PROPORTIONAL MANY VS *MOST*[*] AND THE QUANTIFICATIONAL STATUS OF STRONG INDEFINITES

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Abstract. This paper is concerned with the analysis of strong indefinites and in particular of the proportional readings of *many*. Can we account for the proportional readings of *many* by assuming a uniform analysis, according to which *many* is a cardinality predicate, or do we need to postulate an ambiguity between a cardinality predicate and a quantificational determiner (Partee 1989)? I will argue in favour of the uniform analysis by comparing proportional *most* with proportional *many*: it will be shown that the former is necessarily a quantificational determiner (as in Generalized Quantifier theory, *contra* Hackl 2009), whereas the latter is a cardinality predicate inside a strong indefinite DP. This somewhat paradoxical result (a strong DP built with weak *many*) will be given a compositional semantics by assuming that constituents of the form many NP are headed by a null Determiner that has the semantics of plural *some*.

Keywords: strong indefinites, quantificational determiners, Generalized Quantifier Theory.

1. DEFINING THE WEAK-STRONG DISTINCTION

1.1. From a Two-way to a Three-way Classification of Nominals

According to Milsark (1977), determiners are either strong (definite, demonstrative, *every, each, all, most*) or weak (indefinite singular article *a, sm* (weak form of *some*), cardinals, *much, many*). The distinction is useful in order to state the following empirical generalizations:

(1) a. Only weak DPs can occur in existential *there*-sentences.
b. Only strong DPs can combine with individual-level predicates.[2]

It is easy to observe that many indefinites can occur in both contexts, which has led Milsark to assume that many indefinites, including *many*, are ambiguous between a weak

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[2] Milsark's own term is 'property-predicate'. The term 'individual-level' is due to Carlson (1977). For various refinements regarding the definition of the relevant class of predicates see McNally (1998), Kiss (1994), Dobrovie-Sorin (1997a,b) and Glasbey (1997) among many others.

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and a strong variant. He has furthermore suggested that weak determiners are 'not quantifiers' but rather 'cardinality words', whereas strong determiners, including indefinite determiners on their strong reading, 'can be regarded as being exactly the set of natural language quantifier words', an assumption that has been adopted by Diesing (1992), Kratzer (1995) a.o. Partee (1989) suggests that the quantificational analysis may underlie proportional *many*.

The quantificational analysis of strong indefinites is confronted with important empirical problems regarding scope effects (Fodor, Sag 1982, Farkas 1997a,b) or the analysis of *unos* in Spanish (Villalta 1995, Tasmowski, Laca 2000), which have led some theoreticians to propose that strong indefinite DPs are referential terms (type e), obtained via an application of a choice function (Reinhart 1997, Winter 1997) or Skolem function (Steedman 2006). The fact that many strong indefinites must be analyzed as referential terms does not yet demonstrate that all strong indefinites are to be analyzed in this way. Indeed, strong DPs other than indefinite qualify as either quantificational (*every NP, each NP, all NP*) or referential (definite and demonstrative DPs, proper names) and we may conjecture that the same distinction may exist among strong indefinites, as shown in the following table:

(2) (Dobrovie-Sorin, Beyssade 2004, 2012: chapter 4, Table (27))

Strong DPs	Strong indef. DPs	DPs other than indefinite
Type <<e,t>,t>	quantificational	quantificational: {*every, most, each, all*} NP
Type e	Referential	proper names, definites, demonstratives

According to Dobrovie-Sorin, Beyssade (2004, 2012), D-linked indefinites (which are covertly partitive) are quantificational (type <<e,t>t>), whereas non-partitive strong indefinites, e.g., Spanish DPs headed by *unos*, are referential (type e). The reasoning put forward in Dobrovie-Sorin, Beyssade (2004, 2012) is that the covert partitivity of strong indefinites is read off a tripartite representation (which is one way of representing quantification), obtained by mapping the NP onto the restrictor:

(3) Two students are blond.
(3') two x (x is student) [x is blond]

1.2. Rules of Semantic Composition

Predicates are unsaturated expressions, which can be represented as open formulae, i.e., as λ-abstracts over one or more argument positions:

(4) a. λx. sing (x)
b. λy. λx. help (x, y)

This type of predicate can combine both with referential DPs and with quantificational DPs (QPs), but the direction of functional application is reversed in the latter case:

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(5) a. John sings. a'. λx. sing (x) (John)
b. Every boy sings. b'. λP. ∀*x*[boy(*x*) –> *P*(*x*)] (λx. sing (x))

