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Superlatives without covert comparison classes¹

Summary:

- Analyses of superlatives rooted in Heim (1999) assume a covert comparison class (CC) argument
- We argue that a CC-argument is not needed for those analyses that assume that one of EST’s arguments is of the entity type (‘e-analyses’); a CC-argument is needed for analyses where EST only has degree-types arguments (a set of degree properties and a degree property) – ‘d-analyses’
- We pursue the goal of eliminating the *covert* C argument, by proposing that:
 - d-analyses apply only when there is an *overt* argument denoting a set of degree properties
 - otherwise, e-analyses apply => no covert C argument
- Evidence: there are languages where the overt counterpart of C is ungrammatical => a covert C would be unlearnable

1. Background: the domain of comparison and the absolute/relative ambiguity

- Adnominal superlatives: usually, the domain of comparison (DC) is provided by the NP property:

- (1) Jupiter is [the largest [planet in our solar system]]
DC = {x: x is a planet in our solar system}
Gradable property: $\lambda d.\lambda x.\text{large}(d)(x)$

DC can, of course, be contextually restricted, but this holds of all quantifiers (superlatives involve universal quantification: *largest* = *larger than all the others*)

- (2) a. John ate the largest cake
b. John ate all/most of the cakes/the cake
ex. of contextual domain restriction: at Fred’s party last evening

- DP-external superlatives (e.g., adverbs): the DC contains the correlate (Farkas & Kiss’s 2000 term) and alternatives to the correlate)

- (3) Yesterday, Mary drove the fastest
(a) Yesterday, **Mary** drove faster than any other person who drove
DC = {Mary and the other persons who drove yesterday}
Compared degrees: $\{\lambda d: x \text{ drove } d\text{-fast yesterday} \mid x \text{ a person who drove yesterday}\}$
(b) **Yesterday**, Mary drove faster than at any other time
DC = {yesterday and other occasions when Mary drove}
Compared degrees: $\{\lambda d: \text{Mary drove } d\text{-fast at } t \mid t = \text{the time of a driving occasion}\}$

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- Szabolcsi (1986), Heim (1999): even for adnominal superlatives, DC can be provided by the clause in which the DP is found – the so-called ‘*relative* (or *comparative*) reading’ (vs. the ‘*absolute*’ reading in (1) and (2)a);

- (4) I got the largest room
- (a) I got a larger room than anybody else got ‘relative’
 DC = {The speaker and the other persons who got a room}
 Compared degrees: $\{\lambda d: x \text{ got a } d\text{-large room} \mid x \text{ a person who got a room}\}$
- (b) I got the largest room in the hotel ‘absolute’
 DC = $\{x: x \text{ a room in the hotel}\}$
 Compared degrees: $\{\lambda d: x \text{ is } d\text{-large} \mid x \text{ a room in the hotel}\}$

Szabolcsi and Heim argue that in the relative reading -EST is interpreted DP-externally, like in (3).

Evidence that the relative vs. absolute distinction is structural (different semantic structure, maybe different syntax), not merely pragmatic:

- DPs with relative superlatives pattern with indefinites in various tests (Szabolcsi 1986):

- (5) a. Who has {the smartest sister/ *the sister/ a sister}?
 b. Who did you take {the *(best) picture of/a picture of}?
 c. There were the ??(fewest) guests yesterday

- The clausal material that can serve as a DC is *syntactically* constrained: the correlate must be a clause-mate of the superlative DP², as shown by Szabolcsi (1986), who also observes that the correlate is usually a focus or wh-item (she actually uses the term ‘licensing variable’)³:

