Forces at the interface of gradability and quantification

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This paper offers an explanation for four interrelated cross-linguistic generalizations regarding superlatives of quantity: (i) **Proportional implies relative**: Regardless of the strategy used in a language to convey a superlative meaning with ordinary gradable adjectives, when that strategy is applied to a word for *many*, the result has a focus-sensitive, *relative reading* as in *John read the most books*, and only occasionally a *proportional reading*, as in *John has read most books*. While cognates of *most* can have both relative and proportional readings, such readings are absent in e.g. Slavic languages (Pancheva & Tomaszewicz, 2012; Dobrovie-Sorin & Giurgea, 2015, i.a.) and most other languages around the world (Coppock et al., 2017). (ii) **Number-marking generalization**: Quantity superlatives never disagree in number with the associated noun on proportional readings, but they often do on relative readings. For example, the Basque superlative morpheme-marked quantity word *gehi-en* (much-SPRL) bears the plural marker *-ek* in sentences with a plural substance noun that receive proportional readings, but *-ek* is absent from sentences with relative readings. (iii) **Adverbial-relative connection**: when quantity superlatives disagree in number with the substance noun, they have the morphological shape of an adverbial superlative (Coppock, to appear). A particularly visible case of a relative reading with adverbial morphology is German *am meisten Bücher* 'the most books', where *am = an dem*, where *dem* is singular and presumably neuter. Adverbial superlatives also use this *am* form. This pattern is also observed in Italian, Spanish, and Portuguese, where quantity superlatives lack the definite article (e.g. It. *che ha **più** soldi* 'who has the most money') even though the definite article is the only overt means of distinguishing comparative from superlative in these languages. (iv) **Relative readings for adverbial superlatives**: Adverbial superlatives (e.g. *John ran the fastest*) have only relative readings.

Several potential explanations for the 'proportional implies relative' generalization exist, including availability of a DP layer (Boškovic & Gajewski, 2008), cardinal vs. proportional *many*, and the type of pseudopartitive underlying quantity superlatives (Pancheva, 2015). While each of these previous works contributes important insights, none accounts for the full typological picture. **Counter to the DP-layer hypothesis**, there are DP-languages in which proportional readings are not available, including Bulgarian, Macedonian, Kurdish, Hebrew and Catalan, and there are DP-less languages where they are. **Counter to the pseudopartitive hypothesis**, quantity superlatives do not take the form of pseudopartitive in several languages (e.g. Italian *piu (*di) soldi*). According to Pancheva (2015), relative readings result from an 'individuating' reading of a pseudopartitive of the form *the greatest number of*, while proportional readings result from a 'measure' reading. Languages are thought to differ in their inventories of these readings. But in Mandarin, the *de* construction is incompatible with an individuating pseudopartitive structure (Cheng & Sybesma, 1998; Rothstein, 2017) yet permitted in quantity superlatives: *Wo chi le zui duo **de** binggan.* 'I ate the most cookies' (gloss: I eat asp SPRL many de cookie). Furthermore, the putative underlying structure for both readings, *the greatest number of*, only has one interpretation: a relative one. This last point brings out an important fact: *When quantities are compared, a relative reading arises*. **Counter to the cardinal/proportional *many* hypothesis**, the inventory of words for *many* does not reflect the distribution of proportional readings (Pancheva, 2015).

We propose that quantities are indeed being compared in the case of quantity superlatives, in the unmarked case, and that is why they are so often unambiguously relative. In particular,

the target argument of a quantity superlative such as *most* or *fewest* is ordinarily a degree that is greatest among a given set of degrees, rather than e.g. an individual. We propose furthermore that this follows from (i) a lexical entry for quantity words (Q-words) like *many* and *few* on which they are gradable predicates of degrees type $\langle d, dt\rangle$ (cf. $\langle d, et\rangle$),[1] and (ii) a presuppositional constraint on superlatives that the *contrast set* consists of individuals (cf. Coppock & Beaver 2011).

