Pre-print version of:
Romero, M. 2011. "Modal Superlatives and 3-Place vs. 2-Place -*est*", *The Baltic International Yearbook of Cognition, Logic and Communication* 6, 1-39.

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MODAL SUPERLATIVES AND 3-PLACE VS. 2-PLACE -*EST* *

ABSTRACT. Superlative sentences with modal modifiers like *possible* give rise to the so-called 'modal superlative reading' (Larson 2000, Schwarz 2005). The present paper uses this reading to investigate an open issue in degree constructions: whereas two different lexical entries have been argued to exist for the comparative morpheme -*er* (3-place and 2-place), it is not clear whether two entries are needed for the superlative morpheme -*est*. The paper argues that, with 3-place –*est*, otherwise unmotivated syntactic material would to have to be postulated and that, even with this material, not all modal superlative examples would be assigned correct truth conditions. In contrast, 2-place -*est* can generate the modal superlative reading in all the cases, as shown in Romero (to appear, under review). Modal superlative sentences, thus, provide evidence that 2-place –*est* is needed in the grammar.

1. INTRODUCTION

This paper is concerned with superlative predicates accompanied by certain modal adjectives, like *possible*, *conceivable* and *imaginable*. On the one hand, we have simple superlative constructions like (1). On the other, we have sentences like (2) where the modal adjective simply modifies a noun N, the result denoting the set of individuals that are N in some possible / conceivable / imaginable world.

(1) John is the smartest liar.
a. "John is a liar that is smarter than any other (relevant) liar."

(2) John is a possible / conceivable / imaginable liar.
a. "Possibly / Conceivably / Imaginably, John is a liar."

The two constructions are combined in (3). Sentence (3) has --expectedly-- a reading that directly results from the combination of the ones in (1) and (2). This is the regular modifier reading in (3a). But, interestingly, a further reading has been noted to arise (Corver 1997, Larson 2000, Schwarz 2005): the so-called 'modal superlative' reading, with the (rough) paraphrase "as X as possible" given in (3b). To better get acquainted with the modal superlative reading, the reader can resort to the postnominal version in (4), which lacks the regular modifier reading and only has the modal superlative reading (Larson 2000). To see one truth-conditional difference between the two readings, note that reading (3b) entails that John is a liar in the actual world whereas (3a) does not.

(3) John is the smart<u>est</u> **possible (/ conceivable / imaginable)** liar.
a. Regular modifier reading: "John is possibly a liar and he is smarter than any other (relevant) individual that is possibly a liar."
b. Modal superlative reading: "John is as smart a liar as possible for him/one to be."

(4) John is the smartest liar possible (/ conceivable / imaginable).

The same holds for the following examples. The simple superlative sentence (5) can be understood as in (5a). In (6), the modal adjective *possible* acts as a modifier of the noun *player*. When we combine the two constructions in (7), we obtain the expected regular modifier reading in (7a) and, additionally, the modal superlative reading in (7b). Again, the reader can refine her intuitions about the latter reading with the postverbal version in (8), which only has the modal superlative reading.

(5) Bob met the tallest player.
 a. "Bob met the player that is taller than any other (relevant) player."

(6) Bob met a possible player.
 a. "Bob met somebody who may possibly be a player".

(7) Bob interviewed the tall<u>est</u> **possible** player.
 a. Regular modifier reading: "Bob met the individual who may possibly be a player who is taller than any other (relevant) individual than may possibly be a player."
 b. Modal superlative reading: "Bob met as tall a player as possible for him/one to meet."

(8) Bob met the tallest player possible.

The same phenomenon is found with *most* and *fewest*. *Most* and *fewest* are analysed as the superlative of *many* and of *few* respectively (Hackl 2009). The simple superlative sentences (9) and (10) have the readings in (9a) and (10a) respectively. The insertion of the modal adjective in principle preserves this reading with an extra modification of the head noun, as in (11a) and (12a). And the additional modal superlative reading arises, paraphrased in (11b)-(12b). Again, to better single out this reading, the reader can use the postnomimal versions in (13)-(14), which only have the modal superlative reading.[1,2]

(9) John climbed the most mountains.
 a. "John climbed more mountains than anybody else (relevant) did."

(10) John talked to the fewest guests.
 a. "John talked to fewer guests than anybody else (relevant) did."

(11) John climbed the mo<u>st</u> **possible** mountains.
 a. (#) "John climbed more objects that possibly were mountains than anybody else (relevant) did."
 b. "John climbed as many mountains as it was possible for him/one to climb."

(12) John talked to the few<u>est</u> **possible** guests.
 a. "John talked to fewer individuals that possibly were guests than anybody else (relevant) did."
 b. "John talked to as few guests as it was possible for him/one to talk to."

(13) John climbed the most mountains possible.

(14) John talked to the fewest guests possible. (modified from Schwarz 2005)

Two interconnected questions arise:

(A) How does the modal adjective syntactically and semantically combine with the rest of the elements in the sentence to yield the modal superlative reading? [3]

(B) What can the modal superlative reading teach us about superlative constructions and degree constructions in general?

Previous analyses of the phenomenon tackle question (A). Larson (2000) and Schwarz (2005) note some important lexical and syntactic restrictions on the modal superlative reading. They mostly focus on the syntactic derivation and constituency structure of the construction. Larson (2000) does not tackle the semantic computation, and Schwarz (2005) treats the string *-est possible* as one single lexical entry, non-decomposable. Romero (2011, to appear) takes the observed restrictions and, combining insights from the two approaches, develops a first compositional semantic account of the modal superlative reading, separating the semantic contribution of *-est* from that of the modal adjective.

The present paper investigates question (B), and, in doing so, also reflects on question (A). Its general goal is to place the modal superlative reading in the bigger picture of comparative and superlative constructions.[4] On the one hand, for the comparative morpheme, it has been recently argued that we need two lexical entries for *-er* crosslinguistically (Bhatt and Takahashi 2008): 3-place *-er* in (15) and 2-place *-er* in (16). The 3-place *-er* occurs in phrasal comparatives non-amenable to a deletion account, e.g. Hindi-Urdu (17). The 2-place *-er* is used *inter alia* for clausal comparatives like (18). That is, (15) and (16) are not theoretical variants of each other, but each of them is empirically motivated.

(15) $[\![\textit{-er}_{3\text{-place}}]\!] = \lambda x_e.\lambda P_{<d,et>}.\lambda y_e.\ \exists d\ [P(d)(y)\ \&\ \neg(P(d)(x))]$

(16) $[\![\textit{-er}_{2\text{-place}}]\!] = \lambda Q_{<d,t>}.\lambda P_{<d,t>}.\ \exists d\ [P(d)\ \&\ \neg(Q(d))]$ (Heim 2006)

(17) Atif-ne Boman-se zyaadaa kitaabe parh- i Hindi-Urdu
Atif-Erg Boman-than more books.f read-Pfv.FP1
'Atif read more books than Boman.' (Bhatt and Takahashi 2008)

(18) John is taller than Mary is.

On the other hand, for superlative constructions, it is not clear whether we need to distinguish between a 3-place *-est* and a 2-place *-est*. Two such lexical entries, given in (19)-(20), have been defined in the literature (Heim 1999), but they have been treated as theoretical alternatives to each other.[5] Evidence for 3-place *-est* arguably comes from cases like (21), with the overt comparison argument *among the candidates* (type <e,t>). The question is: Are there cases where the 2-place lexical entry for *-est* is empirically needed? This question has, to my knowledge, not been addressed in the literature.

(19) $[\![\textit{-est}_{3\text{-place}}]\!] = \lambda Y_{<e,t>}.\lambda P_{<d,et>}.\lambda x_e.\ \exists d\ [\ P(d)(x)\ \&\ \forall y \in Y[y \neq x \rightarrow \neg(P(d)(y))]\ ]$

(20) $[\![\textit{-est}_{2\text{-place}}]\!] = \lambda \mathbf{Q}_{<dt,t>}.\lambda P_{<d,t>}.\ \exists d\ [\ P(d)\ \&\ \forall Q \in \mathbf{Q}\ [Q \neq P \rightarrow \neg(Q(d))]\ ]$

(21) John is the tallest among the candidates.

The concrete (and relatively modest) goal of the present paper is the following: to use the modal superlative reading to provide evidence that 2-place *-est* is empirically needed. More specifically, the first compositional approach given by Romero's (2011, to appear) was implemented with 2-place *-est*. The present paper investigates whether 3-place *-est* could be used instead to derive the correct truth conditions. We will see that, to get close to the intended reading with 3-place *-est*, one would need to posit otherwise unmotivated non-overt material, and that, even with this material, incorrect truth conditions are derived for some of the cases. The correct results are obtained if we assume 2-place *-est* instead. The conclusion is that, under the framework for degree constructions assumed in this paper, 3-place *-est* is ill-suited to derive the modal superlative reading, and, thus, that a 2-place lexical entry for *-est* is needed in the grammar.[6]

The rest of the paper is organized as follows. Section 2 provides background on the LF approach to degree constructions assumed here, introducing 3-place *-est* and 2-place *-est* as theoretical alternatives to each other. Section 3, the central part of the paper, carries out several attempts at deriving the modal superlative reading with 3-place *-est*. Section 4 summarizes Romero's analysis based 2-place *-est*. Section 5 concludes.

2. BACKGROUND: LF ANALYSIS OF DEGREE CONSTRUCTIONS

2.1. Comparatives: 3-place *-er* and 2-place *-er*

Gradable predicates like *tall* have, besides their individual argument(s) (type e), a degree argument (type d). They are treated as downward monotonic. That is, if the height of a given individual x is exactly 170cm, x counts as 170cm tall, as 169cm tall, as 168cm tall, etc.

The comparative morpheme *-er* combines with the *than*-clause or phrase to form a Degree Phrase (DegP), which occupies the degree argument position of the gradable predicate. DegP can undergo LF movement to gain sentential scope, leaving behind a trace of type d (von Stechow 1984, Heim 2000, among many others). (22) illustrates the LF and compositional semantic derivation of the Hindu-Urdu example (17), with a *than*-phrase and with 3-place *-er*. *More* in *more books* is treated as the comparative of the gradable adjective *many* in (22c) (Hackl 2000):

(22) a. LF of (17): [Atif $[_{DegP}$ -er [(than) Boman]] [2 read SOME t_2-many books]]
b. ⟦*Boman*⟧ = b
c. ⟦*many*⟧ = $\lambda d_d.\lambda x_e.\ |x| \geq d$ (Adapted from Hackl 2009)
d. ⟦*read SOME t_2-many books*⟧ = $\lambda y.\ \exists z[\text{books}(z)\ \&\ |z|\geq g(2)\ \&\ \text{read}(y,z)]$
e. ⟦*2 read SOME t_2-many books*⟧ = $\lambda d'.\lambda y.\ \exists z[\text{books}(z)\ \&\ |z|\geq d'\ \&\ \text{read}(y,z)]$
f. ⟦*Atif*⟧ = a
g. ⟦*-er*$_{3\text{-place}}$⟧ = $\lambda x_e.\lambda P_{<d,et>}.\lambda y_e.\ \exists d\ [P(d)(y)\ \&\ \neg(P(d)(x))]$
h. ⟦*[-er (than) Boman] [2 Atif read SOME t_2-many books]*⟧ = 1 iff
$\exists d\ [\ \exists z[\text{books}(z)\ \&\ |z|\geq d\ \&\ \text{read}(a,z)]\ \&\ \neg\exists z[\text{books}(z)\ \&\ |z|\geq d\ \&\ \text{read}(b,z)]\ ]$

(23) illustrates the LF and semantic derivation when a *than*-clause and 2-place *-er* are involved.