- (6) a. Who_i did you claim [t_i got the fewest letters]?
 b. * Who said [that you got the fewest letters]?
- (7) a. John showed the highest mountain to BILL. (cf. Szabolcsi 1986:20-21)
 = John showed Bill a mountain higher than to anybody else
 DC = {Bill and other persons John showed a mountain to}
 Compared degrees: $\{\lambda d: \text{John showed a } d\text{-high mountain to } x\}$
- b. JOHN showed the highest mountain to Bill
 = John showed Bill a mountain higher than all the others showed him
 DC = {John and other persons who showed Bill a mountain}
 Compared degrees: $\{\lambda d: x \text{ showed a } d\text{-high mountain to Bill}\}$

=> the proposal that -EST takes scope in the clause, where it can access the correlate and a lambda-abstract based on replacing the correlate with a variable

² We use the term ‘superlative DP’ for a DP that embeds a superlative.

³ Quantity superlatives normally lack absolute readings (see also Gawron 1995) => Szabolcsi (1986) uses them as a test for the behavior of relative superlatives. For *most*, the superlative of *much/many*, Hackl (2009) identified the absolute reading with the majority reading, but there is abundant cross-linguistic evidence against this identification, see Dobrovie-Sorin & Giurgea (2021).

2 proposed structures for relative superlative readings (adapted from Heim 1999):

(I) e-analysis: -EST raises below the correlate; -EST takes an open predicate formed by abstraction over the correlate; due to QR of -EST, this predicate is turned into a $\langle d, et \rangle$ relation; -EST takes this relation as an argument and predicates it of the correlate:

- (8) BILL₁ [-EST₂ [2 [1 [John showed a d₂-high mountain to t₁]]]]
 JOHN₁ [-EST₂ [2 [1 [t₁ showed a d₂-high mountain to Bill]]]]

(II) 'd-analysis': -EST raises above the constituent that contains the correlate; the sister of -EST is of type $\langle d, t \rangle$ (due to the QR of -EST to a t-node):

- (9) -EST₁ [1[John showed a d₁-high mountain to [Bill]_{Foc}]]
 -EST₁ [1[[John]_{Foc} showed a d₁-high mountain to Bill]]

2. Comparison classes

- Heim proposes that EST comes with a covert comparison class argument (C) for both analyses.

2.1 Comparison classes in the d-analysis

In the d-analysis, this argument is crucial. It is established based on focus and provides the DC:

- (10) [C-EST₁] [1[John showed a d₁-mountain to [Bill]_{Foc}]]
 $C = \{\lambda d \lambda w. \text{John showed in } w \text{ a } d_1\text{-mountain to } x \mid x \text{ belongs to a contextual set of people}\}$
 EST(C)(John showed a d-mountain to Bill) =
 the set of degrees 'λd. John showed a d-high mountain to Bill' contains a maximal degree, a degree that is not found in any other property in C

- (11) $\llbracket \text{EST} \rrbracket = \lambda C_{\langle d, \langle s, dt \rangle \rangle} \lambda P_{\langle d, t \rangle} \exists d [P(d) \wedge \forall Q((Q \in A \wedge Q \neq P) \rightarrow \neg Q(d))]$

definedness conditions:

- (i) $P \in A$
 (ii) For any Q in C, $\exists d.Q(d)$
 (iii) $\exists Q \in C, Q \neq P$ (based on Heim 1999:(66), Howard 2014:(46))

When the correlate is a variable bound by a relativizing operator, one needs to assume that the trace of a relative operator is focused (cf. Bhatt 2002, Romero 2013):

- (12) the man John showed the highest mountain to $[\]_{\text{Correlate}}$
 the man [Op_i [-EST [John showed a d-high mountain to [t_i]_{Foc}]]]

Heim notes however other cases where focus, at least the one manifested by prosody (nuclear stress), is not on the correlate:

- (13) All the sopranos that auditioned were impressive. But Mary sang the LOUDEST at 11 am.
 (Howard 2014: (42), citing Heim, p.c.)
 correlate = Mary

- (14) How does one win this contest?
 By putting the tallest plant on the table. (Heim 1999:(17))
 (correlate = PRO, the person who puts the plant)
 => maybe C is pragmatically established and association with focus is just one option