(5a) relies on predicate-saturation: the DP argument *John* saturates the open position of the predicate λx. sing (x). In (5b), on the other hand, this predicate functions as the argument of the QP *every boy*, represented as a generalized quantifier, λP. ∀*x*[boy(*x*) –> *P*(*x*)], i.e., as the set of properties P such that every boy has P (for all x, if x is a boy, then x has P). Given (5a)', the sentence in (5a) is true iff John belongs to the set of entities denoted by the predicate λx. sing (x) and given (5b'), the sentence in (5b) is true iff the property of singing belongs to the set of properties that every boy has. For ease of reference I will refer to the semantic compositions illustrated in (5'a) and (5'b) as *predicate-saturation* and *quantification*, respectively.

Turning now to weak indefinite DPs (the clearest example of which are existential bare plurals and indefinite mass DPs) it has been argued that they denote neither individuals nor generalized quantifiers, but rather properties (i.e., they have the semantic type of common Ns rather than the semantic type of DPs). In addition to *there*-sentences, weak indefinites, in particular bare plurals, are found in examples of the following type:

(6) a. John drank two litres of beer.
b. Children were sleeping by the fire.

Property-denoting constituents cannot be assumed to compose with the main predicate via either predicate-saturation (because in that case they should denote an individual) or quantification (because in that case they should denote a generalized quantifier). The consequence is that those predicates that can combine with existential bare NPs cannot be assumed to be of the canonical types shown in (4a-b). The solution adopted by many theoreticians (van Geenhoven 1996, Dobrovie-Sorin 1997a,b, Dobrovie-Sorin, Beyssade 2004, 2012) is to assume that certain verbal predicates can be represented not only as open formulae (4a-b), but also as existential predicates (7a-b). In (7a-b) argument variables are bound by an existential quantifier and a λ-operator binds the variable P over the properties P that restrict the range of the argument variable. By applying such predicates to property-denoting constituents, e.g., to *two litres of beer* and to *children*, we obtain the LF representations in (8a-b)[3], which respectively correspond to (6a) and (6b). Note that in (8a) it is only the object position that is bound by an existential operator; the subject argument combines with the main predicate via predicate saturation.

(7) a. λP λx ∃y [drink(x, y) ∧ P(y)]
b. λP ∃x [sleep(x) ∧ P(x)]
(8) a. λPλx ∃y [drink(x, y) ∧ P(y)] (John)(two litres of beer)
=> ∃y [drink(John, y) ∧ beer (y) ∧ two litres (y)]
b. λP ∃x [sleep(x) ∧ P(x)] (children) => ∃x [sleep(x) ∧ children (x)]

[3] This analysis may be improved (see Dobrovie-Sorin, Beyssade 2012, Dobrovie-Sorin, Giurgea 2014), but refinements are out of the main scope of the present paper, which is concerned with the *strong* readings of indefinites.

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The table in (9) summarizes the overview sketched above, by indicating the correspondence between the three distinct types of arguments and the three distinct rules of semantic composition. The third column indicates that the type of the main predicate is the same for the rules of quantification and predicate-saturation. In order to keep the presentation as simple as possible, I consider only one-argument verbal predicates.

(9)

Semantic Type of arg	Rule of Semantic Comp	Semantic Type of VP
Type <<e,t>,t> : QP	quantif : QP(VP)	type <e,t> : λxVP (x)
Type e: DP_e	pred satur: VP(DP_e)	type <e,t> : λxVP (x)
Type <e,t> weak DP	existential predication	λP ∃x [VP (x) ∧ P(x)]

This table indicates that the distinction between weak and non-weak DPs correlates with a difference in the main predicate, whereas the difference between QP and DP_e depends on the properties of the arguments themselves: because they are quantificational, QPs cannot saturate the main predicate, but instead they can take that predicate as an argument; but crucially, the type of the predicate itself is not shifted when that happens.

Against this background, I will try to clarify the analysis of proportional many: is it to be analyzed as a quantificational determiner or rather as a cardinality predicate? To this end, I will examine the possibility of the proportional reading of beaucoup (de) 'many/much' in French vs. the impossibility of the proportional reading of le plus (de) 'the most'. The conclusion will be that proportional beaucoup (and therefore probably proportional MANY crosslinguistically) is a cardinality predicate. Nevertheless, a DP built with proportional MANY qualifies as a strong DP (e.g., i-level predicates force the proportional reading of MANY).