(23) John is taller than Mary is.
a. LF: $[_{DegP}$ -er [(than) 1 Mary is <t_1-tall>]] [2 John is t_2-tall]
b. ⟦*2 John is t_2-tall*⟧ = $\lambda d'.\ \text{tall}(j,d')$
c. ⟦*1 Mary is t_1-tall*⟧ = $\lambda d'.\ \text{tall}(m,d')$

d. ⟦*-er*$_{\text{2-place}}$⟧ = $\lambda Q_{<d,t>}.\lambda P_{<d,t>}.\ \exists d\ [P(d)\ \&\ \neg(Q(d))]$
e. ⟦*[-er [(than) 1 Mary is <t$_1$-tall>]] [2 John is t$_2$-tall]*⟧ = 1 iff
$\exists d\ [\text{tall}(j,d)\ \&\ \neg\text{tall}(m,d)]$

Note, however, that some languages have a definite free relative as the complement of *than* (Pancheva 2006, Romero 2011). This is exemplified in (24). The definite free relative refers to the maximal degree (or to the maximally informative degree) of which the descriptive content of the relative clause holds. But ⟦*-er*$_{\text{2-place}}$⟧ expects a set of degrees (<d,t>), not a single degree (type d), as the comparison class. Thus, before it can combine with ⟦*-er*$_{\text{2-place}}$⟧, the degree referred to by the free relative has to be converted into the appropriate set of degrees. This job is carried out by the function in (25), which Romero (2011, to appear) treats as the type-shifter $\text{SHIFT}^{\leq}_{d\rightarrow<d,t>}$ when no overt element is directly responsible for the conversion.[7] The semantic computation of (24) is spelled out in (26).

(24) Juan es más alto **de** [$_{\text{FreeRC}}$ **lo** que lo es María]. Spanish
John is more tall **of** [$_{\text{FreeRC}}$ **the** that$_{\text{REL-PRON}}$ it is Mary]
'John is taller than Mary is.'

(25) $\text{SHIFT}^{\leq}_{d\rightarrow<d,t>}$ = ⟦*of*$^{\leq}$/ *than*$^{\leq}$⟧ = $\lambda d''.\lambda d'.\ d' \leq d''$

(26) Juan es más alto **de** [$_{\text{FreeRC}}$ **lo** que lo es María].
John is more tall **of** [$_{\text{FreeRC}}$ **the** that$_{\text{REL-PRON}}$ it is Mary]
a. LF: [$_{\text{DegP}}$ -er [(of) the 1 Mary is <t$_1$-tall>]] [2 John is t$_2$-tall]
b. ⟦*2 John is t$_2$-tall*⟧ = $\lambda d'.\ \text{tall}(j,d')$
c. ⟦*1 Mary is t$_1$-tall*⟧ = $\lambda d'.\ \text{tall}(m,d')$
d. ⟦*the 1 Mary is t$_1$-tall*⟧ = $\text{MAX}_{\text{INF}}\ (\lambda d'.\text{tall}(m,d'))$
e. ⟦*of*⟧ = $\text{SHIFT}^{\leq}_{d\rightarrow<d,t>} = \lambda d''.\lambda d'''.\ d''' \leq d''$
f. ⟦*(of) the 1 Mary is t$_1$-tall*⟧ = $\lambda d'''.\ d''' \leq \text{MAX}_{\text{INF}}(\lambda d'.\text{tall}(m,d'))$
g. ⟦*-er*$_{\text{2-place}}$⟧ = $\lambda Q_{<d,t>}.\lambda P_{<d,t>}.\ \exists d\ [P(d)\ \&\ \neg(Q(d))]$
h. ⟦*[-er [(than) 1 Mary is <t$_1$-tall>]] [2 John is t$_2$-tall]*⟧ = 1 iff
$\exists d\ [\ \text{tall}(j,d)\ \&\ \neg(d \leq \text{MAX}_{\text{INF}}(\lambda d'.\text{tall}(m,d')))\ ]$

2.2. The scope of *LITTLE*

It has been noted that sentences with a *less* comparative are ambiguous between a maximal boundary reading and a minimal boundary reading (Seuren 1973, Rullmann 1995). This ambiguity is exemplified in (27):

(27) Lucinda was driving less fast than is allowed on this highway. (Rullmann 1995)
a. Maximal boundary reading: "She drove below the maximal speed limit".
b. Minimal boundary reading: "She drove below the minimum speed limit".

Heim (2006), following Rullmann (1995), decomposes *less* into the comparative morpheme *-er* and an element *LITTLE*, which basically amounts to negation. The ambiguity in (27) is derived by allowing *LITTLE* to have different scoping possibilities with respect to the modal verb in the *than*-clause. When *LITTLE* scopes over the modal, the maximal boundary reading is obtained, as in (28). When *LITTLE* scopes under the modal, the minimal boundary reading is generated, as in (29).

(28) Maximal boundary reading: "Lucinda drives below the maximum speed limit"

a. LF: [[-er (than) 4 [[t_4 LITTLE] 3[allowed Lucinda drive t_3-fast]]] 2[[t_2 LITTLE] 1[Lucinda drives t_1-fast]]]

b. ⟦*1[Lucinda drives t_1-fast]]*⟧ = λd'. Lu drives d'-fast

c. ⟦*LITTLE*⟧ = $\lambda d_d.\lambda P_{<d,et>}.\neg P(d)$

d. ⟦*[[t_2 LITTLE] 1[Lucinda drives t_1-fast]]*⟧ = 1 iff ¬(Lu drives g(2)-fast)

e. ⟦*2 [[t_2 LITTLE] 1[Lucinda drives t_1-fast]]*⟧ = λd'. ¬(Lu drives d'-fast)

f. ⟦*4 [[t_4 LITTLE] 3[allowed Lucinda drives t_3-fas]]*⟧ = λd'. ¬◊(Lu drives d'-fast)

g. ⟦*-er*⟧ = $\lambda Q_{<d,t>}.\lambda P_{<d,t>}$. ∃d [P(d) & ¬(Q(d))]

h. ⟦(28a)⟧ = 1 iff ∃d [¬(Lu drives d-fast) & ◊(Lu drives d-fast)]

(29) Minimum boundary reading: "Lucinda drives below the minimum speed limit"

a. LF: [[-er (than) 4[allowed [[t_4 LITTLE] 3[Lucinda drive t_3-fast]]]] 2[[t_2 LITTLE] 1[Lucinda drives t_1-fast]]]

b. ⟦*2[[t_2 LITTLE] 1[Lucinda drives t_1-fast]]*⟧ = λd'. ¬(Lu drives d'-fast)

c. ⟦*4[allowed [[t_4 LITTLE] 3[Lucinda drives t_3-fast]]]*⟧ = λd'. ◊¬(Lu drives d'-fast)

d. ⟦*-er*⟧ = $\lambda Q_{<d,t>}.\lambda P_{<d,t>}$. ∃d [P(d) & ¬(Q(d))]

e. ⟦(29a)⟧ = 1 iff ∃d [¬(Lu drives d-fast) & ¬◊¬(Lu drives d-fast)]
= 1 iff ∃d [¬(Lu drives d-fast) & □(Lu drives d-fast)]

Note that, in languages that use a definite free relative clause in the *than*-phrase, we will need to do some type adjustment again. Consider example (30), which display the same ambiguity as its English counterpart above:

(30) Lucía conducía menos deprisa de **lo** que estaba permitido en esa autopista.
Lucía drove less fast of **the** that was allowed on that highway
'Lucinda drove less fast than what was allowed on that highway.' Spanish

This time, instead of the operation in (25) mapping each degree d" into the set of degrees *lower* or equal to it, we will need the operation in (31), which maps each degree d" into the sets of degrees *higher* or equal to it.

(31) $\text{SHIFT}^{*}_{d\rightarrow<d,t>}$ = ⟦*of*/ than**⟧ = λd".λd'. d'≥d"

To see why we need (31), consider e.g. the semantic derivation of the minimum boundary reading of (30), spelled out in (32). We have the property of degrees in (32c). In a scenario where the minimum speed required is 100km/h, (32c) is the characteristic function of the set {101km/h, 102km/h, 103km/h, 104km/h, ...}, which goes up to infinitum. Then we have to compute the contribution of the definite article. Rather than picking the maximal of these degrees (which would be undefined), the definite article should pick the most *informative* degree of which its sister property P holds, that is, the degree d such that P(d)=1 and, for any other d' such that P(d')=1, P(d) entails P(d') (cf. Beck and Rullmann 1996 for maximal informativity in questions). In our scenario, this gives us the degree 101km/h as the value of (32e) (since being allowed not to have 101km/h among your degrees of fastness entails being allowed not to have 102km/h among your degrees of fastness, and so on). Now, before the comparative morpheme *-er* can apply, we have to switch the degree 101km/h into a set of degrees, namely into the same set of degrees (29c) that we had obtained for the same reading of the English counterpart. In our scenario, this is the set {101km/h, 102km/h, 103km/h, 104km/h, ...}again, that is, the set of degrees of speed that one is allowed not to have. This means that we should not use the lower-or-equal shifting operation in (25), which would map the degree 101km/h to the set {..., 98km/h, 99km/h, 100km/h, 101km/h}. Instead, we need to use the higher-or-equal shifting operation in (31), which maps 101km/h into the desired set {101km/h, 102km/h, 103km/h, 104km/h, ...}.[8]

(32) Minimum boundary reading: "Lucinda drives below the minimum speed limit"
a. LF: [[-er than/of **the** 4[allowed [[t_4 LITTLE] 3[Lucinda drive t_3-fast]]]] 2[[t_2 LITTLE] 1[Lucinda drives t_1-fast]]]
b. ⟦*2[[t_2 LITTLE] 1[Lucinda drives t_1-fast]]*⟧ = $\lambda d'.\neg$(Lu drives d'-fast)
c. ⟦*4[allowed [[t_4 LITTLE] 3[Lucinda drives t_3-fast]]]*⟧
= $\lambda d'.\Diamond\neg$(Lu drives d'-fast)
d. ⟦*the*⟧ = $\lambda P_{<d,t>}.\ \mathrm{MAX_{INF}}(P)$
e. ⟦*the 4[allowed [[t_4 LITTLE] 3[Lucinda drives t_3-fast]]]*⟧
= $\mathrm{MAX_{INF}}(\lambda d'.\Diamond\neg$(Lu drives d'-fast))
f. ⟦*of*$^{\geq}$*/ than*$^{\geq}$⟧ = $\mathrm{SHIFT}^{\geq}_{d\rightarrow<d,t>}$ = $\lambda d''.\lambda d'''.\ d'''\geq d''$
g. ⟦*of/than the 4[allowed [[t_4 LITTLE] 3[Lucinda drives t_3-fast]]]*⟧
= $\lambda d'''.\ d''' \geq \mathrm{MAX_{INF}}(\lambda d'.\Diamond\neg$(Lu drives d'-fast))
h. ⟦*-er*⟧ = $\lambda Q_{<d,t>}.\lambda P_{<d,t>}.\ \exists d\ [P(d)\ \&\ \neg(Q(d))]$
i. ⟦(32a)⟧
= 1 iff $\exists d\ [\neg$(Lu drives d-fast) & $\neg(d\geq\mathrm{MAX_{INF}}(\lambda d'.\Diamond\neg$(Lu drives d'-fast)))]
= 1 iff $\exists d\ [\neg$(Lu drives d-fast) & $d < \mathrm{MAX_{INF}}(\lambda d'.\Diamond\neg$(Lu drives d'-fast))]

LITTLE and its scope will become relevant later for modal superlative examples involving *fewest possible*.

2.3. The Absolute / Relative Ambiguity in Superlatives: 3-place *-est* and 2-place *-est*

We move now to superlative constructions. A well-known ambiguity is found in superlative sentences with a covert comparison class argument *C* (Szabolcsi 1986, Heim 1985, 1999). Consider sentence (33), ignoring intonation for a moment. Under the so-called ‘absolute’ reading, (33) compares mountains in terms of their heights and asserts something of the highest one, yielding the paraphrase in (33a). Under the so-called ‘relative’ reading, mountain-climbers are compared in terms of their climbing achievements, and the sentence is paraphrasable as (33b). Heim's example (34) displays the same ambiguity, each of the answers in (34a,b) corresponding to one of the readings:

(33) John climbed the highest mountain.
a. ABSOLUTE reading: "John climbed a mountain higher than any other (relevant) mountain".
b. RELATIVE reading: "John climbed a higher mountain than anybody else (relevant) climbed".

(34) Who wrote the largest prime number on the blackboard? (Heim 1999)
a. Nobody, of course! There is no largest prime number! Absolute reading
b. John did. He was the only one above 100. Relative reading

Furthermore, the type of comparison carried out in the relative reading depends on the focus structure of the sentence. The placement of focus shapes the comparison class. To see this, consider the examples in (35), where two different relative readings arise correlating with focus: (35a) compares recipients of John's letters (in terms of the lengths of the letters they received from John), whereas (35b) compares senders of letters to Mary (in terms of the lengths of the letters they sent to Mary).[9]

(35) a. John wrote the longest letter to MARY.
b. JOHN wrote the longest letter to Mary.