2.2 Comparison classes in the e-analyses

In the e-analysis, C provides further contextual restrictions on the entities that are compared to the correlate, but the DC *is syntactically represented*: it is provided by the predicate EST attaches to (the comparison holds between the elements that satisfy this predicate):

- (15) a. BILL₁ [[C-EST₂] [2 [1 [John showed a d₂-high mountain to t₁]]]]
 DC = {x: John showed a mountain to x}
 b. JOHN₁ [[C-EST₂] [2 [1 [t₁ showed a d₂-high mountain to Bill]]]]
 DC = {x: x showed a mountain to Bill}

This predicate is turned by QR of -EST into a relation between degrees and entities
 EST(R) holds of x if there is a degree d such that x is R to the degree d and for no other y that is R to some degree, y is R to the degree d
 The fact that only entities that have R to a certain degree are compared is encoded in a definedness condition, see (ii) below:

- (16) $[[EST]] = \lambda C_{\langle e,t \rangle} . \lambda R_{\langle e,dt \rangle} . \lambda x . \exists d [R(d)(x) \wedge \forall y [(y \in C \wedge y \neq x) \rightarrow \neg R(d)(y)]]$
 defined iff (i) $x \in C$ and (ii) $\forall y (y \in C \rightarrow \exists d R(d)(y))$

N.B. Gajewski (2010), discussing the NPI licensing property of superlatives, argues that the definedness condition (ii) is too strong (it would make superlatives both SDE (Strawson downward entailing) and SUE (Strawson upward entailing)) and should be replaced by a weaker one (the requirement that some element of C, distinct from x, satisfies R), coupled with the requirement that x satisfies R:

- (16)' EST(C)(R)(x) is defined iff $x \in C \wedge \exists d R(d)(x) \wedge \exists y (y \neq x \wedge y \in C \wedge \exists d' R(d')(y))$

3. No need of comparison classes in the e-analyses

Heim (1999) also applies the e-analysis with CCs (comparison classes) to the absolute reading (see (1)-(2)):

- (17) [_{DP} the [C-EST₁ [1 [t₁-large planet in our solar system]]]]
 [_{DP} the [C-EST₁ [1 [t₁-large cake]]]]

But, as we have seen, contextual domain restrictions in this case are not different than those found with other quantifiers/determiners (see (2), resumed under (18) below):

- (18) a. John ate the largest cake
 b. John ate all/most of the cakes/the cake
 ex. of contextual domain restriction: at Fred's party last evening

There have been indeed analyses of -EST without a C argument, mostly for absolute superlatives – see e.g. von Stechow (1999), Krasikova (2012)⁴. However, most works on superlatives postdating Heim (1999) adopt a C argument throughout⁵.

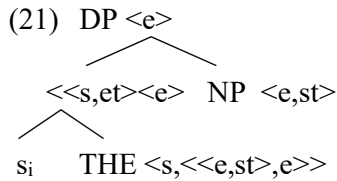
- (19) Our proposal in a nutshell
 (i) We adopt the CC-free analysis of absolute readings
 (ii) We improve that analysis by resorting to situation-arguments (cf. Schwarz 2009)
 (iii) We extend the CC-free analysis to relative readings

For quantifiers such as determiners and adverbs of quantification, a widespread view is that contextual domain restrictions are due to the situation argument that all predicates have (see the overviews in Schwarz 2009 and Kratzer 2007/2017).

Since situations are located in space and time and are parts of possible worlds, the *s* argument also accounts for the temporal and modal interpretation of predicates.

