1 Degree semantics

Gradable predicates, such as *tall* (1a), can occur in the comparative (1b) and superlative (1c) constructions, which express *comparison*:

(1)  
   a. John is tall.
   b. John is taller than Bill.
   c. John is the tallest.

*Comparative* is agreed to involve *comparison of degrees*, its two arguments are of the ⟨d,t⟩ type, e.g. (2b) (Seuren 1973, 1984):

(2)  
   a. ⟦tall⟧ = λd:d∈Dₜ.λx:x∈Dₓ.tall(d)(x)
   b. ⟦-er⟧ = λP. λQ. ∃d [¬P(d) ∧ Q(d)]
   c. ⟦John is taller than Bill⟧ = 1 iff ∃d [tall(j,d) & ¬tall(b,d)]

*Superlative* has been analyzed as *comparison* either between *sets of degrees* (3) or between *sets of individuals* (4). Heim (1999) introduced the two lexical entries for the -est superlative morpheme with truth-conditionally equivalent meaning:

(3)  
   ⟦-est₂-place⟧ = λCₑₜ,tₜ.λPₑₜ,tₜ.∃d[P(d) & ∀Q∈C [Q≠P → ¬(Q(d))]]
   Presuppositions:
   (a) P∈Cₑₜ
   (b) ∃Q∈C: Q≠P

(4)  
   ⟦-est₃-place⟧ = λCₑₜ,tₜ.λPₑₜ,tₜ.λxₓₑₜ.∃d[P(d)(x) & ∀y∈C [y≠x→ ¬(P(d)(y))]]
   Presuppositions:
   (a) x∈Cₑₜ
   (b) C⊆{z:∃d P(d)(z)}

→ Question 1: Do we need two lexical entries (3-4) for -est?

The evidence for *3-place* -est comes from the option of *overtly specifying C* as in (5); the PP explicitly defines a set of individuals (Heim 1999).

(5)  
   a. John is the most impressive [PP among the candidates].     (Heim 1999)
   b. LF: John is [-est C] impressive
   c. Cₑₜ,tₜ={x: ∃d. x is a d-impressive candidate}

An argument that also *2-place* -est is needed in grammar comes from Romero’s (2011) analysis of *modal superlatives* (Larson 2000, Schwarz 2005).

(6)  
   a. ‘Out of objects that were possible presents, John bought the largest one.’ → noun modifier
   b. ‘John bought as large a present as it was possible for him to buy.’ → *modal superlative*
2 Comparison Class and Focus

Both (3) and (4) contain the restrictor variable C that specifies the comparison class. Differences in the comparison class give rise to the absolute/relative ambiguity:

(7) John gave Mary the most expensive gift. (Quality Superlative)

a. **Absolute reading:** "John gave Mary a gift more expensive than all other tomatoes."
   
   Comparison class determined solely on the basis of the DP 'the most expensive gift', i.e. tomatoes in absolute terms (in a given context) without consideration of who buys/gets them.

b. **Relative reading:** "John gave Mary a gift more expensive than he gave anybody else."

c. **Relative reading:** "John gave Mary a gift more expensive than anybody else gave her."

Comparison class determined on the basis of other constituents (John or Mary).

DP-external relative reading: (7b-c),(8b-c)

DP-internal relative reading: (8d) (Pancheva and Tomaszewicz 2012)

(8) Jan dał Marii najwięcej pomidorów. (Polish) (Quantity Superlative)

Jan gave for-Maria most tomatoes

a. **Absolute reading:** *missing*

b. **Relative reading (DP-external):** "John gave Mary more tomatoes than he gave anybody else."

c. **Relative reading (DP-external):** "John gave Mary more tomatoes than anybody else gave her."

d. **Relative reading (DP-internal):** "John gave Mary more tomatoes than anything else he gave her."

The placement of focus clearly facilitates relative readings:

(9) a. John gave [M Ary], the most expensive gift.

b. [JOHN] gave Mary the most expensive gift.

(10) [NajWIEcej]-topic (to) Jan kupił [pomiDOrów]-Focus

most Jan bought tomatoes

LH* HL*

'Jan bought a larger quantity of tomatoes than of any other vegetable/thing he bought.'