Heim (1999), building on Heim (1985) and Szabolsci (1986), develops two LF-based accounts of this ambiguity, one using 3-place *-est* and one using 2-place *-est*. In both cases, the main idea is that the Degree Phrase *[-est C]* can undergo LF movement out of its host NP, leaving behind a trace of type d. The LF position of *[-est C]* then determines the range of possible choices for the contextual comparison class ⟦*C*⟧, which in turn (partly) determines whether we obtain the absolute or the relative reading.[10] We will present each account in turn.

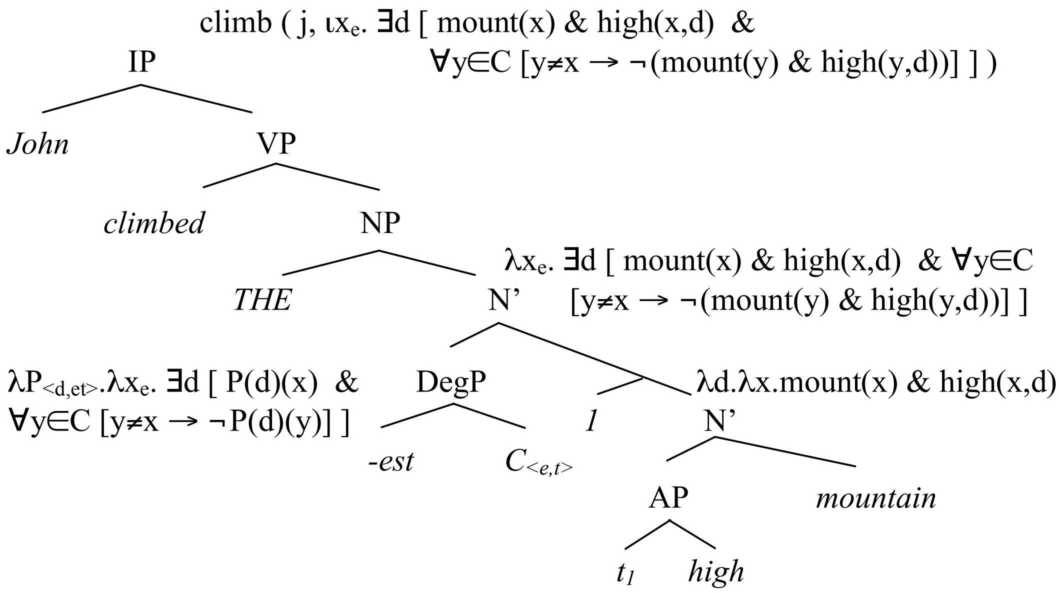
2.3.1. Analysis of the Absolute / Relative Ambiguity using 3-place *-est*

Heim's (1999) lexical entry for 3-place *-est* including presuppositions is given in (36):

(36) 3-place lexical entry and presuppositions:
⟦*-est*⟧ = $\lambda Y_{<e,t>}.\lambda P_{<d,et>}.\lambda x_e.\ \exists d\ [\ P(d)(x)\ \ \&\ \ \forall y \in Y\ [y \neq x \rightarrow \neg(P(d)(y))]\ ]$ (=(19))
Presuppositions:
(a) the third argument, x, is a member of the comparison class, Y.
(b) all members of the comparison class Y have the property P to some degree.

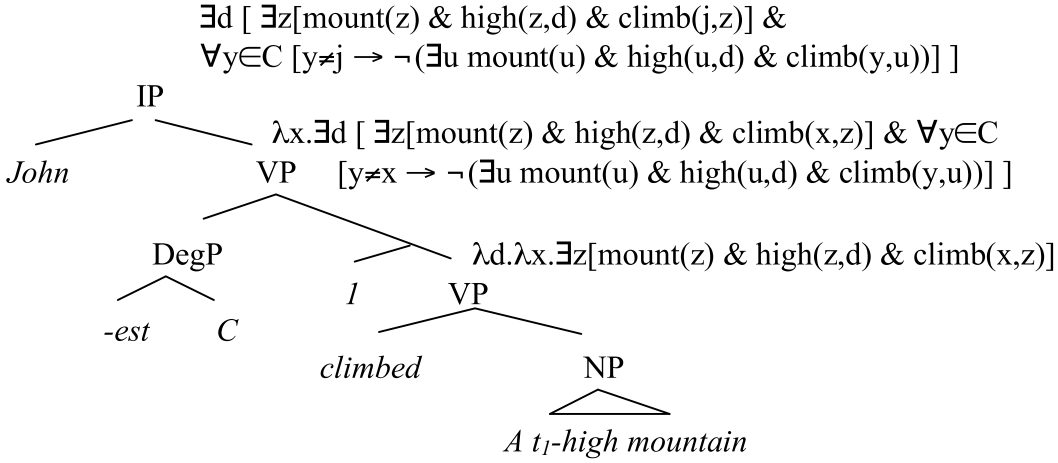
The ABSOLUTE reading is derived by scoping the DegP *[-est C]* within its host NP, as in (37). The LF sister of *[-est C]* is the constituent *[1 t_1-high mountain]*, which expresses a <d,<e,t>>-property relating mountains to their degrees of height. Note that the presupposition (36b) requires that all members of the comparison class ⟦*C*⟧ –written as the set C in the formulas– have the sister property to some degree. This boils down to requiring that C be a set of mountains. If C equals e.g. {z: z is a mountain on earth}, the absolute reading obtains with *the highest mountain* referring to Mount Everest.[11]

(37) John climbed the highest mountain.



The RELATIVE reading arises from scoping *[-est C]* outside its host NP and adjoining it under the term to be compared, as in (38). Now the sister constituent, *[1 climbed A t_1-high mountain]*, expresses a <d,<e,t>>-property relating mountain climbers to their achievements in terms of heights of mountains climbed. Thus, by the presupposition in (36b), all members of the comparison class C are mountain climbers that have climbed some mountain of some height. The result is comparison among mountain climbers.

(38) John climbed the highest mountain.

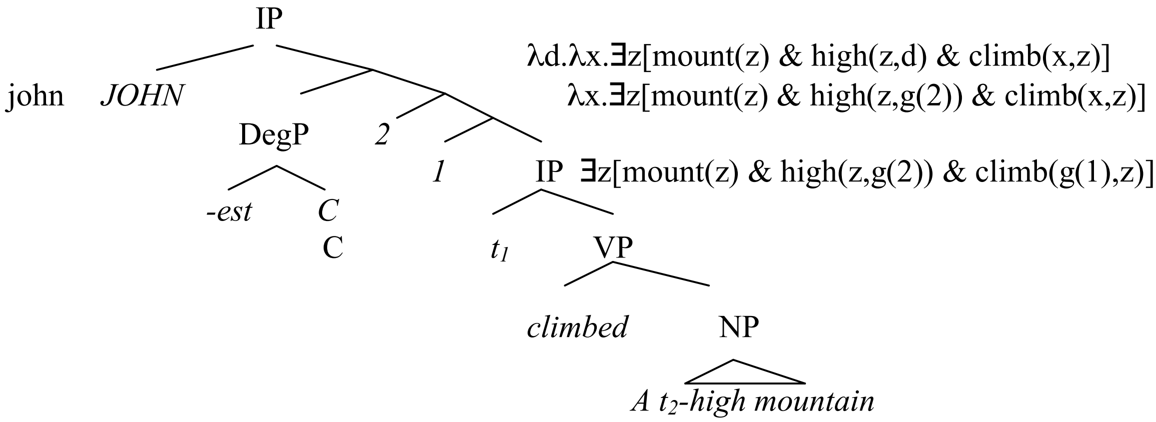


(38) is Heim's (1999) analysis of the relative reading with 3-place *-est*, disregarding focus (Heim 1999:§6). Szabolsci's (1986:§2) idea is similar, except that she factors focus into the account: the term to be compared in the relative reading (*MARY* in (35a), *JOHN* in (35b) and focused *John* in (38)) bears focus and undergoes focus movement.[12] With this focus, 3-place -*est* can be regarded as a schönfinkelized version of the GB-style structured meaning approach to focus sensitivity (Jacobs 1983, von Stechow 1990; see also Krifka 2006), where focus sensitive particles combine with the elements of a triple like (39). For the relative reading of the sentence *JOHN climbed the highest mountain*, the triple needed is (40). The syntactic tree needed with focus movement of *JOHN* looks like (41) (cf. Heim (1999:(42)). Note that one needs to allow for the moved DegP to land between the focus-moved subject *JOHN* and its movement index *1*. With this assumption, the tree provides the three elements of the desired triple, one at a time.

(39) <F, C, R>, where F is the meaning of the focused element, C is the comparison class or set of alternatives to F, and R is the background relation.

(40) < john, C, λd.λx.∃z[mount(z) & high(z,d) & climb(x,z)] >, where C is resolved to a set of relevant mountain climbers (due to the presupposition (36b)).

(41) JOHN climbed the highest mountain.



2.3.2. Analysis of the Absolute / Relative Ambiguity using 2-place *-est*

Heim's (1999) 2-place lexical entry for *-est* is spelled out in (42). As before, the LF position of *[-est C]* delimits the range of possible comparison classes C. The extra "shaping" of C induced by focus is achieved via Rooth's (1985) squiggle operator ~ in (43): C must be a subset of the focus semantic value of its sister constituent α.[13]

(42) $[\![\textit{-est}]\!] = \lambda \mathbf{Q}_{<dt,t>}.\lambda P_{<d,t>}.\ \exists d\ [\ P(d)\ \&\ \forall Q \in \mathbf{Q}\ [Q \neq P \rightarrow \neg(Q(d))]\ ]$ (=(20))

(43) $[\![\alpha \sim C]\!]$ is felicitous only if C is a subset of the focus semantic value of α.

The RELATIVE reading results when *[-est C]* moves out of the host NP and attains sentential scope, as in (44a). Given (43), C must be constrained so as to fulfill the condition in (44b). The final truth conditions are spelled out in (44c), yielding the relative reading.

(44) JOHN climbed the highest mountain.
a. LF: [[-est C] [1[JOHN_F climbed A t_1-high mountain]] ~ C]
b. C ⊆ $[\![\textit{1[JOHN}_F\textit{ climbed A t}_1\textit{-high mountain]}]\!]^f$
C ⊆ { λd'. x climbed a d'-high mountain: $x \in D_e$ }
C ⊆ { λd'. John climbed a d'-high mountain, λd'. Bill climbed a d'-high mountain, λd'. Chris climbed a d'-high mountain, ... }
c. $\exists d\ [\ \exists z[\text{mount}(z)\ \&\ \text{high}(z,d)\ \&\ \text{climb}(j,z)]\ \&$
$\forall Q \in C\ [\ Q \neq (\lambda d'.\ \text{John climbed a d'-high mountain}) \rightarrow \neg(Q(d))\ ]\ ]$

To derive the ABSOLUTE reading within Heim's (1999) second LF analysis, an extra assumption is needed: traces and other empty categories can be focus-marked. This assumption finds empirical support in examples like (45) and (46), which allow for relative readings similar to those in (35) except that the focused element would have to be a trace or *PRO* (Heim 1999; see also Krifka 1998). With this assumption, and allowing for a trace t_2 of type e within the NP, as in (47a),[14] the comparison class C would be constrained as in (47b). The final truth conditions in (47c) correspond to the absolute reading.

(45) a. I met the person that John wrote the longest letter to t_F. Cf. (35a)
b. I met the person that t_F wrote the longest letter to Mary. Cf. (35b)

(46) How does one impress Mary?
By PRO_F writing the longest letter to her. Cf. (35b)

(47) John climbed the highest mountain.
a. LF: John climbed THE 2 [[-est C] [1[$t_{2,F}$ t_1-high mountain]]~C]
b. C ⊆ $[\![$*1[$t_{2,F}$ t_1-high mountain]*$]\!]^f$
C ⊆ { λd'. x is a d'-high mountain: x∈D_e }
C ⊆ { λd'. Everest is a d'-high mountain, λd'. Kilimanjaro is a d'-high mountain, λd'. Aneto is a d'-high mountain, ... }
c. John climbed the unique z: ∃d [mount(z) & high(z,d) &
∀Q∈C [Q ≠ (λd'.z is a d'-high mountain) → ¬Q(d)]]

2.4. Wrapping up

For comparative constructions, we have seen that some comparatives sentences employ 3-place -*er* and some others use 2-place -*er*. Furthermore, for some examples with 2-place -*er*, some type adjustment is empirically needed: $SHIFT^{\leq}_{d\rightarrow<d,t>}$ in (25) for positive predicates and $SHIFT^{\geq}_{d\rightarrow<d,t>}$ in (31) for negatives predicates.