Schwarz (2009) summarizes the evidence in favor of analyzing the situation argument as an argument of the determiner, at least for strong determiners, see e.g. THE:

- (20) $\llbracket \text{THE} \rrbracket = \lambda s. \lambda P_{\langle e, st \rangle} : \exists ! x. P(x)(s). \iota x. P(x)(s)$ (Schwarz 2009:184)
 $\llbracket \text{THE } s_i \rrbracket = \lambda P : \exists ! x P(x)(s). \iota x. P(x)(g(i))$ (s_i is a situation-pronoun merged with D)



=> by endowing EST with a situation argument, we dispense with the need of a C argument for contextual domain restrictions; instead of requiring that the entities compared to the external argument of the superlative should belong to C, we just require them to satisfy the gradable property to some degree in the relevant situation (a requirement that was included by Heim among the definedness conditions):

- (22) $\llbracket \text{EST} \rrbracket = \lambda R_{\langle e, \langle d, st \rangle \rangle} \lambda x. \lambda s. \exists d [R(d)(x)(s) \wedge \forall y [(\exists d' (R)(d')(y)(s) \wedge y \neq x) \rightarrow \neg R(d)(y)]]$
 defined iff $\exists d R(d)(x)(s)$ ⁶

⁴ For relative superlatives, Bumford (2017) and Bumford & Sharvit (2022) propose an analysis without C, but it is implemented in a dynamic framework, employing tests on variable assignments. Our goal is to show that covert C can be dispensed with in static frameworks as well.

⁵ See Sharvit & Stateva (2002), Herdan & Sharvit (2006), Fitzgibbons et al. (2009), Hackl (2009), Kotek et al. (2011), Pancheva & Tomaszewicz (2012), Chacón & Wellwood (2012), Romero (2013), Howard (2014), Wilson (2018), Charnavel (2023). Krasikova (2012) uses a covert C only for relative superlatives. Gajewski (2010) first uses an entry without C but then shows how a C argument can be accommodated with NPI licensing, leaving open the possibility that C arguments are necessary for contextual restrictions. Dunbar & Wellwood (2012) do not use C but they do not address relative readings.

⁶ Evidence (see von Stechow 1999):

- (i) Fred is the smartest linguist / Fred is not the smartest linguist / Is Fred the smartest linguist?
 : all imply 'Fred is a linguist'

We are not 100% sure that a second presupposition requiring the existence of at least 2 compared elements is necessary. Heim includes it in her d-analysis, see (11), but not in the e-analysis (see (16)). Hackl (2009), and Gajewski (2010) include it in the e-analysis as well, citing the oddest of (ii):

- (ii) # You are the best mother I have.

- (i) If EST is in a DP, *s* is bound by the determiner, see (20)-(21)
- (ii) In EST is not in a DP, *s* is identified with the situation described in the sentence

=> this entry applies equally well to DP-external superlatives, such as adverbial superlatives and relative superlatives under the raising analysis.

(23) Yesterday, **Mary** drove the fastest

[[EST]] $(\lambda d.\lambda x.\lambda s. x \text{ drove } d\text{-fast yesterday})(\text{Mary}) = \text{'}\lambda s. \text{there is a } d \text{ such that Mary drove } d\text{-fast in } s \text{ and for all } y \text{ different from Mary that drove in } s, y \text{ did not drive } d\text{-fast in } s\text{'}$

This property is applied to the topic situation (the situation the sentence is about), which is here a contextually restricted situation; its time is further specified by *yesterday*.

Welcome result:

- covert *C* is an argument specific to the superlative: how is it learned?
- situation arguments are present on all predicates; they are probably innate in our conceptual system, part of a universal LF-grammar, so no special learning is necessary (once they understand speech about past times and fictional situations, children must employ situation arguments)

4. Overt *C*-arguments compatible with the *d*-analysis

The previous section suggests that, all things being equal, the *e*-analysis is preferable because it allows us to dispense with a covert argument specific to superlatives.

There are nevertheless instances reported in the literature where the *C* argument necessary for the *d*-analysis appears to be overt:

4.1 The superlative degree clauses discovered by Howard (2014) – henceforward ‘Howard relatives’ (HR):

(24) Mary sang the loudest [that any soprano ever sang]. (Howard 2014:(21)b)

- Adverbs don’t license relative clauses => the *that*-clause here is licensed by *-est*.
- There is a matching effect between the predicates in the *that*-clause and in the matrix:

(25) * Mary yelled the loudest [that any soprano ever sang].