#'Jan bought more tomatoes than anybody else.'

In the Slavic languages various 'split constructions' (split scrambling, split topicalization) are associated with a "marked information structure" (Féry et al. 2007). Each of the parts of the split phrase has a different information status (topic, focus, given, new).

-EST can be said to associate with focus similarly to focus sensitive adverbs:

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1 E.g. while the sentence 'John bought the largest tomatoes' on the absolute reading says that John bought those tomatoes that were larger than other tomatoes, the sentence 'John bought the most tomatoes' cannot mean that John met the largest number of tomatoes.
    b. John only gave Mary [a SMALL gift]₆.

    b. John always gave Mary [a SMALL gift]₆.

3 Degrees vs. Individuals

Bhatt (2006): when an infinitival relative clause overtly specifies the comparison class, as in (14), relative readings are blocked.

(13) John gave Mary the most expensive telescope (that was built in the 19th century).
    a. ‘John gave Mary the telescope that is more expensive than any other contextually relevant telescope (that was built in the 19th century).’   (Absolute)
    b. ‘John gave Mary a more expensive telescope (that was built in the 19th century) than he gave anybody else.’   (Relative)
    c. ‘John gave Mary a more expensive telescope (that was built in the 19th century) than anybody else gave her.’   (Relative)

(14) John gave Mary the most expensive telescope to be built in the 19th century.
    ‘John gave Mary the telescope that is more expensive than any other contextually relevant telescope built in the 19th century.’   (Absolute)

The relative clause in (13) is an adjunct, while in (14) it is an overt specification of the variable C.

Bhatt's example, (14), is not so surprising if the relative clause overtly sets the comparison class to other telescopes – the meaning of the relative clause is incompatible with the relative reading.

But it is surprising that when a relative clause explicitly calls for comparison with other people, it is incompatible with a matrix clause that has a relative reading expressing comparison with other people.

| Question 2: Is focus association necessary for relative readings? |

(15) Jan kupił najwięcej pomidorów, *ile ktokolwiek kupił.
    Jan bought most tomatoes how much anybody bought
    ‘Jan bought more tomatoes than anybody else did.’

    Jan bought most tomatoes how much his friends bought
    ‘Jan bought more tomatoes than his friends did.’

    b. Jan kupił najwięcej pomidorów ze swoich kolegów.
    Jan bought most tomatoes of his friends
    ‘Jan bought more tomatoes than his friends did.’ (cf. (5c)).

The ile-relative clause can function as overt specification of C (with relative readings blocked as in (14)):

(17) Jan kupił najwięcej pomidorów, ile było dozwolone.
    Jan bought most tomatoes how much was allowed
‘Jan bought the largest amount of tomatoes that was allowed.’

Crucially, the relative clauses in (15)-(17) contain a dedicated relativizer for modifying amounts, *ile*, by which we know that those are ‘degree relative clauses’.

For the relative reading in (18a-b) *C* is specified as in (18c) due to the focus on ‘John’, and the surprising fact from Polish is that (18c) cannot be spelled out by a degree relative *ile*-clause!

\[(18)\]
\[(18\text{a})\] [John]₁ bought the most tomatoes.
\[(18\text{b})\] LF: [[-est \ C] [1 [John]₁ bought d-many tomatoes]] \text{~S}
\[(18\text{c})\] \(C_{\text{dt,lo}} \subseteq \{1 \text{[John]₁ bought d-many tomatoes]} \}^\text{f}
\(C_{\text{dt,lo}} \subseteq \{D: \exists x [D = \{d'. x bought d-many tomatoes}\}

PROPOSAL:
The degree relative clause can overtly specify the restrictor of the 2-place -est. The ungrammaticality of (15), (16a) indicates that a 2-place semantics is unavailable when a relative reading is obtained by focus.

→ 2-place -est cannot associate with focus.
→ 3-place -est is required for focus association.

### 4 Polish Degree Relative Clauses

For degrees of quantities a dedicated item *ile*, ‘*wh*-many/much’, is used, (18).

\[(19)\] *ile* pomidorów kupił Jan?
how-many tomatoes bought Jan
‘How many tomatoes did Jan buy?’

