s).

The property that the examples in (32) are claimed to have, that those in (31) lack, is identified as 'monotonicity' by Schwarzschild (hence the 'Mon' label for the functional projection that encodes it). Schwarzschild assumes that Mon^0 is also present in sentences like (32d-f), but that it is licensed to be silent whenever it hosts a Q-adjective in its specifier. The measure pseudopartitive structure for (32a) is given in (33a). The parallel, covert pseudopartitive structure for (32d) is given in (33b).

(33) a. $[_{MonP}\ [_{MeasP}$ a square foot$]\ [_{Mon'}\ [\ of_{Mon}\ ]\ [_{NP}$ plywood$]]]$
b. $[_{MonP}\ [_{Q\text{-}AP}$ a little$]\ [_{Mon'}\ [\ \varnothing_{Mon}\ ]\ [_{NP}$ plywood$]]]$

I adopt Schwarzschild's syntax for the extended projection of the substance noun but postpone my discussion of the semantics of this construction to section 5. In order to introduce the Q-adjective phrase with the same Mon^0 that introduces DP measure phrases of type $\langle\langle e,t\rangle,t\rangle$, we need to assume that it is of that type. A similar syntactic move is made by Kayne (2007), who proposes that Q-adjectives combine with contain a silent noun, NUMBER or AMOUNT.[5]

One piece of syntactic evidence that we are on the right track is that, unlike other types of adjectives, Q-adjectives can appear in argument positions in English without modifying any overt nominal (34a,c). Conversely, they may not combine with the NP pronoun *one*(*s*) (34e).

(34) a. Anne bought many.
b. *Anne bought big.
c. Anne bought too much.
d. *Anne bought too big.
e. *Anne bought many ones.
f. Anne bought big ones.

[5] Pancheva (2015) also makes use of the silent noun idea in her explanation of the difference between Bulgarian and English with respect to the proportional reading of *most*. I believe that my proposal for definite *the most* as a measure phrase is not incompatible with Pancheva's for bare *most*, but this possibility requires further investigation.

This indicates that the Q-adjectives may have already merged with some silent nominal element. If we incorporate this null element into the MonP structure, we end up with a constituent that looks more like an ordinary measure phrase. Indeed, the mysterious indefinite article that appears with *few* and *little* can be analyzed straightforwardly as the weak quantifier of a measure DP.

(35) [$_{MonP}$ [$_{MeasDP}$ a [d-little] N_{AREA}] [$_{Mon'}$ [$\varnothing_{Mon}$] [$_{NP}$ plywood]]]

An overt measure noun supplies the dimension feature of the measure phrase and provides a kind of sortal for counting – we know that when counting *square feet*, for example, two portions of matter that are each a square foot do not count as distinct individuals if they overlap in area. The silent noun in (35) serves the same function: restricting the dimension and referring to a portion of matter that does not overlap with any other portion on that dimension. An alternative approach might encode these elements in the Q-adjective itself. But we will use the silent, dimensionally-specified noun for concreteness. Separating out the nominal element allows us to use the following simple denotations for *much* and *little*:

(36) a. $[\![\text{much}]\!]_{DIM} = \lambda d\lambda x.\mu_{DIM} \geq d$ b. $[\![\text{little}]\!]_{DIM} = \lambda d\lambda x.\mu_{DIM} \leq d$

We can treat *many* and *few* as equivalent to these except that they are specified for the count dimension. The Q-adjective is merged with overt or covert degree morphology in a DegP which in turn is merged with the silent N. From these assumptions it is a short step to (37) in which the superlative form of *much* is used in a MonP structure:

(37) [$_{MonP}$ [$_{MeasDP}$ the [est-C] [d-much] N_{AREA}] [$_{Mon'}$ [$\varnothing_{Mon}$] [$_{NP}$ plywood]]

The agreement morphology of Flemish provides some interesting evidence for such a structure. Roelandt (2014) argues for a DP-within-DP analysis of *het meeste NP* ('the most NP'), based on a mismatch between the features of the determiner and of the overt noun. I turn to this next.