- The correlate *Mary*, in (24), must be included in the set the subject NPI in the *that*-clause quantifies over:

(26) # Mary sang the loudest [that any baritone (ever) sang]. (Howard 2014:(22)b)

These properties follow once we adopt the hypothesis that the *that*-clause denotes the *C* argument of the *d*-analysis – see (11), resumed under (27) below:

(27) [[EST]] = $\lambda C_{\langle d, \langle s, dt \rangle \rangle} \lambda P_{\langle d, t \rangle} \exists d [P(d) \wedge \forall Q((Q \in C \wedge Q \neq P) \rightarrow \neg Q(d))]$

definedness conditions:

- (i) $P \in C$

- (ii) For any Q in C, $\exists d.Q(d)$
 (iii) $\exists Q \in C, Q \neq P$ (based on Heim 1999:(66), Howard 2014:(46))

(27)(i) requires that the degree description in the matrix (e.g. ‘Mary sang d-loud’) belongs to the set of degree properties introduced by C => the matching effect in (25) and the fact that the correlate, Mary, should belong to the set quantified over by *any soprano*

- (28) \llbracket that any soprano ever sang $\rrbracket = \{\lambda d.\lambda w. x \text{ sang } d\text{-loud at } t \text{ in } w \mid x \text{ a soprano, } t \text{ a time}\}$ (based on Howard 2014:(54))

Note that the overtiness of the DC allows more than one element of variation – besides the subject, corresponding to the overt correlate *Mary* in the matrix, there is variation of times, introduced by *ever* (see Howard 2014 for a way of compositionally achieving this denotation)

4.2 Modal superlatives⁷

- (29) a. John bought the largest possible present (Romero 2013: (11))
 - modal superl. reading: John bought as large a present as it was possible for him/for anyone to buy
 - regular modifier reading: John bought the largest thing that can be a present
 b. John bought the largest present possible: only the modal superlative reading

This reading is found with a small number of adjectives (*possible, imaginable, conceivable*) and participles (*allowed, permitted* – only in postnominal position). Not all modal adjectives allow this reading (e.g. *probable, potential* disallow it).

Romero (2013) provides a compositional analysis in which [*possible* + elided CP] serve as a C-argument of -EST.

- (30) \llbracket [-EST [1 [possible [for him/one to buy a t_1 -large present]]]] [2 [John bought a t_2 -large present]]

This C-argument cannot be conceived as a set of entities, because the obligatory element of variation in this case are possible worlds => only a d-analysis can apply

N.B. evidence that *possible* forms a constituent with the superlative:

- adjacency required:

- (31) I bought the largest affordable possible present *modal superl. reading (Schwarz 2005)

- The inflection pattern [Sup Modal+inflection] in German (Agr infl. at the end of the phrase):

- (32) a. Ich habe das größt-e möglich-e Geschenk gekauft. (Schwarz 2005)
 I have the largest.AGR possible-AGR present bought
 ‘Out of the possible presents, I bought the largest one.’ (regular modifier)
 b. Ich habe das größt möglich-e Geschenk gekauft.
 I have the largest possible-AGR present bought
 ‘I bought as large a present as it was possible for me to buy.’ (modal superlative)

⁷ Modal superlatives are also discussed by Corver 1997, Larson 2000, Schwarz 2005, Loccioni 2018.