For superlative constructions, the situation with respect to the lexical entries for -*est* is different. On the one hand, superlative sentences with an explicit comparison class argument, like the ones in (48), provide evidence that 3-place -*est* is needed in the grammar (see e.g. Heim 1985 p. 19). The phrases *among the candidates* and *of all my friends* (type <e,t>) are taken to express the comparison class and thus fill up the $\lambda Y_{<e,t>}$ argument of –*est* in (36).

(48) a. John is the tallest among the candidates. (=(21))
b. Of all my friends, he sang the loudest. (Heim 1985)

On the other hand, superlative sentences without an explicit comparison class argument can be analyzed with 3-place -*est* or with 2-place -*est*. Each of the two lexical entries can be used to derive both the absolute and the relative reading. In fact, with the additional assumptions on each side noted above, the choice between 3-place -*est* and 2-place -*est* basically boils down to the choice between the structured meaning approach to focus (Jacobs 1983, von Stechow 1990) and the alternative semantics approach (Rooth 1985) for the relative reading. The 3-place -*est* analysis and the 2-place -*est* analysis are, thus, theoretical alternatives to each other.

The question to be addressed in this paper is whether the modal superlative reading can provide any evidence that 2-place -*est* is needed in the grammar as well.

We go back now to our modal superlative examples. Section 3 develops three attempts at deriving this reading using the 3-place lexical entry for -*est*, evaluating the results. Section 4 presents Romero's (2011, to appear) proposal, which uses 2-place -*est*. In both cases, the modal adjective will not be syntactically parsed as a modifier of the head noun. Rather, it will form a syntactic constituent with the superlative morpheme -*est*, filling up the λC slot of –*est* (following Romero (2011)) together with some elliptical material marked as ▲ (corresponding to the infinitival complement of *possible*, as in Larson 2000).

3. ATTEMPTS WITH THE 3-PLACE LEXICAL ENTRY -*EST*

We have seen that, when we insert certain modal adjectives next to a predicate in the superlative, e.g. *highest*, *most* and *fewest*, we obtain, besides the expected regular modifier reading, an additional reading: the modal superlative reading given in (49a)-(51a).

(49) John climbed the high<u>est</u> **possible** mountain.
a. Modal superlative reading: "John climbed as high a mountain as it was possible for him to climb."

(50) John climbed the mo<u>st</u> **possible** mountains. (=(11))
a. Modal superlative reading: "John climbed as many mountains as it was possible for him to climb."

(51) John climbed the fewe<u>st</u> **possible** mountains.
a. Modal superlative reading: "John climbed as few mountains as it was possible for him to climb."

The question to be addressed in this section is whether one can derive the correct truth-conditions for this reading using Heim's 3-place lexical entry for *-est*, repeated below:

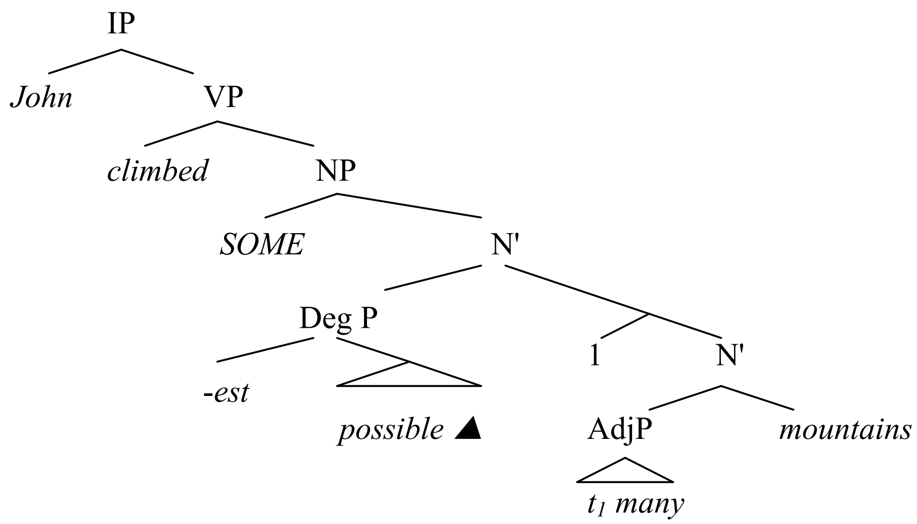
(52) 3-place lexical entry: (=(19))
$[\![\text{-}est]\!] = \lambda Y_{<e,t>}.\lambda P_{<d,et>}.\lambda x_e.\ \exists d\ [P(d)(x)\ \&\ \forall y \in Y\ [y \neq x \rightarrow \neg(P(d)(y))]]$

I will present in three successive attempts what one would need to do to get close to the modal superlative reading with 3-place *-est*. I will start with a simple syntactic tree (attempt 1), a "straw man" representation that fails to derive the reading. To redeem the structure, the syntactic LF representation will be enriched with considerable non-overt material (attempt 2). This representation will generate the correct truth conditions for complex examples with *most*, but not with *few*. This will lead us to modify the scope of *LITTLE* in the enriched syntactic structure (attempt 3). The change will bring us closer to the correct truth conditions of examples with *fewest*, but not entirely there. The conclusion will be that, even if we allow for this particular (and otherwise unwarranted) syntactic enrichment, not all the modal superlative examples will be assigned correct truth conditions.[15]

3.1. Scoping 3-place *-est* inside the host NP

Consider again example (50) with *most*, repeated below as (53). The intuition is that the sentence does not compare mountain climbers and their achievements, as the relative reading did. Thus, we will start not with the relative LF but with the absolute LF. That is, we will use the overt ingredients that we have and build a syntactic structure parallel to that for the absolute reading with 3-place *-est* in §2.3.1, where the DegP moves within the host NP. This gives us the tree under (53), where *most* is decomposed into *many* + *-est* (Hackl 2009).[16] The semantic computation is sketched in (54).[17]

(53) John climbed the most possible mountains.



(54) a. ⟦*possible* ▲⟧ = $\lambda y.\ \exists d'[\text{mounts}(y)\ \&\ |y| \geq d'\ \&\ \Diamond\text{climb}(j,y)]$
b. ⟦*t_1-many mountains*⟧ = $\lambda x.\ \text{mounts}(x)\ \&\ |x| \geq g(1)$
c. ⟦*1 t_1-many mountains*⟧ = $\lambda d.\lambda x.\ \text{mounts}(x)\ \&\ |x| \geq d$
d. ⟦*[-est possible ▲] 1 t_1-many mountains*⟧
$= \lambda x.\ \exists d\ [\text{mounts}(x)\ \&\ |x| \geq d\ \&\ \forall y\ [\ (y \neq x\ \&\ \exists d'[\text{mounts}(y)\ \&\ |y| \geq d'\ \&\ \Diamond\text{climb}(j,y)]) \rightarrow \neg|y| \geq d\ ]\ ]$
e. ⟦*John climbed SOME [[-est possible ▲] 1 t_1-many mountains]*⟧ = 1 iff
$\exists x\ [\ \text{climb}(j,x)\ \&\ \exists d\ [\text{mounts}(x)\ \&\ |x| \geq d\ \&\ \forall y\ [\ (y \neq x\ \&\ \exists d'[\text{mounts}(y)\ \&\ |y| \geq d'\ \&\ \Diamond\text{climb}(j,y)]) \rightarrow \neg|y| \geq d\ ]\ ]\ ]$

Note that (54e) includes the predication $y \neq x$ over the variables y and x ranging over mountain sums. Following Hackl (2009), this clause is interpreted as requiring that the values of x and y do not overlap. With this in mind, (54e) can be paraphrased as (55):

(55) Paraphrase of (54e):
"Out of the set of mountain-sums y that it is possible for John to climb, the cardinality of the sum x that John actually climbed is greater than the cardinality of any sum y non-overlapping with x."

This compares certain mountain sums – the ones that were allowed – and picks the sum that has the relevant property – being numerous – to the highest degree. This produces the reading "more than half of the allowed mountains", that is, the reading we would obtain if *[possible ▲]* was a regular modifier of *mountains*. This is not the modal superlative reading.[18]

3.2. Adding ingredients for an amount reading

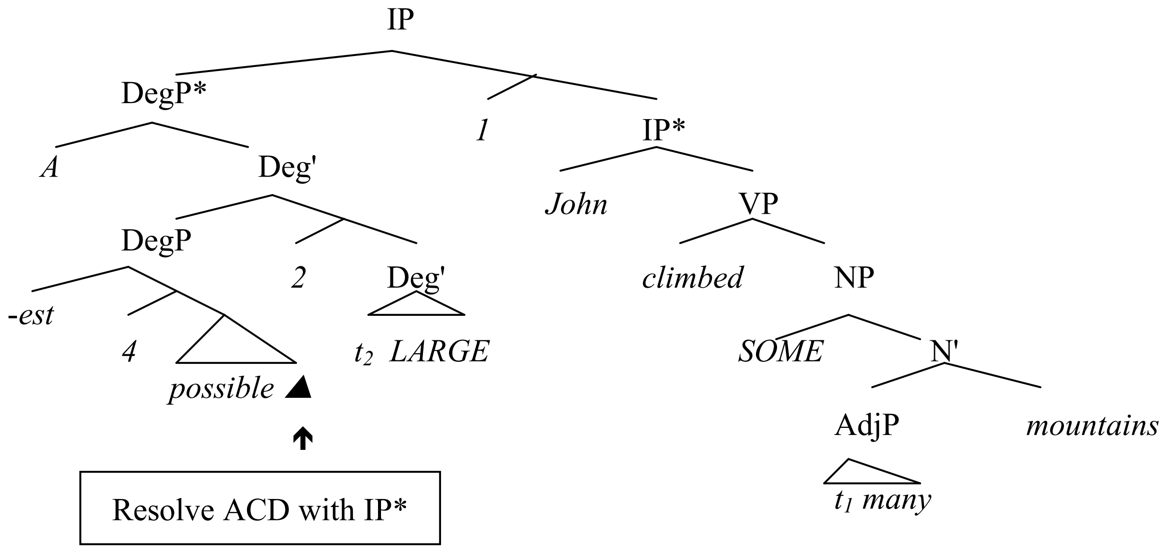
Instead of selecting a mountain sum out of the comparison class of allowed mountain sums, we need to pick an amount out of the comparison class of allowed amounts. That is, we need to generate an amount reading. This type of reading is exemplified in (56), where *the champagne* is understood as "the amount of champagne" (Heim 1987, Grosu and Landman 1998). Similarly, in its modal superlative reading, (57) is understood as "John climbed mountains in the largest amount out of the amounts allowed".

(56) It will take us the rest of our lives to drink the champagne they spilled that evening. (Heim 1987)

(57) John climbed the most possible mountains.

Hence, we have to single an amount out of a comparison class. Since we are using 3-place *-est* in (52), we need a property $P_{<d,et>}$ which the to-be-selected amount x_e has to a degree that no other y_e in the comparison class has.[19] This property will be expressed by a covert LF predicate, which I will write as *LARGE*. The DegP *[-est 4 possible ▲]* moves out of the d-complement position of *LARGE* (cf. *[-est C]* moving out of the d-complement position of *high* in (37)). When combined with its syntactic sister, *[-est 4 possible ▲]* will distill a singleton out of the comparison class. The unique element in that singleton – namely, the amount n that has a degree of largeness that no other n' in the comparison class has – is the denotation of DegP*, i.e., the moved degree phrase of the gradable predicate *many*. The resulting tree is given in (58):

(58) John climbed the most possible mountains.



Once ellipsis is resolved to the indicated IP, we obtain the LF representation in (59).[20] The crucial steps of the semantic derivation are given in (60).