3.4. Agreement mismatch in Flemish

According to Roelandt (2014) Flemish Dutch has an internal relative reading of *het meeste* ('the most'). The reading is available with a peculiar form, in which the definite article does not agree with the noun in number and gender. The following examples illustrate two points. First, Flemish patterns with English in that the internal relative reading (38a) is not available with non-Q

superlative adjectives, while the external relative and absolute readings are (38b&c). Second, Flemish requires *phi*-feature agreement between the article and the noun it introduces (39).

(38) *Jan heeft de beste platen van Zappa.* (Flemish, Koen Roelandt, p.c.)
Jan has the$_{pl.fem}$ best record$_{pl.fem}$ by Zappa
a. #"John has better albums by Zappa than by anyone else"
b. "John has better albums by Zappa than anyone else does"
c. "John has the best albums by Zappa that exist"

(39) **Jan heeft het beste platen van Zappa.* (Flemish)
Jan has the$_{sing.neut}$ best record$_{pl.fem}$ by Zappa

When the superlative is a Q-adjective, however, it is possible for the determiner to appear in the singular neuter form in the same DP as a plural noun (40). In this construction the NP-internal reading is available (40a). Agreement is also possible (41), but the internal reading is lost (41a).

(40) *Jan heeft* [*het meeste platen van Zappa*]. (Flemish)
Jan has the$_{sing.neut}$ most record$_{pl.fem}$ by Zappa
a. "John has more records by Zappa than by any other band."
b. "John has more records by Zappa than anyone else does."

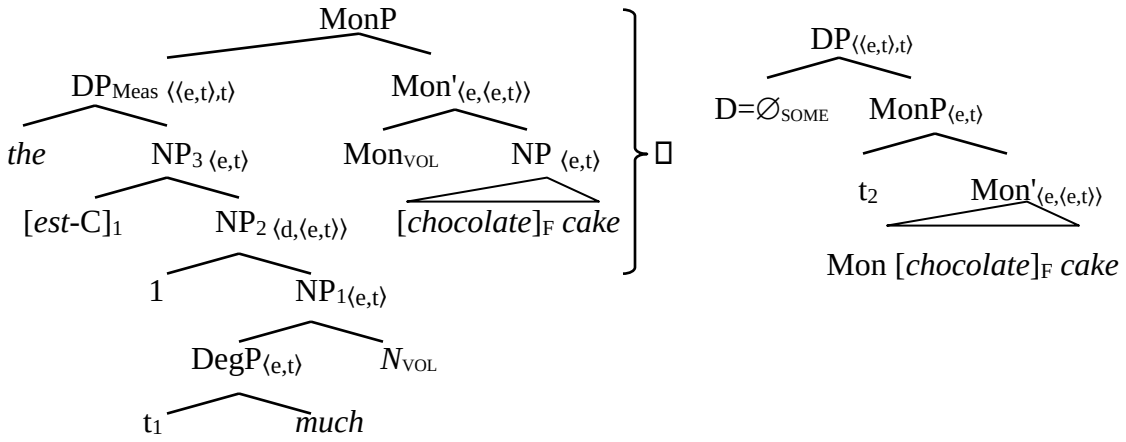
(41) *Jan heeft* [*de meeste platen van Zappa*]. (Flemish)
Jan has the$_{pl.fem}$ most record$_{pl.fem}$ by Zappa
a. #"John has more records by Zappa than by any other band."
b. "John has more records by Zappa than anyone else does."

Roelandt argues that the neuter singular features on the determiner show default agreement with a null noun. This suggests to him that [*het meeste* N$_{\varnothing}$] is a DP constituent in a specifier of the overt noun's extended projection. Roelandt's proposal fits well with what we have concluded about *the most* as a measure phrase. The agreement morphology in Flemish makes it transparent that *het* is not merged directly with the overt noun in (40), thus making indirectly visible the silent measure noun with which it forms a constituent. His data and analysis lend support to the idea that this structure is available to Universal Grammar, and is even made use of in Germanic.