Proposed semantics:

- The degree is relativized inside the [possible+CP] constituent:

(33) $\llbracket 1 \text{ [possible [for him/one to buy a } t_1\text{-large present]]} \rrbracket = \lambda d. \diamond \exists x [x \text{ a } d\text{-large present and John/one buys } x]$

- This set of degrees is turned into a set of sets of degrees via a type-shifter; this shifter creates, for each degree in the set, a set of degrees smaller or equal to that degree:

(34) $\text{SHIFT}_{dt \rightarrow dt,t} \llbracket 1 \text{ [possible [for him/one to buy a } t_1\text{-large present]]} \rrbracket = \lambda D_{\langle d,t \rangle} \exists d [\diamond \exists x. [x \text{ a } d\text{-large present and John/one buys } x] \wedge D = \lambda d'. d' \leq d]$

- This set of sets of degrees serves as the C-argument of EST:

(35) $\text{EST} (34)(\lambda d. \text{John bought a } d\text{-large present}) = \exists d [\text{John bought a } d\text{-large present} \wedge \forall Q ((Q \in \lambda D_{\langle d,t \rangle} \exists d [\diamond \exists x. [x \text{ a } d\text{-large present and John/one buys } x] \wedge D = \lambda d'. d' \leq d] \wedge Q \neq \lambda d. \text{John bought a } d\text{-large present}) \rightarrow \neg Q(d))]$

Given this evidence for an overt C-argument that requires a d-analysis of -EST, one may be tempted to extend the d-analysis to all environments in which -EST occurs. But this requires a massive use of covert C arguments. We will argue against such extension.

5. Proposal

- The denotation of EST depends on the syntactic environment where it is inserted (i.e., on its selectional properties, registered in the lexicon)
 - A d-analysis applies only when EST takes at LF an overt clausal argument denoting a set of degree descriptions⁸. This happens in only 2 types of configurations: Howard-type examples and modal superlatives
 - In all other environments, an e-analysis may apply
- => no need for covert comparison class arguments that do not correspond to an argument provided by the syntactic configuration

Evidence:

5.1 Scarcity or absence of the relevant constructions

Recall that the main problem for a d-analysis is that it needs to assume a covert constituent specific to superlatives, the comparison class argument.

Modal superlatives and Howard-relatives are not frequently used => it is unlikely that they serve as an input for learning that superlatives have a covert C argument

Moreover, there are languages which completely lack Howard-relatives – see Romanian, where there is no possible counterpart of (36), no matter which relativizing element is used:

(36) Mary sang the loudest [that any soprano ever sang]. (Howard 2014:(21)b)
 Ro.: *Maria a cântat cel mai tare ce /care /(din) cât /decât ca a
 Maria has sung SUP more loud what/which/(of) how-much/than / as has
 cântat vreo soprană vreodată
 sung any soprano ever

⁸ In the case of modals, the modal adjective (e.g. *possible*) is overt and its CP complement is elided.

This also holds for adnominal Howard-relatives – (37) shows that there is no way of rendering the sentence in (37) in Ro.

- (37)a gets one of the two readings of prenominal MOST that are generally available (relative with an external correlate and proportional), which both yield an odd interpretation: (i) The relative reading sounds odd because of the addition of the variation over times (induced by the presence of *vreodată*) and because the information that poems have been written by somebody is superfluous; without *vreodată*, (37)a can get an absolute reading where maximal sums of poems written by somebody are compared; (ii) The proportional reading implies that Bill wrote more than half of the poems ever written, which is ruled out by world knowledge.
- Note moreover that the amount relativizer *cât* or the uninflected relativizer *ce* ‘what, that’ cannot be used, see (37)b:

(37) Bill wrote the most poems that anyone ever wrote

Ro.: a. # Bill a scris cele mai multe poezii pe care le-a scris
 Bill has written SUP/the more many poems DOM which CL.ACC-has written
vreodată cineva.
 ever somebody/anybody

Interpreted as: ‘Bill wrote most (of the) poems that anyone ever wrote’

b. * Bill a scris cele mai multe poezii cât(e) / ce a scris
 Bill has written SUP/the more many poems how-much(AGR) that has written
vreodată cineva.
 ever somebody/anybody

Howard-relatives are the clearest example of a degree-denoting C-argument (as they can also modify adverbial superlatives);

5.2 Peculiarities of modal superlatives

Modal superlatives cannot constitute an argument for a d-type analysis of superlatives in general, because they are themselves peculiar – there is evidence that they do not involve the standard EST:

- First, note that Romero’s account (the only attempt at a compositional analysis based on the general denotation of EST we know of) is not fully compositional: it involves a type-shifter that maps a set of degrees onto a set of sets of degrees.