(59) LF: [[A [-est 4 possible < John climbed SOME t_4-many mountains >] 2 t_2-LARGE] 1 John climbed SOME t_1-many mountains]

(60) a. $[\![$*1 John climbed SOME t_1-many mountains*$]\!]$
$= \lambda n.\ \exists x\ [\text{mounts}(x)\ \&\ |x| \geq n\ \&\ \text{climb}(j,x)]$

b. $[\![$*4 possible <John climbed SOME t_4-many mountains>*$]\!]$
$= \lambda n'.\ \Diamond\exists y\ [\text{mounts}(y)\ \&\ |y| \geq n'\ \&\ \text{climb}(j,y)]$

c. $[\![$*2 t_2-LARGE*$]\!]$ $=$ $\lambda d.\lambda n.\ \text{large}(n,d)$

d. $[\![$*-est [4 possible <John climbed SOME t_4-many mountains>] 2 t_2-LARGE*$]\!]$
$= \lambda n.\ \exists d\ [\text{large}(n,d)\ \&\ \forall n'\ [\ (n' \neq n\ \&\ \Diamond\exists y[\text{mounts}(y)\ \&\ |y| \geq n'\ \&\ \text{climb}(j,y)]) \rightarrow \neg\,\text{large}(n,d)\ ]\ ]$

e. $[\![(59)]\!] = 1$ iff $\exists n\ [\ \exists x\ [\text{mounts}(x)\ \&\ |x| \geq n\ \&\ \text{climb}(j,x)]\ \&\ \exists d\ [\text{large}(n,d)\ \&\ \forall n'\ [\ (n' \neq n\ \&\ \Diamond\exists y[\text{mounts}(y)\ \&\ |y| \geq n'\ \&\ \text{climb}(j,y)]) \rightarrow \neg\,\text{large}(n,d)\ ]\ ]\ ]$

The final truth conditions can be paraphrased as in (61). This boils down to the reading "John climbed as many mountains as possible", which is the modal superlative reading.

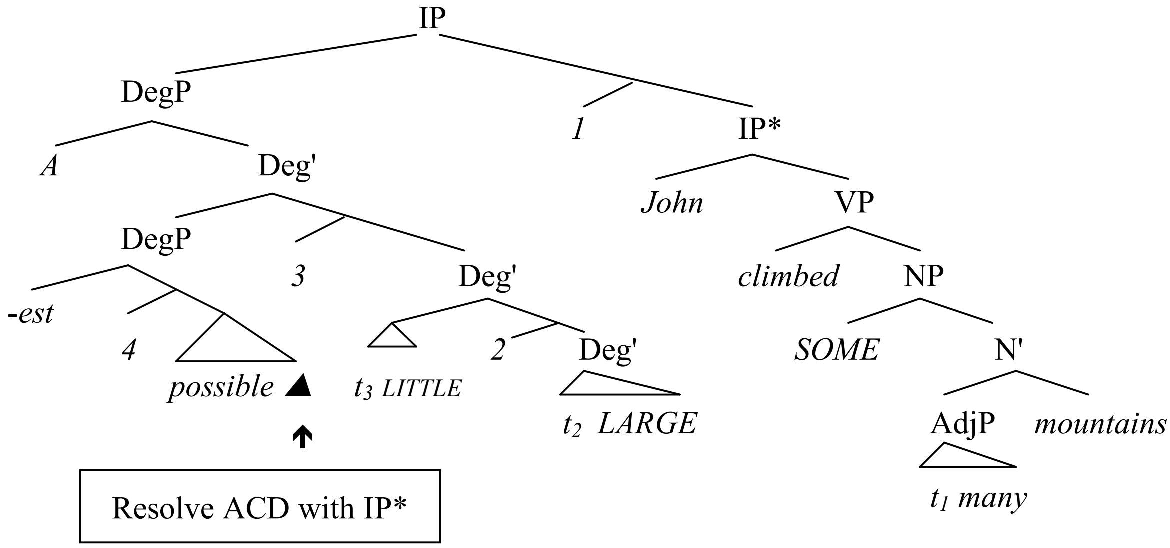
(61) Paraphrase of (60e):
"Out of the amounts such that it is possible for John to climb that amount of mountains, take the largest one. John climbed mountains in that amount."

But what would happen if we applied this analysis to a negative gradable adjective, e.g. *few* in (62)?

(62) John climbed the fewest possible mountains.

We have seen that *most* is underlyingly *many* + *-est*. *Fewest* is analyzed as LITTLE + *many* + *-est* (Hackl 2009). The question is, what the scope of LITTLE should be in the LF tree. In this attempt, we will locate LITTLE as scoping just above the predicated *LARGE*, as depicted in (63). The LF representation after ellipsis resolution is (64). The semantic derivation is sketched in (65):

(63) John climbed the fewest possible mountains.



(64) LF: [[A [-est 4 possible < John climbed SOME t_4-many mountains >] 3[[t_3 LITTLE] 2 t_2-LARGE]] 1 John climbed SOME t_1-many mountains]

(65) a. ⟦*1 John climbed SOME t_1-many mountains*⟧
$= \lambda n.\ \exists x\ [\text{mounts}(x)\ \&\ |x| \geq n\ \&\ \text{climb}(j,x)]$

b. ⟦*4 possible <John climbed SOME t_4-many mountains>*⟧
$= \lambda n'.\ \Diamond\exists y\ [\text{mounts}(y)\ \&\ |y| \geq n'\ \&\ \text{climb}(j,y)]$

c. ⟦*2 t_2-LARGE*⟧ $= \lambda d_d.\lambda n_e.\ \text{large}(n,d)$

d. ⟦*LITTLE*⟧ $= \lambda d.\lambda P_{<d,et>}.\lambda n.\neg P(d)(n)$

e. ⟦*3 [[t_3 LITTLE] 2 t_2-LARGE]*⟧ $= \lambda d.\lambda n.\ \neg\text{large}(n,d)$

f. ⟦*-est [4 possible <John climbed SOME t_4-many mountains>] 3[[t_3 LITTLE] 2 t_2-LARGE]*⟧
$= \lambda n.\ \exists d\ [\neg\text{large}(n,d)\ \&\ \forall n'\ [\ (n' \neq n\ \&\ \Diamond\exists y[\text{mounts}(y)\ \&\ |y| \geq n'\ \&\ \text{climb}(j,y)]) \rightarrow \text{large}(n,d)\ ]\ ]$

e. $[\![(64)]\!] = 1$ iff $\exists n\ [\ \exists x\ [mounts(x)\ \&\ |x| \geq n\ \&\ climb(j,x)]\ \&\ \exists d\ [\neg large(n,d)\ \&$
$\forall n'\ [\ (n' \neq n\ \&\ \Diamond \exists y[mounts(y)\ \&\ |y| \geq n'\ \&\ climb(j,y)]) \rightarrow large(n,d)\ ]\ ]\ ]$

The truth conditions in (65e) are decidedly too weak. Regardless of what the minimum amount of mountains required is, as long as John climbed at least one mountain, the formula is true. This is so because the predication introduced by *many* – as we saw for gradable predicates in general – is downward monotonic: if $|x| \geq 7$, then it is also true that $|x| \geq 6$, that $|x| \geq 5$, that $|x| \geq 4$, etc. To see the impact of this in the present truth conditions, consider a scenario where the rules of the contest set a minimum amount of mountains to be climbed, e.g. 3, and a maximum amount, e.g. 7. Assume, furthermore, that John happened to climb exactly 5 mountains. Sentence (62) is intuitively false in this scenario. However, the truth conditions generated in (65) are satisfied. The comparison class (65b) – the class of amounts n' such that it is permitted to climb a sum of mountains y such that $|y| \geq n'$ – is the set $\{n' : 1 \leq n' \leq 7\}$ (since there is an allowed world where he climbs e.g. the mountain sum A+B+C, and $|A+B+C| \geq 1$). From this class, the superlative selects the smallest amount, that is, 1. The formula in (65e) is true as long as John happened to climb some mountain(-sum) x such that $|x| \geq 1$.

The reader may wonder what would happen if we suspended the assumption that *many* is downward monotonic in this example. Could we appeal to a pragmatically enriched meaning where *many* relates its individual argument x only to its exact cardinality n, as in $|x|=n$? This move would gives us the truth conditions in (66) below, paraphrased in (67):

(66) $[\![(64)]\!] = 1$ iff $\exists n\ [\ \exists x\ [mounts(x)\ \&\ |x|=n\ \&\ climb(j,x)]\ \&\ \exists d\ [\neg large(n,d)\ \&$
$\forall n'\ [\ (n' \neq n\ \&\ \Diamond \exists y[mounts(y)\ \&\ |y|=n'\ \&\ climb(j,y)]) \rightarrow large(n,d)\ ]\ ]\ ]$

(67) Paraphrase of (66):
"Out of the amounts n' such that it is possible for John to climb that amount of mountains, there is a mountain-sum that John climbed whose cardinality equals the smallest of those amounts."

Unfortunately, these modified truth conditions are still too weak. Consider again the scenario described above, where the minimum requirement is 3 mountains, the maximum is 7 and John happens to climb exactly 5 mountains. We saw that sentence (62) is judged intuitively false in this scenario, since John climbed more than the minimum. But the truth conditions in (66) predict it to be true, due to distributivity: if John climbed the mountain sum A+B+C+D+E, he certainly climbed the mountain (sub-)sum A+B+C. Hence, there exists a mountain-sum (A+B+C) of cardinality 3 climbed by John, that is, a mountain-sum climbed by John whose cardinality equals the minimum required.[21,22]

3.3. Relocating *LITTLE*

To avoid these riddles, the next and final attempt changes the location of *LITTLE*. The treatment of the positive version with *most* remains the same, as in (68). But the case with *fewest* is revised. In attempt 2, we assumed that *LITTLE* modifies the LF predicate *LARGE*, rendering the paraphrase in (69a). In attempt 3, we will treat *LITTLE* as a modifier of *many*, as the paraphrase in (69b) suggests:

(68) John climbed the most possible mountains.

a. Attempt 2 / 3: "John climbed mountains in the largest amount out of the amounts allowed".

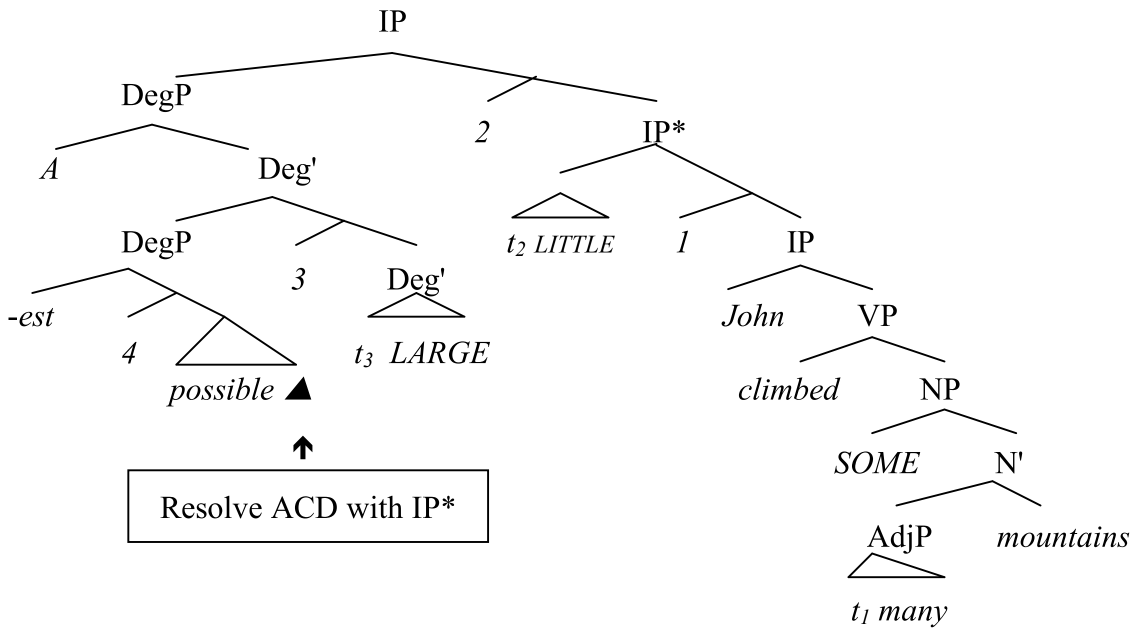
(69) John climbed the fewest possible mountains.

a. Attempt 2: "John climbed mountains in the <u>small</u>est amount out of the amounts allowed".

b. Attempt 3: "John climbed mountains in the largest <u>lack</u>-of-amount out of the lacks-of-amount allowed".

With this modification, we let *LITTLE* scope over the matrix IP spine, crucially out of the host NP *[SOME t_1-many mountains]*. This gives us the tree in (70):

(70) John climbed the fewest possible mountains.