(1) a. *-est*$\rightsquigarrow$
$\lambda M_{\langle d,\langle \tau,t\rangle\rangle}\lambda y_\tau \,.\, \partial(\mathbf{C}(\mathbf{x}) \wedge \mathbf{R}(\mathbf{x}, y)) \wedge \textsc{sup}(\mathbf{x}, \mathbf{R} \circ M, \mathbf{C})$
Here, τ can be type e, d or v. **C** must consist of individuals (type e) and **R** relates individuals in **C** to things of type τ. Combined with a gradable predicate like *many* or *much*, the result is a predicate of type $\langle d, t\rangle$.

b. *much/many* $\rightsquigarrow \lambda d \lambda d' \,.\, \textsc{size}(d') = d$
(*Many* has an additional presupposition that d' is a cardinality.)[2]

c. MEAS $\rightsquigarrow \lambda d_d \lambda x_e \,.\, \mu(x) = d$ (where μ is a salient measure function (Solt, 2015))

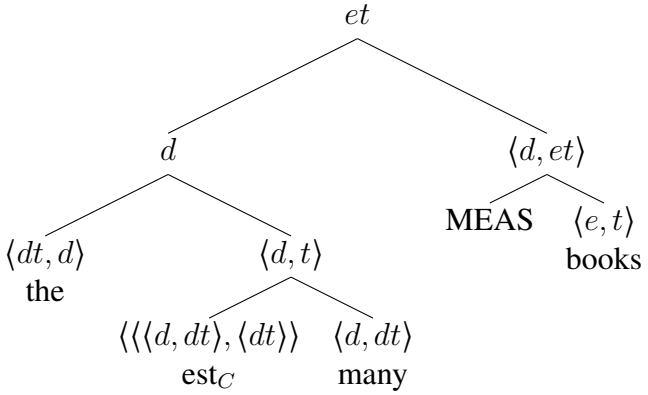
A sample derivation for relative readings is given in (2). Note that MEAS combines with the noun via Variable Identification in the spirit of Solt (2015). Crucially, the target argument of the superlative is a degree. In conjunction with Coppock's (to appear) *target-domain hypothesis*, according to which the agreement features of a superlative reflect the domain from which the target argument is drawn (degrees, individuals, events, etc.), this analysis explains why quantity superlatives on relative readings often exhibit default agreement, and resemble adverbial superlatives.

Proportional readings deviate from the unmarked case; we propose they can arise through a lexicon-augmenting process fusing the basic meaning for quantity words with the meaning of elements that typically co-occur with them, including a silent measure head. Technically, this is achieved by converting the relation denoted by *many* to a function of type $\langle d, d\rangle$; the result after function composition with MEAS is a version of MEAS with a cardinality restriction, type $\langle d, et\rangle$, as in Hackl 2009. Combined with a superlative, this yields a predicate of pluralities (hence number agreement). See (3). With this in hand, proportional readings can be derived either as in Hackl 2009 or as in Hoeksema 1983, where the comparison class is allowed to consist of two pluralities; we adopt the latter. Reconceptualizing pluralities as sets produces a quantifier (proportional *most*). We conjecture that this pathway relies on latent options activated only under analogical pressure from other quantifiers, so it does not produce a proportional quantifier of *fewest*.

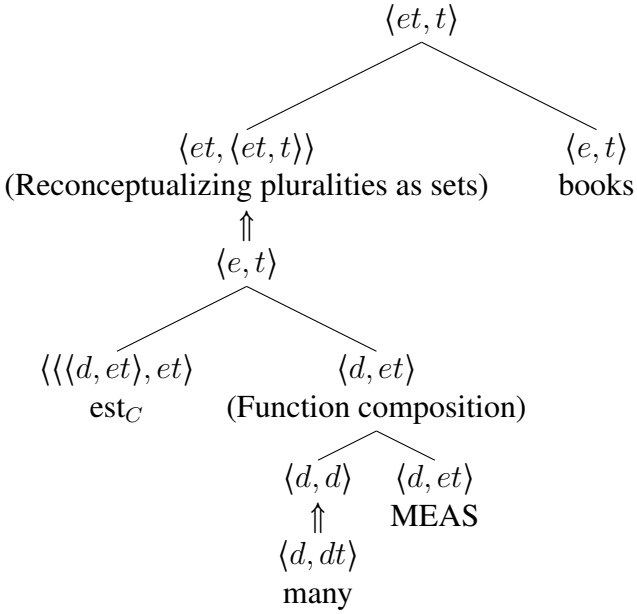
[1] Of prior proposals for quantity words, ours most resembles those of Solt (2009, 2015) and Rett (2008), where Q-words are type $\langle d, \langle dt, t\rangle\rangle$ and $\langle dt, dt\rangle$, respectively. Rett does not apply her analysis to superlatives; Solt offers a treatment using a modification of her 2015 theory in her 2011 paper but under that analysis the target of a quantity superlative is still always an individual rather than a degree. Our analysis of quantity superlatives under relative readings is similar to Krasikova's (2012) proposal for relative readings in general insofar as the comparison class involves something like degrees, but it overcomes Krasikova's problem with ties discussed by Bumford (2016) discusses.

[2] The size of a degree may be the degree itself.

(2) Structure of a relative reading



(3) Structure of a proportional reading (⇑ signals latent option)



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