The basic syntax of relativization involving *wh*-movement, (20), has the semantics of abstraction over a variable of the type determined by the *wh*-operator, e.g. of individuals, of degrees, of times, etc.

\[(20)\]
\[(20\text{a})\] \([_\text{CF} \text{wh} C^0 \text{TP} \ldots \text{ti} \ldots \text{]}\]
\[(20\text{b})\] I like the tomatoes that John bought \(t_i\).

Relative clauses in Polish can participate in correlative structures. Correlativization shows that *ile*-relative clauses modify degrees - in the matrix clause the degree variable it abstracts over is picked up by a dedicated degree demonstrative tyle (‘that much/many’), (21), and not a regular demonstrative referring to individuals, (22) vs. (23).

\[(21)\] Jan kupił tyle pomidorów. ( + a pointing gesture) → degrees of quantity
Jan bought DEM tomatoes
‘Jan bought that many tomatoes.’

\[(22)\] Jan kupił Marii tyle pomidorów, *ile/*które pro mógł kupić.
Jan bought for-Maria DEM tomatoes how-many/which could buy
‘Jan bought Maria as many tomatoes as he could buy.’

\[(23)\] Jan kupił Marii te pomidory, które pro mógł kupić.
Jan bought for-Maria DEM tomatoes which could buy
‘Jan bought Maria those tomatoes that he could buy.’
In English a *that-relative clause* can receive a **degree reading**, as disambiguated by the context, (24) (Heim 1987).

(24) It will take us the rest of our lives to drink the champagne that they spilled that evening.
   a. LF1: [champagne λd [they spilled d-much champagne that evening]]
   b. LF2: [champagne λx [they spilled x that evening]]

(24a): ‘identity of amounts’ (i.e. degree) interpretation of the *that*-clause ⟨d,t⟩
(24b): regular relative clause interpretation) of the *that*-clause ‘identity of substances’, ⟨e,t⟩)

For the amount reading in Polish the dedicated quantity demonstrative *tyle* and the relativizer *ile* have to be used:

    Jan drank DEM champagne how-much spilled.lmtrs on floor that evening.
    ‘Jan drank as much champagne as they spilled on the floor that evening.’
   b. Jan wypił tyle szampana, którego wylano na podłogę tego wieczoru.
    Jan drank that champagne which spilled.lmtrs on floor that evening.
    ‘Jan drank the same champagne that they spilled on the floor that evening.’

5 **Degree Relative Clauses in Superlatives**

5.1 **Degree relatives can specify the comparison class C**

The fact that the same degree relative clauses which participate in correlativization are found also with superlatives, (26) indicates that they can function as the overt specification of the **comparison set argument** $C_{<dt, t>}$ of the 2-place -est (but not of the $C_{<e,t>}$ restricting the 3 place -est).

(26) Jan kupił Marii najwięcej pomidorów, ile pro mógł kupić.
    Jan bought for-Maria most tomatoes how-many could buy
    ‘Jan bought Maria the most tomatoes he could buy.’

(27) Jan kupił Marii tyle pomidorów, ile pro mógł kupić.
    Jan bought for-Maria DEM tomatoes how-many could buy
    ‘Jan bought Maria as many tomatoes as he could buy.’

Relativization over a degree variable $p$ produces a ⟨d,t⟩ type interpretation for the relative clause. This denotation can be shifted to the ⟨dt,t⟩ type, the type of the $C$ variable in the 2-place entry for -est $\rightarrow$ Romero’s (2011) SHIFT operator, (28), can apply freely to convert the set of degree points into a set of sets of lower-or-equal degrees.

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

(29) For (26):
   $C_{<dt,t>} = \text{SHIFT}_{<dt,t>\rightarrow<dt,t>} ([1 \text{ he could buy d-many tomatoes }])$
   $\rightarrow C$ in (26) is the set of amounts of tomatoes Jan could afford

   When the superlative involves a comparison of different amounts of tomatoes, (26), the degree relative clauses can overtly specify the variable $C$. 
5.2 Degree relatives are incompatible with relative readings

The comparison class variable $C_{<dt,t>$ contains sets of amounts. But when the comparison of amounts of tomatoes in (30)-(32) also necessarily involves the consideration of who bought them, (30), or for whom they were bought, (31), or when they were bought, degree clauses are simply ungrammatical.