4. Deriving *the most* internal reading

Returning to our original example (*He ate the most CHOCOLATE cake*) we can now see what this alternative syntax for Q-superlatives achieves. As a measure phrase with a silent measure noun, *the most N*$_{\varnothing}$ is initially merged in the specifier of MonP:

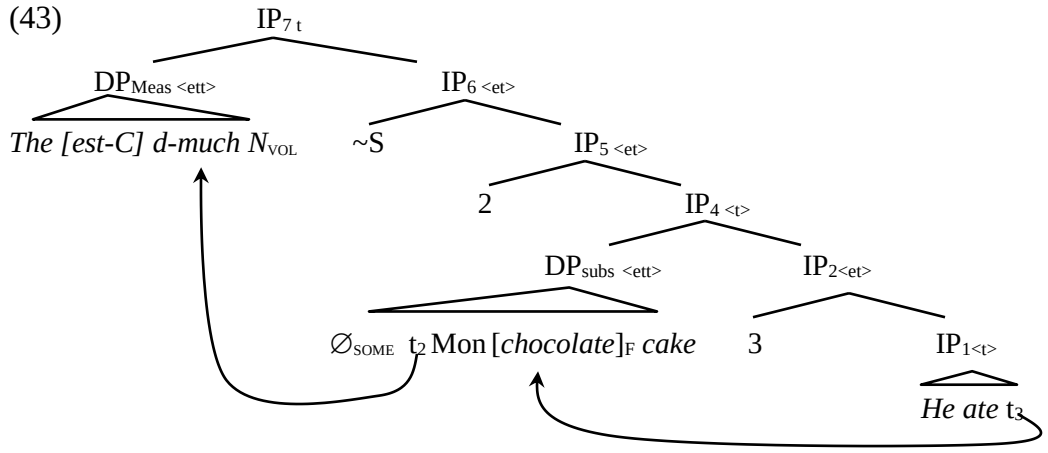
(42)



As with the derivation in section 3.1, there is a type mismatch between the Measure DP and Mon'. The measure phrase must QR, leaving a trace to saturate Mon'. MonP then merges with silent indefinite D as indicated in (42). Intuitively, MonP is the property of being *chocolate cake* that is coextensive with the entity described by the measure DP, but in order to determine what the measure DP denotes, the comparison class argument, C, must be valued.

Recall that the problem with the attributive modification structure was that there was no possible place for a focus operator to be inserted above the NP-internal focused element where it would also be discontinuous with C. Focus association failed either due to infinite regress or a clash between the requirements of the focus operator and the presuppositions of the superlative morpheme. This is no longer an issue in (43). The operator can be merged just above IP_5 where the trace of the measure DP is bound. C and ~S are discontinuous, and the operator has the substance DP containing the focus-marked *chocolate* in its scope.

(43)



C is valued by association with the alternative set introduced by this operator. S contains sets of things that are coextensive with chocolate cake that Clemens ("he") ate or some alternative to

chocolate cake that he ate (44). So C is a subset of the grand union of this.

(44) $S \subseteq [\![IP_5]\!]_F = \left\{ \begin{array}{l} \lambda x \exists y.[ate(y)(c) \wedge \textbf{chocolate}(y) \wedge cake'(y) \wedge x =_{VOL} y] \\ \lambda x \exists y.[ate(y)(c) \wedge \textbf{almond}(y) \wedge cake'(y) \wedge x =_{VOL} y] \\ \lambda x \exists y.[ate(y)(c) \wedge \textbf{vanilla}(y) \wedge cake'(y) \wedge x =_{VOL} y]... \end{array} \right\}$

(45) $C = \cup S = \{x: \exists Q \in \{\text{chocolate, almond, vanilla}\ldots\} \exists y.[ate(y)(c) \wedge Q(y) \wedge cake(y) \wedge x =_{VOL} y\}$