But even this result is not fully in compliance with EST in the d-analysis: as explained in Howard (2014), the C-argument of EST, in this analysis, should not be a set of *sets* of degrees, but a set of degree *properties*. This is necessary to eliminate ties:

(38) Mary drove the fastest

Scenario: Mary drove 75 km/h, Lucy drove 75 km/h, the others: lower speeds

(38) is not judged true in this scenario. But if the C-argument of EST had been a set of degrees, the set of degrees Q of Mary’s speed would have been the same as the set of degrees of Lucy’s speed => this set Q is larger than any other => (38) should be true

This is why Heim and Howard resorted to degree *properties* instead of degree sets:

$\lambda d.\lambda w.$ Mary drove d-fast \neq $\lambda d.\lambda w.$ Lucy drove d-fast => the sentence comes up as false

But modal superlatives, as is well known, do allow ties. Intuitively, what varies across alternatives in this case are possible worlds, and the maximum degree may obtain in more than just one world.

=> **Loccioni (2018) proposed a special semantic composition for modal superlatives:**

- The combination THE+EST takes a *possible*+CP (as in Romero 2013) but returns a *maximal degree*, not a set of sets of degrees
- This DegP further moves to a clausal position, as in Romero's analysis, saturating the open d-position of the predicate

- The idea that the EST used in modal superlative is special is supported by the peculiar behavior it shows in some languages:

Thus, in Italian, according to Loccioni (2018), modal superlatives are the only case where a definite article form (*il*) can occur as part of the superlative:

- (39) a. Maria doveva essere Ø / **il** più carina possibile. (Loccioni 2018:76)
 Maria had-to be the.MS more pretty.FS possible
 'Maria had to be the prettiest possible.'
- b. Maria è la ragazza (*il/*la) più carina. (attributive) (ibid.:143)
 Maria is the girl the more pretty
 'Maria is the prettiest girl.'
- c. l'anno in cui Maria fu (*il/#la) più felice (predicative) (ibid.:103)
 the year in which Maria was the.MS/the.FS more happy
 'the year in which Maria was happiest' (compared to other times)
 (*la* impossible with an interpretation where the time – *in cui* – is the correlate;
 if *la* is used, Maria is compared with others => an elliptical DP, where *la* is the
 D, rather than a predicative adjective)

Moreover, they can be embedded in an indefinite DP, which is impossible for other types of superlatives:

- (40) a. Ho bisogno di una torta il più grande possibile. (Loccioni 2018:131)
 have.1S need of a.F cake(F) the.MS more big possible
- b. # Ho bisogno di una torta (*il) più grande (#: impossible sup. interpretation)

=> A special variety of EST, with a special denotation, correlated to the selectional pattern *the*+ *possible*-CP, can safely be posited. It is not necessary, and probably inadequate, to base the denotation of EST in general on the EST that shows up in modal superlatives

5.3 Problems for generalizing the d-analysis (especially to absolute superlatives)

- According to Heim (1999), focus plays a crucial role for inferring the C argument based on the overt material; we saw in (13)-(14) that prosodic focus does not always indicate the correlate, but one could argue that the context makes salient the relevant alternatives.

However, extending the d-analysis to absolute superlatives (i.e., where DC is given by NP-internal material alone) is suspicious, because in that case neither prosodic focus nor contextual alternatives play any role.