Once ellipsis is resolved, we obtain the LF representation in (71). The semantic computation is sketched in (72):

(71) LF: [[A [-est 4 possible < [t_4 LITTLE] 5 John climbed SOME t_5-many mountains >] 3 t_3-LARGE] [2 [t_2 LITTLE] 1 John climbed SOME t_1-many mountains]]

(72) a. ⟦*1 John climbed SOME t_1-many mountains*⟧
= $\lambda n.\ \exists x\ [\text{mounts}(x)\ \&\ |x| \geq n\ \&\ \text{climb}(j,x)]$

b. ⟦*LITTLE*⟧ = $\lambda n.\lambda P_{<e,t>}.\neg P(n)$

c. ⟦*2 [[t_2 LITTLE] 1 John climbed SOME t_1-many mountains]*⟧
= $\lambda n.\ \neg\exists x\ [\text{mounts}(x)\ \&\ |x| \geq n\ \&\ \text{climb}(j,x)]$

d. ⟦*4 possible <[t_4 LITTLE] 5 John climbed SOME t_5-many mountains>*⟧
= $\lambda n'.\ \Diamond\neg\exists y\ [\text{mounts}(y)\ \&\ |y| \geq n'\ \&\ \text{climb}(j,y)]$

c. ⟦*3 t_3-LARGE*⟧ = $\lambda d.\lambda n.\ \text{large}(n,d)$

d. ⟦*-est [4 possible <[t_4 LITTLE] 5 John climbed SOME t_5-many mountains>] 2 t_2-LARGE*⟧
= $\lambda n.\ \exists d\ [\text{large}(n,d)\ \&\ \forall n'\ [\ (n' \neq n\ \&\ \Diamond\neg\exists y[\text{mounts}(y)\ \&\ |y| \geq n'\ \&\ \text{climb}(j,y)]) \rightarrow \neg\text{large}(n,d)\ ]\ ]$

e. $[\![(71)]\!] = 1$ iff $\exists n$ [$\neg\exists x$ [mounts(x) & $|x| \geq n$ & climb(j,x)] & $\exists d$ [large(n,d) & $\forall n'$ [(n'$\neq$n & $\Diamond\neg\exists y$[mounts(y) & $|y| \geq n'$ & climb(j,y)]) $\rightarrow$ $\neg$large(n,d)]]]

(73) Paraphrase of (72e):
"Out of the amounts n' such that it is permitted to fail to climb n'-many mountains, take the *largest* one. John failed to climb mountains in that amount."

To see what (72e)/(73) commits us to, consider a scenario where the rules of the contest just set a minimum amount of mountains to be climbed, let us say 10. The comparison class – the set of amounts n' such that it is permitted to fail to climb n'-many mountains – is thus {n': 10 < n'}. Then we have to select the largest amount in that set. But this is not possible, since the set goes up to infinitum, i.e., it is unbounded on the upper side. This means that, regardless of how many mountains John climbed in actuality, the sentence is predicted to yield a presupposition failure in this scenario. This is contrary to intuitions.

What we would need in order to derive the correct truth conditions for examples with *fewest* is to select not the largest amount in the comparison class, but the *smallest*. In other words, we would need the truth conditions in (74) and the correponding paraphrase in (75). This would give us the modal superlative reading "John climbed as few mountains as possible".

(74) $[\![(70)]\!] = 1$ iff $\exists n$ [$\neg\exists x$ [mounts(x) & $|x| \geq n$ & climb(j,x)] & $\exists d$ [$\neg$large(n,d) & $\forall n'$ [(n'$\neq$n & $\Diamond\neg\exists y$[mounts(y) & $|y| \geq n'$ & climb(j,y)]) $\rightarrow$ large(n,d)]]]

(75) Paraphrase of (74):
"Out of the amounts n' such that it is permitted to fail to climb n'-many mountains, take the *smallest* one. John failed to climb mountains in that amount."

Could we justify this change and thus derive the desired truth conditions? I do not see a way to successfully implement this move while preserving the correct results for other degree constructions in general and for other modal superlative examples in particular. Here I will briefly sketch two avenues, both unsatisfactory.

A first try would be to assume that, in the modal superlative examples, *fewest* actually involves two occurrences of *LITTLE*. Note that, in the desired paraphrase (75), there are semantically two negations: one corresponding to "fail" and one corresponding to "small", i.e., "LITTLE/not large". Then, one occurrence of *LITTLE* would scope over the matrix IP spine, as in the current attempt 3, and give us the predication with "fail" in the semantic paraphrase. The other occurrence would negate *LARGE*, as in attempt 2, and give us the predicate "small" in the semantic paraphrase. However, under this approach, it would be completely obscure why negative predicates involve one instance of *LITTLE* in other degree constructions (e.g. in *less* comparatives in §2.2) but two in modal superlative cases.

A second try would be to have, instead of the covert predicate *LARGE*, something vague, a predicate that sometimes compares the amounts in the comparison class in terms of their largeness, as in (60e)-(61), and sometimes in terms of their smallness, as in (74)-(75). The problem here is that it is totally unclear what would ensure that the correct property is chosen. In the case of (70) with *fewest*, we could perhaps justify the right choice in the following way. Resolving the vague predicate to the property "large" automatically yields a presupposition failure, whereas resolving it to the property "small" does not. Since speakers are cooperative, they try to avoid presupposition failures in production and comprehension. Hence, resolution to "large" will be dismissed in favor of resolution to "small". But now consider example (58) with *most*. Here we would also have a vague predicate to be resolved to the property "large" or to the property "small". If we chose "large", the correct truth conditions are derived. But, as the reader can check for herself, if we choose "small", we end up with the problematic weak truth conditions in (66)-(67) that we discussed in §3.2. This is certainly not a possible reading of the sentence *John climbed the most possible mountains*.

To recapitulate, the modal superlative reading intuitively involves an amount reading where possible degrees or amounts (of height, of cardinality, etc.) are being compared. Since we are using the 3-place lexical entry for *-est*, repeated below, we need to set up: (i) a comparison class of degrees or amounts (for the $\lambda Y_{<e,t>}$ slot); (ii) the "winning" degree or amount (for the λx_e slot); and (iii) a property to measure the competing degrees or amounts of type e using degrees of type d (for the $\lambda P_{<d,et>}$ slot). Basically, the 3-place lexical entry forces us to artificially use degrees in two different ways (as the measured objects and as the measuring units) and to come up with a covert measuring predicate in the syntactic tree whose varying content causes problems.

(76) 3-place lexical entry: (=(19))
$[\![\text{-}est]\!] = \lambda Y_{<e,t>}.\lambda P_{<d,et>}.\lambda x_e.\ \exists d\ [P(d)(x)\ \&\ \forall y{\in}Y\ [y{\neq}x \rightarrow \neg(P(d)(y))]]$

As we will see in §4, the need to use degrees or amounts in two different ways and to insert a covert syntactic predicate disappears if we use 2-place *-est*.

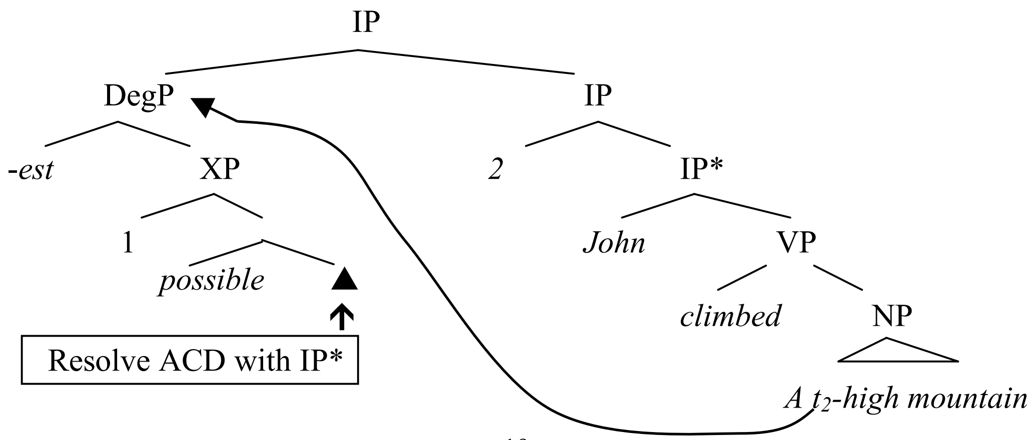
4. ROMERO'S ANALYSIS USING THE 2-PLACE LEXICAL ENTRY *-EST*

Romero (2011), who develops in detail the analysis sketched in Romero (to appear), derives the modal superlative reading using Heim's (1999) 2-place *-est* in (77). She takes *[1 possible ▲$_{ACD}$]* to overtly express the comparison class argument of *–est*, thus directly filling up its $\lambda\mathbf{Q}_{<dt,t>}$ slot.

(77) 2-place lexical entry: (=(20))
$[\![\text{-}est]\!] = \lambda\mathbf{Q}_{<dt,t>}.\lambda P_{<d,t>}.\ \exists d\ [\ P(d)\ \&\ \forall Q{\in}\mathbf{Q}\ [Q{\neq}P \rightarrow \neg Q(d)]\ ]$

Let us begin with the simple example (78) first. The LF she proposes is below. The Degree Phrase consists of *-est* plus its comparison class complement *[1 possible ▲$_{ACD}$]*, which, following Larson (2000), is a reduced relative clause (*1 possible for him to climb a t_1-high mountain*) with antecedent-contained IP-deletion (*1 possible* ▲). DegP moves out of the host NP to gain sentential scope, as in the relative LF in §2.3.2. Finally, the ACD gap is resolved. This gives us the LF structure (79), which is fed to semantic interpretation.

(78) John climbed the highest possible mountain.



(79) LF: [-est [1 possible <John climb A t_1-high mountain>]] [2 John climbed A t_2-high mountain]

The semantic computation is spelled out in (81). Recall that, for comparative constructions, we sometimes needed the type-shifter $\text{SHIFT}^{\leq}_{d\rightarrow<d,t>}$ (25) turning a degree point into the set of degrees lower or equal to it. Parallel to that shifter, a shifter $\text{SHIFT}^{\leq}_{<d,t>\rightarrow<dt,t>}$ is defined in (80) turning a *set* of degree points into the *set* of corresponding lower-or-equal degree sets. The final truth conditions of the sentence are given in (81g).

(80) $\text{SHIFT}^{\leq}_{<d,t>\rightarrow<dt,t>} = \quad \lambda D_{<d,t>}.\lambda D'_{<d,t>}.\ \exists d'\ [D(d')\ \&\ D'=\lambda d''.d''\leq d']$