With the value of the comparison class established, we can see that the superlative NP_3 (in (42)) is the property of being the unique thing (out of those things that are coextensive with some flavor of cake that Clemens ate) that reaches the greatest degree of volume:

(46) $[\![NP_3]\!] = \lambda x \exists d.[N_{VOL}(x) \wedge \mu_{VOL}(x) \geq d] \wedge \forall y \in C[y \neq x \rightarrow \neg[N_{VOL}(y) \wedge \mu_{VOL}(y) \geq d]]$

This combines with the definite article to produce an existentially quantified DP as in (47). The ordinary value of IP_6 is equal to that of IP_5 (provided that the presuppositions of ~ are satisfied, that is, that S is a subset of the alternative denotation of IP_5. The derivation proceeds as in (48).

(47) $[\![DP_{Meas}]\!] = \lambda Q \exists x \exists d.[N_{VOL}(x) \wedge \mu_{VOL}(x) \geq d] \wedge \forall y \in C[y \neq x \rightarrow \neg[N_{VOL}(y) \wedge \mu_{VOL}(y) \geq d]] \wedge Q(x)$

(48) $[\![IP_6]\!]^o = \lambda x \exists y.[ate(y)(c) \wedge chocolate(y) \wedge cake(y) \wedge x =_{VOL} y]$

$[\![IP_7]\!] = \exists x \exists d.[N_{VOL}(x) \wedge \mu_{VOL}(x) \geq d] \wedge \forall y \in C[y \neq x \rightarrow \neg[N_{VOL}(y) \wedge \mu_{VOL}(y) \geq d]]$

$\wedge \exists y.[ate(y)(c) \wedge chocolate(y) \wedge cake(y) \wedge x =_{VOL} y]$

"There is something which is the largest volume out of all the flavors of cake that Clemens ate and there is something that is chocolate cake that he ate, and these are coextensive on the volume dimension."

This will be true just in case Clemens ate a greater volume of chocolate cake than he did of any other kind of cake. This successfully derives the NP-internal truth conditions.

5. Semantic constraints on the construction

If this is indeed the correct derivation for the internal relative reading of *the most*, then a pressing question remains. Why is it not possible for superlatives of non-quantificational adjectives to be

parsed with this structure, giving rise to the internal relative reading in the same way as Q-superlatives? For example, why is the following structure not available as a parse for the superlative NP in (5) (*He ate the tastiest chocolate cake*)?

(49) [$_{MonP}$ [$_{MeasP}$ the tastiest $N_{\varnothing}$] [$_{Mon'}$ [$\varnothing_{Mon}$] [$_{NP}$ [chocolate]$_F$ cake]]]

Recall that in (34) above, non-Q-adjectives must appear with an overt pronoun. Whatever causes (34b,d) to be ungrammatical could be assumed to prevent the parse in (49). But it would be more satisfying to find an explanation for this in the semantics of the construction. In this section I pursue an answer that uses Champollion's notion of Stratified Reference.

5.1. Stratified Reference

Champollion (2010, 2015a,b) formalizes the semantic restriction on measure pseudopartitives as a higher-order property of Stratified Reference (SR). There is a presupposition that the substance noun (P) and its external argument (x) must satisfy this property, which is defined as follows:

(50) $SR_{\mu}(P,x)$ iff $x \in *\lambda y[P(y) \wedge \mu(y) < \mu(x)]$

A property, P, has stratified reference for a measure function with respect to a particular argument, x, just in case x can be exhaustively divided into parts that each have the property themselves and that each measure strictly less than the whole.

While the expression of measurements in terms of particular units may vary, the measure function for a particular dimension will always return the same abstract degree for a given entity. Therefore, in integrating this presupposition into our denotation of Mon^0 we can simply match the measure function to the dimension that Mon^0 itself is parameterized for.