(30) [JAN]$_F$ kupił Marii najwięcej pomidorów, *ile ktokolwiek jej kupił.
Jan bought for-Maria most tomatoes how anyone her buy
‘Jan bought Maria the most tomatoes anyone ever bought her buy her.’

Jan bought for-Maria most tomatoes how for-anyone bought
b. [MArii]$_F$ Jan kupił najwięcej pomidorów, *ile pro komukolwiek kupił.
for-Maria Jan bought most tomatoes how for-anyone bought
‘Jan bought Maria the most tomatoes he bought anyone.’

(32) [DZsiaj]$_F$ Jan kupił Marii najwięcej pomidorów, *ile kiedykolwiek jej kupił.
Today Jan bought for-Maria most tomatoes how-many ever her bought
‘Today Jan bought Maria the most tomatoes he ever bought her.’

On the relative readings with the focus (pitch accent/focus movement) on Jan, (30), Maria, (31), or ‘today’, (32), an ile-clause becomes ungrammatical. This is not due to the presence of the NPIs, cf. (35).

If the specification of $C$ as a set of sets of degrees can be freely shaped by the presence of focus (Heim 1999), it is surprising that in e.g. (30) the degree relative clause cannot specify $C$ as set of sets of amounts bought by someone.

In fact, the nuclear stress in the previous sentences where degree clauses were grammatical, (17), (26), has to fall on the superlative adjective/quantifier itself $\rightarrow$ narrow focus on -est:

Jan bought most tomatoes how-much was allowed
‘Jan bought the largest amount of tomatoes that was allowed.’

Jan bought for-Maria most tomatoes how-many could buy
‘Jan bought Maria the most tomatoes he could buy.’

Jan today bought for-Maria most tomatoes how-many ever her bought
‘Today Jan bought Maria the most tomatoes he ever bought her.’

If [-est $C_{<dt,t}>$ itself is focused] it evokes alternatives of the same type, [most $C$], [least $C$] and other properties of the (dt,t) type, e.g. $\lambda P_{<dt,t>} \lambda x_o. [\mathbb{N}(P)(x)]$. The $C$ restrictor is explicitly specified by the degree relative clause.

The comparison class on the relative reading needs to be specified by (i) association with focus ($C_{<dt,t>$), or (ii) overtly by a degree relative clause. If the presence of the degree clause requires focus on -est then it follows that no other constituent can be focused. But why then the degree relative cannot overtly specify the comparison needed for relative readings to obtain? (15), repeated in (36), vs. (37).

Jan bought most tomatoes how-much anybody bought
‘Jan bought more tomatoes than anybody else did.’

(37) Jan kupił [najWIĘcej]$_F$ pomidorów (ze wszystkich studentów).
Jan bought most tomatoes (of all students)
‘Jan bought the most tomatoes (of all the students).’
Upon hearing (36)-(37) the DP-external interpretation is assigned, and it is possible to add ‘of all the students’ but not the degree relative clause.

- The relative reading in (36)-(37) requires comparison between individuals.
- The relative reading requires a different kind of comparison than that specified in the degree clause.

The relative reading requires C to contain alternatives of the same type as the constituent in focus.

Upon hearing (36)-(37) the relative interpretation using a 3-place -est is assigned and further explicit specification of C requires a ⟨e,t⟩ type denotation.

Support comes from the cases where the reverse obtains: (38) and (39). In both cases the fronted superlative DP and the main clause contain a focus: most and the right-most constituent². The comparison class as specified by the degree clause is the same in both (38)-(39) → focus does not determine the comparison class.

(38) [NajWIĘcej]₇ pomidorów ile________ kiedykolwiek kupił, Jan kupił [Marii].
most tomatoes how-much ever bought Jan bought for-Maria
‘Jan bought Mary the largest amount of tomatoes that he ever bought’

(39) [NajWIĘcej]₇ pomidorów, ile________ kiedykolwiek kupił, Jan kupił [dzisiaj]₇.
most tomatoes how-much ever bought Jan bought today
‘Jan bought today the largest amount of tomatoes that he ever bought’

Even though (39)-(41) describe comparison that matches the comparison required on the relative interpretation, I conclude that (39)-(41) are not derived by -est taking sentential scope for the relative reading, but are derived exactly in the same way as (38).