Because in the d-analysis C-EST must attach to a proposition-denoting constituent, for absolute superlatives we need to postulate an elaborate construction: a reduced relative with a PRO subject and the superlative+NP as its predicate + the stipulation that the trace of PRO is F-marked and must be used as the correlate (see Romero 2013 for an elaborate proposal):

- (41) [the [PRO [C-EST [[t_{PRO}]_F [NP [AP t_{EST} high] mountain]]]]]
 the [1 [C-EST [2 [t₁ [[t₂-high] mountain]]]]]

5.4 Possible evidence for an e-analysis: superlatives as arguments of ordinals

- Ordinals are notoriously underspecified wrt the ordering relation they employ
- Superlatives may specify this ordering relation:

(42) the third highest mountain

- But ordinals operate on sets of *entities*

=> an e-analysis of superlatives is better suited for this environment, because in this analysis [Sup+NP] constituents denote properties of entities

The general semantics of ordinals (informal):

- Ordering is based on antisymmetric relations: $\forall x,y,x \neq y: R(x,y) \rightarrow \neg R(y,x)$
- Ordinals indicate how much a set must be shrunk so that an element is ordered on top of all the others

=> we build a 'superlative property' based on the antisymmetric relation:

(43) Given a set N and an antisymmetric relation R, the Superlative of R is a relation between sets and entities such that

$$S_R(x,N) =_{\text{def}} \forall y \in N (y \neq x \rightarrow R(x,y))$$

(44) Given a set N, a superlative relation S and a number n, x is the n-est in N = n-1 elements must be removed from N, creating a subset N' such that S(x,N')

e.g. *the first train* = the x such that if we remove *no* train (1-1=0) from the set of trains, the train x comes before any other train (the ordering relation = *before*)

the second train = the x such that if we remove one train from the set of trains, the train x comes before any other train

etc.

=> the superlative can be treated as an overt realization of this S relation; superlatives are built on the antisymmetric relation 'greater than' (cf. the decomposition of superlatives into a Sup head and a comparative, see Bobaljik 2012, Dunbar & Wellwood 2016)

(45) Given a nominal property N and a superlative S based on N (S = -EST[A+N]),

$$n^{\text{th}}(S)(N) = \lambda x. \lambda s. [N(x)(s) \wedge \max(\{y: N(y)(s) \mid \exists s' (s' \leq s \wedge y = \sigma z N(z)(s') \wedge S(x)(s')\}) \mid = n-1]]$$

'x is the nth S N in the situation s iff x is N in s and the set of N in s has n-1 elements more than the maximal set N' such that there is a sub-situation s' of s in which x has S and N' is the set of N in s'

e.g. x is the third highest mountain in s = the maximal set of mountains in s has 2 more elements than the maximal set of mountains for which there is a sub-situation of s' in which this set is the set of all the mountains in s' and x is the highest mountain in s'

N.B. If we use the denotation of EST in (22), with no separate A and N arguments, the superlative property itself must be built on N => 2 occurrences of the NP are necessary for the interpretation, one of which is deleted under identity:

(46) [OrdP [Ord [SupP EST [t-EST-AP NP]]] NP]
 [OrdP [third [SupP EST [highest mountain]]] mountain]

6. Conclusions

- The superlative morpheme may have different denotations depending on the number of arguments it takes
- -EST can take an overt degree-denoting argument specifying its DC: a [Modal-Adj+CP]

- constituent (\Rightarrow modal superlatives) or a ‘Howard relative’ (in certain languages) \Rightarrow a denotation where [-EST+Clause] combines with a degree property ($\langle d, \langle st \rangle \rangle$)
- In all other environments, it can be safely assumed that EST directly attaches to a property of individuals which provides its domain of comparison (\Rightarrow the first argument of EST is of the type $\langle d, \langle e, \langle s, t \rangle \rangle \rangle$, a relation between entities and degrees created by QR of EST)
 - \Rightarrow no need for covert comparison class arguments

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