(51) $[\![Mon]\!]_{DIM} = \lambda P \lambda y \lambda x$: $SR_{\mu DIM}(P,x)$. $P(x) \wedge x =_{DIM} y$

Recall that we characterized a measure noun as a property of type ⟨*e,t*⟩ that specifies a dimension as part of its lexical entry. *Square foot* encodes AREA, *degree Fahrenheit*, TEMPERATURE. Since the noun is the lexical head of the measure phrase, we can assume that this dimension feature is visible to the Mon^0 head that introduces the measure phrase to the substance NP. Mon^0 selects a measure phrase that matches the dimension for which it is parameterized.

5.2. Ruling out *the tastiest*

In section 3.2 we argued that a measure phrase can include adjectival modification *as long as* the adjective serves to further specify the size of the unit denoted by the measure noun. If a lexical adjective were to modify a silent measure noun, we would be able to tell from the dimension denoted by the adjective what dimension feature the noun encodes.

This information, combined with what we know about the presupposition introduced by Mon^0 allows us to rule out the hypothetical structure in (49) as a parse for *the tastiest chocolate cake* (repeated here but with the tastiness dimension indicated on the silent measure noun).

(52) * $[_{MonP}\ [_{MeasP}$ the tastiest $N_{TASTE}]\ [_{Mon'}\ [\ \varnothing_{Mon}\ ]\ [_{NP}\ [\text{chocolate}]_F$ cake]]]

In order for Mon^0 to introduce this measure phrase, it must be parameterized for the 'tastiness' dimension. This Mon^0 would introduce the presupposition that *chocolate cake* be exhaustively divisible into parts such that each part has a strictly lower tastiness measure than the whole. This is not the case for chocolate cake, so the MonP structure is undefined. A Mon^0 parameterized for some other dimension, (for example, volume), for which *chocolate cake* does have stratified reference, would not be able to introduce a measure phrase modified by *tasty*. (52) is therefore not a possible parse for the string – it can only compose with *tastiest* as an attributive modifier:

(53) $[_{DP}$ the $[_{NP}$ tastiest $[_{NP}\ [\text{chocolate}]_F$ cake]]]]

With the focused element, *chocolate* trapped inside the same definite-marked DP as the superlative morpheme, there is no way to derive the internal relative reading.

5.3. Ruling out superlatives of size

A more difficult challenge to my proposal is posed by those adjectives that more readily appear as modifiers of overt measure nouns. We saw that *small* can modify *handful* and *generous* can modify *amount* in the pseudopartitive. Why, then, can't these appear with a silent N_{VOL} or $N_{\#}$? For example, we expect (54) to give rise to an NP-internal relative reading, if it can be parsed as containing the MonP structure in (55).

(54) He ate the smallest ALMOND tarts.

(55) $[_{MonP}\ [_{MeasP}$ the smallest $N_{VOL}]\ [_{Mon'}\ [\ \varnothing_{Mon}\ ]\ [_{NP}\ [\text{almond}]_F$ tarts]]]

Nothing in the semantics of the construction as we have understood it should bar *the smallest* from appearing as a constituent in this context. The sentence should compose just as (3) did. It would not express a proposition about the size of the individual tarts, instead it would assert that that the *volume* of almond tarts that Clemens ate was smaller than the volume he ate of any other kind of tarts. Since size adjectives are not barred from this construction by the semantic requirements of stratified reference, we are forced, for the moment, to resort to the stipulation that this silent measure noun selects for Q-adjectives exclusively.

6. Conclusion

This paper has attempted to fill a gap in the literature on superlatives in English. We observed that definite-marked constructions with adnominal Q-superlatives give rise to both NP-external and NP-internal relative readings, while non-quantificational superlatives do not allow the internal readings. While it is advantageous to treat *most, least,* and *fewest* as superlatives of adjectival *many, little* and *few*, straightforward attempts to combine the syntax and semantics of Q-adjectives with either the movement or the *in situ* theory of superlatives make the wrong predictions about which readings should be available. Taking Schwarzschild's parallel between Q-adjective phrases and measure phrases perhaps more literally than he intended, we have arrived at a way to derive the internal reading for Q-superlatives. We hope that this line of inquiry will ultimately yield a more thorough explanation of the silent elements in this construction, their semantics and selectional requirements.

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