(40) [NajWIĘcej]₇ pomidorów ile________ ktokolwiek kupił, kupił [Jan]₇.
most tomatoes how-much whoever bought bought Jan
‘Jan bought today the largest amount of tomatoes that anyone ever bought.’

(41) [NajWIĘcej]₇ pomidorów ile________ komukolwiek kupił, Jan kupił [Marii]₇.
most tomatoes how-much for-whoever bought Jan bought for-Maria
‘Jan bought Mary the largest amount of tomatoes that he (ever) bought anyone.’

NPIs in (40)-(41) specify sets of individuals which licenses focus for congruence:

(42) [TYLE]₇ pomidorów ile________ komukolwiek kupił, Jan kupił też [Marii]₇.
most tomatoes how-much for-whoever bought Jan bought also for-Maria
‘Jan bought Mary the same amount of tomatoes he bought anyone else.’

C_{ext,p} contains sets of amounts:

(43) [NajWIĘcej]₇ pomidorów ile________ komukolwiek kupił, to 100.
most tomatoes how-much for-whoever bought COPULA 100
‘The largest amount of tomatoes that he bought anyone was 100.’

The sentences in (39)-(41) contain degree relative clauses that could be taken to specify the comparison class on the relative reading. If that were the case, the reason why with superlative DPs in-situ the same degree clauses are ungrammatical remains mysterious, (36).

- My explanation for the contrast in acceptability between (40) and (36) is that (40) is derived exactly the same way as (38). The degree relative clause overtly specifies the comparison class, the DP-external relative interpretation is blocked.

² IS Ordering Rule (Dyakonova 2009, p. 55): Topic > (Discourse Neutral Material) > Focus
As predicted, once it is clear from the context that we are comparing amounts, the degree relative clause is grammatical ((45) vs. (31)=(44)).

(44)=(31) Jan kupił Marii najwięcej pomidorów, *ile pro komukolwiek kupił. (45) Jan bought for-Maria most tomatoes how-much for-anyone bought 'Jan bought Maria more tomatoes than he bought anyone.'

Relative readings obtained by focus require C to provide a set of individuals and are thus compatible only with the 3-place semantics for -est.

(46) [\text{Jan}]_F kupił Marii najwięcej pomidorów. (47) Jan bought for-Maria most tomatoes 'Jan bought Maria more tomatoes than he bought anyone.'

- [tp1] John [tp2 [\mathbf{-est} C] [tp3 [ \sim S] [tp4 x bought Mary [dp a [np d-many tomatoes]]]]]
- S \subseteq [[\mathbf{tp4}]]' = \{ P \exists d [P = \lambda x \lbrack x \text{ bought Mary a d-many tomatoes}]]\};
- [[\mathbf{tp3}]] = [[\mathbf{tp4}]]' = \lambda d \lambda x [x \text{ bought Mary a d-many tomatoes}] ;
- C_{\text{est}} = S = \{ x: \exists d [x \text{ bought Mary a d-many tomatoes}] \} (\text{focus association});
- John \in C_{\text{est}}; \forall y [y \in C \Rightarrow \exists d [x \text{ bought Mary a d-many tomatoes}] \} (\text{presuppositions of -est (4)})

6 Conclusion

Answer to Question 1: Yes, we need the two lexical entries for -est.
- 3-place -est is required for focus association
- 2-place -est is required for modification by \langle dt,t \rangle relative clauses

- This result supports the recent proposal of Szabolcsi (2012) that “probably, each way of building superlatives is “right” for some languages, and both may coexist in (varieties of) the same language.”

Answer to Question 2: Yes, focus association is necessary for relative readings.
- the fact that -est associates with focus explains the restrictions on the availability of \langle dt,t \rangle relative clauses with superlatives in Polish.

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Szabolcsi, Anna. 2012. Compositionality without word boundaries: (the) more and (the) most. Proceedings of SALT 22