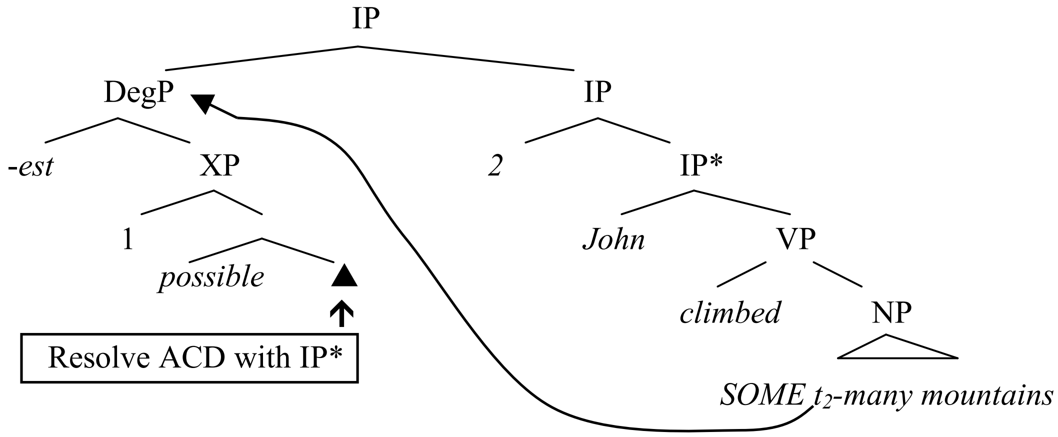
(81) a. ⟦*2 John climbed A t_2-high mountain*⟧ =
$\lambda d.\ \exists x\ [\text{mount}(x)\ \&\ \text{climb}(j,x)\ \&\ \text{high}(x,d)]$
b. ⟦<*John climbed A t_1-high mountain*>⟧ =1 iff
$\exists x\ [\text{mount}(x)\ \&\ \text{climb}(j,x)\ \&\ \text{high}(x,g(1))]$
c. ⟦*possible* <*John climbed A t_1-high mountain*>⟧ =1 iff
$\Diamond\exists x\ [\text{mount}(x)\ \&\ \text{climb}(j,x)\ \&\ \text{high}(x,g(1))]$
d. ⟦*1 possible* <*John climbed A t_1-high mountain*>⟧ =
$\lambda d.\ \Diamond\exists x\ [\text{mount}(x)\ \&\ \text{climb}(j,x)\ \&\ \text{high}(x,d)]$
e. $\text{SHIFT}^{\leq}_{<d,t>\rightarrow<dt,t>} = \quad \lambda D_{<d,t>}.\lambda D'_{<d,t>}.\ \exists d'\ [D(d')\ \&\ D'=\lambda d''.d''\leq d']$
f. $\text{SHIFT}^{\leq}_{<d,t>\rightarrow<dt,t>}$ (⟦*1 possible* <*John climbed A t_1-high mountain*>⟧) =
$\lambda D'_{<d,t>}.\ \exists d'\ [\ \Diamond\exists x[\text{mount}(x)\ \&\ \text{climb}(j,x)\ \&\ \text{high}(x,d')]\ \&\ D'=\lambda d''.d''\leq d'\ ]$
g. ⟦(80)⟧ = 1 iff
$\exists d\ [\ \exists x[\text{mount}(x)\ \&\ \text{climb}(j,x)\ \&\ \text{high}(x,d)]\ \&$
$\forall D'\ [\ (\exists d'\ [\Diamond\exists x[\text{mount}(x)\ \&\ \text{climb}(j,x)\ \&\ \text{high}(x,d')]\ \&\ D'=\lambda d''.d''\leq d'$
$\&\ D' \neq \lambda d'''.\exists x\ [\text{mount}(x)\ \&\ \text{climb}(j,x)\ \&\ \text{high}(x,d''')])\rightarrow \neg D'(d)]\ ]$

To show more intuitively what the computation says, Romero (2011) considers a scenario where John is allowed to climb mountains that are 3000m high or less, but no higher than that. The set of allowed degree sets will be $\{\lambda d''.d''\leq 1m, \lambda d''.d''\leq 2m, ..., \lambda d''.d''\leq 1000m, ..., \lambda d''.d''\leq 2000m, ..., \lambda d''.d''\leq 3000m\}$. This is the comparison class in (81f). Now consider the set corresponding to the maximal mountain-height that John climbed in the actual world. This is John's actual set in (81a). The sentence asserts that John's actual set contains a degree point that no other set in the comparison class contains. Hence, John climbed as high a mountain as possible (or allowed).[23]

Romero (2011) further shows how complex examples with *most* and *fewest* can be treated in a parallel way. Let us see each case in turn.

In example (82) with *most*, after the DegP moves out of the host NP to the top of the clause and ACD is resolved, we have the LF (83) and the abridged semantic derivation in (84).

(82) John climbed the most possible mountains.



(83) LF: [-est [1 possible <John climbed t_1-many mountains>]] [2 John climbed t_2-many mountains]

(84) a. $[\![$*2 John climbed t_2-many mountains*$]\!] = \lambda d.\ \exists x\, [\text{mount}(x)\ \&\ \text{climb}(j,x)\ \&\ |x| \geq d]$

b. $[\![$*1 possible <John climbed t_1-many mountains>*$]\!] =$

$= \lambda d. \Diamond \exists x[\text{mount}(x)\ \&\ \text{climb}(j,x)\ \&\ |x| \geq d]$

c. $\text{SHIFT}^{*}_{<d,t> \to <dt,t>} = \lambda D_{<d,t>}.\lambda D'_{<d,t>}.\ \exists d'\, [D(d')\ \&\ D' = \lambda d''.d'' \leq d']$ (=(81e))

d. $\text{SHIFT}^{*}_{<d,t> \to <dt,t>}([\![$*1 possible <John climbed t_1-many mountains>*$]\!]) =$

$\lambda D'_{<d,t>}.\ \exists d'\, [\ \Diamond \exists x[\text{mount}(x)\ \&\ \text{climb}(j,x)\ \&\ |x| \geq d']\ \&\ D' = \lambda d''.d'' \leq d'\ ]$

e. $[\![(83)]\!] = 1$ iff

$\exists d\, [\ \exists x\, [\text{mount}(x)\ \&\ \text{climb}(j,x)\ \&\ |x| \geq d]\ \&$

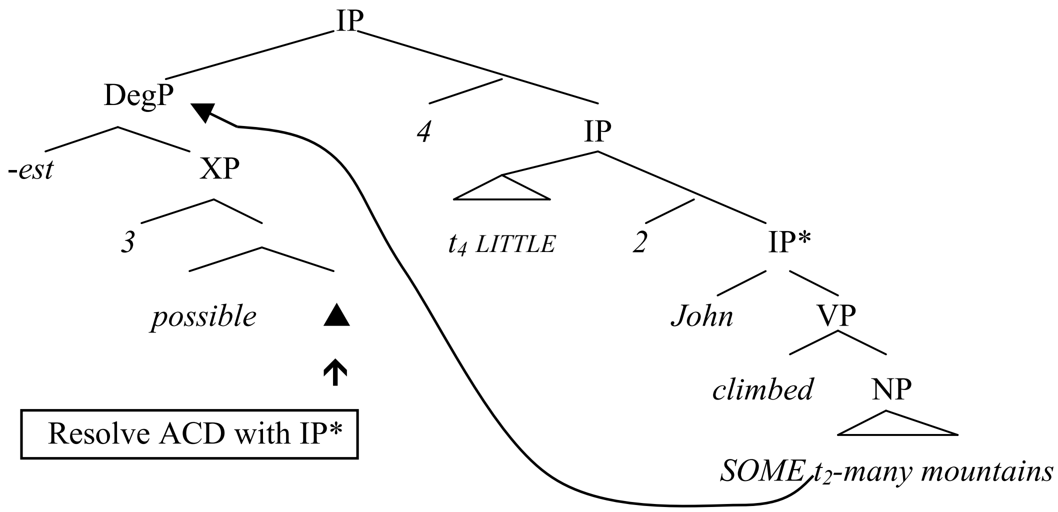
$\forall D'\, [\ (\exists d'\, [\Diamond \exists x[\text{mount}(x)\ \&\ \text{climb}(j,x)\ \&\ |x| \geq d']\ \&\ D' = \lambda d''.d'' \leq d']\ \&$

$D' \neq \lambda d.\exists x\, [\text{mount}(x)\ \&\ \text{climb}(j,x)\ \&\ |x| \geq d]) \rightarrow \neg D'(d)\ ]\ ]$

The result is that the sentence asserts that the set of mountain-amounts (84a) that John actually climbed contains a degree that no other allowed set in the comparison class (84d) contains. Hence, John climbed as many mountains as possible (/as he was allowed to).

For example (85) with *fewest*, we add *LITTLE* and give it sentential scope. Once the ellipsis is resolved, we obtain the LF in (86):

(85) John climbed the fewest possible mountains.



(86) [-est [3 possible <[t_3 LITTLE] 1 John climbed t_1-many mountains>]] [4 [t_4 LITTLE] 2 John climbed t_2-many mountains]

The semantic computation is given under (88). Recall that, for *less* comparatives, we sometimes needed the shifting operation (31) turning a degree into the set of degrees higher or equal to it. We define its sister operation for superlatives in (87): we map a *set* of degrees into the *set* of the corresponding higher-or-equal degree sets. The rest of the computation proceeds as before. As a result, the sentence asserts that John's actual set of unclimbed mountain-amounts contains a degree that no other allowed set of unclimbed mountain-amounts in the comparison class contains. Hence, the total amount of mountains John climbed is as low as possible/permitted. That is, John climbed as few mountains as possible.

(87) $\text{SHIFT}^{\geq}_{<d,t>\rightarrow<dt,t>} = \lambda D_{<d,t>}.\lambda D'_{<d,t>}.\ \exists d'\ [D(d')\ \&\ D'=\lambda d''.d''\geq d']$

(88) a. $[\![\textit{LITTLE}]\!] = \lambda d_d.\lambda P_{<d,et>}.\neg P(d)$

b. $[\![\textit{2 John climbed } t_2\textit{-many mountains}]\!] = \lambda d.\ \exists x[\text{mount}(x)\ \&\ \text{climb}(j,x)\ \&\ |x|\geq d]$

c. $[\![\textit{4 [}t_4\textit{ LITTLE] 2 John climbed } t_2\textit{-many mountains}]\!] =$
$\lambda d.\neg\exists x[\text{mount}(x)\ \&\ \text{climb}(j,x)\ \&\ |x|\geq d]$

d. $[\![\textit{3 possible <[}t_3\textit{ LITTLE] 1 John climbed } t_1\textit{-many mountains>}]\!] =$
$\lambda d'.\Diamond\neg\exists x[\text{mount}(x)\ \&\ \text{climb}(j,x)\ \&\ |x|\geq d']$

e. $\text{SHIFT}^{\geq}_{<d,t>\rightarrow<dt,t>} = \lambda D_{<d,t>}.\lambda D'_{<d,t>}.\ \exists d'\ [D(d')\ \&\ D'=\lambda d''.d''\geq d']$

f. $\text{SHIFT}^{\geq}_{<d,t>\rightarrow<dt,t>}$ ($[\![\textit{3 possible <[}t_3\textit{ LITTLE] 1 John climbed } t_1\textit{-many mountains>}]\!]$) =
$\lambda D'_{<d,t>}.\ \exists d'\ [\ \Diamond\neg\exists x[\text{mount}(x)\ \&\ \text{climb}(j,x)\ \&\ |x|\geq d']\ \&\ D'=\lambda d''.d''\geq d'\ ]$

g. $[\![(86)]\!] = 1$ iff
$\exists d\ [\neg\exists x\ [\text{mount}(x)\ \&\ \text{climb}(j,x)\ \&\ |x|\geq d]\ \&$
$\forall D'\ [\ (\exists d'[\Diamond\neg\exists x[\text{mount}(x)\ \&\ \text{climb}(j,x)\ \&\ |x|\geq d']\ \&\ D'=\lambda d''.d''\geq d']$
$\&\ D'\neq\lambda d.\neg\exists x\ [\text{mount}(x)\ \&\ \text{climb}(j,x)\ \&\ |x|\geq d])\rightarrow\neg D'(d)\ ]\ ]$

Before concluding this section, an important question remains to be addressed. A key ingredient of the analysis is the shifting operations (80) and (87). These are just the shifting operations motivated for comparatives (see §2.1 and §2.2) adapted now to superlative constructions. But, both for comparative and for superlative constructions, the question arises, what guarantees the choice of the right shifter – $\text{SHIFT}^{\leq}$ vs. $\text{SHIFT}^{\geq}$ – in the appropriate configuration. Within the current framework, the intuitive answer is this: The correct choice is secured by whatever principle prohibits comparison between cross-polar degree sets in sentences like (89). Sentence (89) asks us to compare an upper-bound set of degrees (namely, $\lambda d'.\text{tall}(\text{carmen},d')$) with a lower-bound set of degrees (namely, $\lambda d'.\neg\text{tall}(\text{alice},d')$), which renders the sentence odd. This idea can be implemented by adding a presupposition to the lexical entries of 2-place *–er* and 2-place *–est* to ensure that the degree sets to be compared are all bound in the same direction. A way to achieve this effect is formulated in (90) and (91):[24]

(89) ? Alice is shorter than Carmen is tall. (Kennedy 2001)

(90) $[\![\textit{-er}_{\text{2-place}}]\!] = \lambda Q_{<d,t>}.\lambda P_{<d,t>}: Q\subseteq P \vee Q\supseteq P.\ \exists d\ [P(d)\ \&\ \neg(Q(d))]$

(91) $[\![\text{-}est_{2\text{-place}}]\!] = \lambda\mathbf{Q}_{<dt,t>}.\lambda P_{<d,t>}: \forall Q\in\mathbf{Q}[Q\subseteq P \vee Q\supseteq P].\ \exists d\ [\ P(d)\ \&\ \forall Q\in\mathbf{Q}\ [Q\neq P\rightarrow \neg(Q(d))]\ ]$

In sum, using Heim's 2-place lexical entry for *-est*, one can derive the modal superlative reading "as X as possible" in simple examples like (78), as well as in complex examples involving *many*, like (82) and (85).

5. CONCLUSIONS

We have seen that superlative sentences with certain modal adjectives give rise to the so-called modal superlative reading, exemplified with the core examples in (92)-(94). The present paper has investigated whether this reading can be derived using the 3-place lexical entry for *-est*. We have seen that otherwise unmotivated covert syntactic material would need to be posited, and that, even with this material, some complex examples are assigned incorrect truth conditions. In contrast, the 2-place lexical entry for *–est* can derive the correct truth conditions for all the cases at hand, as shown in Romero (2011, to appear).

(92) John climbed the highest possible mountain.
a. Modal superlative reading: "John climbed as high a mountain as possible".

(93) John climbed the most possible mountains.
a. Modal superlative reading: "John climbed as many mountains as possible".

(94) John climbed the fewest possible mountains.
a. Modal superlative reading: "John climbed as few mountains as possible".

In the bigger picture, this brings superlative and comparative morphemes closer. As we saw in §2, two lexical entries for comparative *-er* have been recently motivated using crosslinguistic data: 3-place *-er* and 2-place *–er* in (95)-(96). As for superlatives, the 3-place lexical entry for *-est* in (97) has been argued for on the basis of examples with an explicit comparison class argument of type <e,t>. The question remained, whether we needed the 2-place lexical entry for *–est* in (98) as well. The present paper has argued that we need 2-place *-est* in the grammar.

(95) $[\![\text{-}er_{3\text{-place}}]\!] = \lambda x_e.\lambda P_{<d,et>}.\lambda y_e.\ \exists d\ [P(d)(y)\ \&\ \neg(P(d)(x))]$ (=(15))

(96) $[\![\text{-}er_{2\text{-place}}]\!] = \lambda Q_{<d,t>}.\lambda P_{<d,t>}.\ \exists d\ [P(d)\ \&\ \neg(Q(d))]$ (=(16))

(97) $[\![\text{-}est_{3\text{-place}}]\!] = \lambda Y_{<e,t>}.\lambda P_{<d,et>}.\lambda x_e.\ \exists d\ [\ P(d)(x)\ \&\ \forall y\in Y[y\neq x\rightarrow \neg(P(d)(y))]\ ]$ (=(19))

(98) $[\![\text{-}est_{2\text{-place}}]\!] = \lambda\mathbf{Q}_{<dt,t>}.\lambda P_{<d,t>}.\ \exists d\ [\ P(d)\ \&\ \forall Q\in\mathbf{Q}\ [Q\neq P\rightarrow \neg(Q(d))]$ (=(20))

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* I would like to thank Lisa Bylinina, Irene Heim and, very specially, Barbara H. Partee for their generous comments and fruitful discussion. Many thanks to the audiences of the Goethe University of Frankfurt am Main (Graduirtenkolleg, 2009), Journées Sémantique et Modélisation 2009, SWIGG 2009, NELS 41 and the 6th International Symposium of Cognition, Logic and Communication. All remaining errors are mine.

[1] The attentive reader may have noticed a subtle difference between the simple superlative sentences used so far: (9) and (10) require focus stress on the subject *John* while (1) and (5) do not, and the resulting paraphrases differ. (In fact, (5) also has a paraphrase parallel to (9)-(10) when the subject is focused, as in (i) below.) As we will see below (§2.3), even *simple* superlative sentences give rise to different readings, known as absolute and relative. For the time being, what is important is that, besides the reading(s) shared with the corresponding simple superlative sentence, modal modification adds the indicated modal superlative reading.

(i) BOB met the tallest player.

a. "Bob met a taller player than anybody else (relevant) did."

[2] Barbara H. Partee (p.c.) points out to me that (11)-(12) seem slightly odd on the modal superlative reading and that the postnominal versions are preferred. I do not have an explanation for this preference. Although the alternative analyses to be discussed in this paper will be illustrated for the prenominal versions, they are aimed at the postnominal versions as well, modulo overt syntactic movement of the *possible* phrase.

[3] We are mostly interested in the part of the modal superlative reading corresponding to the paraphrase "as X as possible". The following two further aspects will not be addressed. First, we leave open whether the correct paraphrase corresponds to the structure *[possible for PRO_{ARB} to buy]*, with a generic *PRO_{ARB}*, or to the structure *[possible for him_i to buy]*, with a pronoun coindexed with the matrix subject. A possible way to distinguish between the two, suggested to me by Barbara H. Partee (p.c.), is the following. If the implicit restrictor in (i) corresponds to a generic *PRO_{ARB}*, then the host and I must have talked to the same number of guests. But, if the implicit restrictor in (i) corresponds to a coindexed pronoun, a sloppy reading where the host and I talked to a different number of guests should be available (since it is likely that the host's minimum is higher).

(i) I talked to the fewest possible guests, and so did the host.

My judgement is that a sloppy reading is available in (i), arguing that the coindexed pronoun reading is at least possible. See Larson (2000:§3.4) for an argument that the generic *PRO_{ARB}* interpretation is not possible (though he aknowledges that judgements are subtle). See also footnote 20 below.

Second, we will not investigate the range and distribution of potential modal bases for the modal adjectives. Though metaphysical possibility is often conveyed, deontic possibility also seems to be available in some examples (understanding *possible* as "allowed", e.g. in (11b), (12b), (13) and (14)). We will simply choose one modal base when illustrating alternative analyses.

[4] Thanks to Irene Heim (p.c.) for pointing out the relevance of the comparative data.

[5] See discussion in § 2.3 and §2.4.

[6] The framework assumed in this paper treats degrees as points on a scale (von Stechow 1984, among many others), derives certain readings from different scoping possibilities at LF (Heim 1985, 1999), and decomposes negative adjectives like *short* as “not tall” (Heim 2006). Alternative views exist that treat degrees as intervals (e.g. Schwarzschild and Wilkinson 2002), that derive certain readings in situ (Sharvit and Stateva 2002) and that analyze antonyms as involving two different sorts of degrees (e.g. Kennedy 2001). The analysis of the modal superlative reading in these alternative frameworks is beyond the scope of this paper.

[7] This type conversion is sometimes carried out by an overt element and sometimes by a covert element or a type-shifter. Cases with an overt element are e.g. *niż* 'than' in Polish *niż*-comparatives (Pancheva 2006) and *de* 'of' in Spanish (24). Cases with a covert element are e.g. Russian *čem* 'wh-' comparatives and Polish *jak* 'wh-' comparatives (Pancheva 2006).

[8] Romero (2011) raises the possibility of integrating the two operations $\mathrm{SHIFT}^{\leq}_{d\rightarrow<d,t>}$ in (25) and $\mathrm{SHIFT}^{\geq}_{d\rightarrow<d,t>}$ in (31) into one single $\mathrm{SHIFT}_{d\rightarrow<d,t>}$ based on informativity, but leaves it open for future research.

[9] Focus seems to be necessary for the relative reading to arise. In discussing the two relative readings of (i), Heim (1985) notes that "apparently, the correlate is always marked by focus, so that the sentence is actually never ambiguous in spoken language" (p. 20). Szabolsci (1986) notes that in Hungarian, where focused phrases not only receive pitch accent but are also moved to preverbal position, focus accent and movement are a necessary condition for the relative reading (p. 246ff). She also discusses English, with no focus movement and where the pitch accent may not always be salient, and argues for the same conclusion (pp. 4ff).

(i) Of these three men, John hates Bill the most.

[10] Both alternatives assume that *the* is semantically vacuous, with an abstract THE or A / SOME instead.

[11] The semantic derivation in (37) also allows for the relative reading. See Heim (1999), Sharvit and Stateva (2002) and Büring (2007) among others for extensive discussion.

[12] In fact, in Szabolsci's analysis, what is crucial for the relative reading is that the term to be compared undergoes movement, because it is in focus or because it is a *wh*-word. This will subsume the examples (45) below with a relative pronoun, but not example (46) with *PRO*.

[13] The recursive definition of focus semantic value $[\![.]\!]^f$ based on the ordinary semantic value $[\![.]\!]^o$ is spelled out in (i) (Rooth 1985):

(i) Focus semantic value $[\![.]\!]^f$:

a. If α is a terminal node, then $[\![\alpha]\!]^f = \{[\![\alpha]\!]^o\}$.

b. If α is a non-branching node with single daughter β, then $[\![\alpha]\!]^f = [\![\beta]\!]^f$.

c. If α is a branching node with daughters β and F (Focus feature), then $[\![\alpha]\!]^f = D_\sigma$, where σ is the type of $[\![\beta]\!]^o$.

d. If α is a branching node with daughters β and γ (order irrelevant), and there are types σ and τ such that $[\![\beta]\!]^o \in D_{<\sigma,\tau>}$ and $[\![\gamma]\!]^o \in D_\sigma$, then $[\![\alpha]\!]^f = \{ x \in D_\tau : \exists y \exists z [y \in [\![\beta]\!]^f \ \& \ z \in [\![\gamma]\!]^f \ \& \ x = y(z)] \}$

[14] Heim (1999) does not spell out absolute LFs with 2-place *-est*. (47a) is Romero's (to appear) implementation of her ideas. The required trace t_2 could be obtained by positing an N'-internal *PRO* that moves and then deletes (see Heim and Kratzer 1998 on *PRO*, von Stechow (to appear) on a similar use of *PRO* for tense).

[15] The trees in attempts 1-3 retain the idea from Romero (to appear) that *[possible ▲]* is the explicit complement of *-est*. But the same results would obtain in attempts 2 and 3 if *-est* took a contextual variable C as its complement while *[possible ▲]* was the sister of *[$_{Deg'}$ t LARGE]* to the right.

[16] In the LF trees in §3 and §4, the direct object *[SOME X-est possible mountains]* is left in situ for perspicuity, rather than QRed.

[17] For the sake of the argument, let us assume that the ellipsis in *[possible ▲]* can be resolved so that something like (54a) obtains.

[18] Note that attempt 1 also fails for simple examples like (i). The type of structure in attempt 1 would derive the reading "John climbed the highest of the mountains which he was (de re) allowed to climb" (mountains as de re), rather than the modal superlative reading "John climbed as high a mountain as he was allowed to" (mountains as de dicto, amounts of mountains as de re).

(i) John climbed the highest possible mountain.

[19] For readability, I will treat amounts as a particular sort of individuals (type e), keeping the types $C_{<e,t>}$, $P_{<d,et>}$ and x_e as they are in the lexical entry (52) and using the variables n, n' to range over indivuals of the sort amount. This is not crucial for the analysis. One could have taken amounts to be of type d, and then rewrite (52) with the types $C_{<d,t>}$, $P_{<d,dt>}$ and x_d.

[20] The LFs with the ellipsis site resolved to the matrix IP* as it is correspond to the paraphrase "... as it was possible for *him* to climb". If we wanted to generate the paraphrase "...as it was possible for *one* to climb", we would have to allow for 'vehicle change' between a proper name and *PRO*, in the sense of Fiengo and May (1994). Note that instances of vehicle change between proper names and other empty categories – e.g. a trace – are attested, as exemplified in (i):

(i) John kissed Mary, but I wonder who Harry did ~~kiss t~~.

(Fiengo and May 1994:219, attributed to Wyngaerd-Zwart)

[21] This type of problem is sometimes referred to as 'van Benthem's problem'. See e.g. Hackl (2000) on this problem in comparatives.

[22] In fact, distributivity also has an impact on the comparison class. That is, even if we re-write the logical expression in (65b) using $|y|=n'$, we end up with the same allowed set {n': 1≤n'≤7}. Take an allowed world where John climbs A+B+C, whose cardinality is 3. In that same world, it is also true that John climbs A, whose cardinality is 1. Hence, amount 1 is one of the allowed amounts. This means, again, that the final truth conditions are satisfied as long as John climbed at least one mountain.

[23] The truth conditions in (81g) equal those that Schwarz' non-decomposable lexical entry *[-est possible]* would derive, namely the "at least as X as possible" reading in (i). See Romero (2011) for discussion on the "exactly as X as possible" reading in (ii).

(i) "John climbed as high a mountain as possible/allowed and possibly higher."

(ii) "John climbed as high a mountain as possible/allowed and no higher."

[24] See Kennedy (2001) for an approach to cross-polar anomaly within a different framework, where degrees are viewed not as points but as intervals and where two complementary sorts of degrees – positive and negative – are distinguished.