2. PROPORTIONAL MANY

The examples in (10a-b) respectively illustrate the proportional and the weak readings of *many*, (10c) shows that certain examples allow both readings:

(10) a. Many students are intelligent.
b. John read many books.
c. Many houses collapsed during the hurricane.

(10a) is (or at least tends to be) interpreted proportionally: the *ratio* of intelligent students/students is high (compared to ratios of intelligence in various other types of populations). (10b) on the other hand has a cardinal reading: the *number* of books read by John is high (compared to some contextually relevant number). The formulae in (10'a-b) correspond to the two readings just described:

(10') a. $|\{x: \text{student}(x) \,\&\, \text{intelligent}(x)\}| : |\{x: \text{student}(x)\}| \geq r$
(r a fraction or a percentage)
b. $|\{x: \text{book}(x) \,\&\, \text{was-read-by-John}(x)\}| \geq n$ (n a number)

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Both of these construals are possible in (10)c.

For the moment it is sufficient to observe that *many* allows two distinct interpretations, a weak one and a proportional one, which respectively disregard and take into account the cardinality of the NP-set. The question is how this difference is to be represented: one or two LF representations? Which LF representations? Is the difference in LF representations compatible with a uniform, non-ambiguous analysis of *many* as a cardinality predicate (meaning 'high cardinality') or do we need to assume that *many* itself has two distinct lexical entries, a weak/cardinal and a proportional one? In the remaining part of this subsection I will briefly present the alternatives among which we need to choose and in the rest of the paper I will present the empirical evidence that may help us choose among those alternatives.

Given the background in §1.2, the weak reading is the easiest case: *many students* denotes a complex property (type <e,t>) of being children and having a high cardinality, which saturates an existential predicate, i.e. a predicate that has its argument position bound by an existential quantifier and waits for a property to restrict the range of that predicate. The LF in (11) can thus be assumed to underlie (10b):

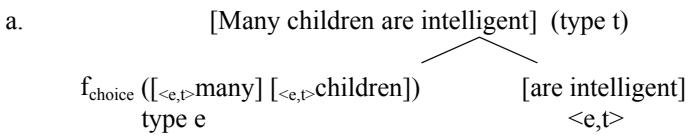
(11) $\lambda P\, \lambda x\, \exists y\, [\text{read}(x,y) \wedge P(y)]\, (\text{John})\, (\text{many books}) \Rightarrow$
$\exists y\, [\text{read}(\text{John}, y) \wedge \text{cbooks}(y) \wedge \text{many}(y)]$

For the proportional reading we need to choose between the entity-denoting and the quantificational analyses (DP_e and QP), which respectively rely on predicate saturation and quantification:

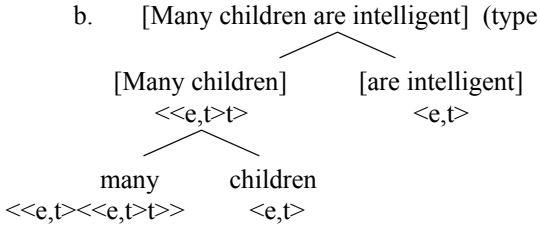
(12) a. λx intelligent (x) (many children)
b. many children (λx.intelligent (x))

In (12a), *many children* is represented as an individual-denoting term (obtained via the application of a choice function) that saturates the unary predicate λx intelligent (x), whereas in (12b), *many children* is represented as denoting a generalized quantifier that applies to the same predicate. The semantic types of the relevant constituents are indicated in the tree representations below:

(13) a.



b.



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The semantic composition shown in (13a) relies on the hypothesis that strong indefinites are referential terms obtained by applying a choice function to the NP-set (Reinhart 1997, Winter 1997). This analysis is compatible with the cardinal meaning of *many*: the choice function picks up one of the sum-individuals in the set denoted by *many children*, which contains sum-individuals each of which is made up of children and has a 'high cardinality'. Under this analysis, the sentence is true iff the sum-individual picked up by the choice function belongs to the set of sum-individuals that are intelligent.

According to the representation in (13b), proportional *many* has the semantic type of quantificational determiners, which implies that *many* is ambiguous, being able to denote either a relation between sets (as in (13b) which corresponds to the proportional reading) or a cardinality predicate (which would underlie the weak and referential readings of *many NPs*). In this article I will argue that none of the two representations in (13a-b) is correct. I will then try to propose a new analysis that attempts to reconcile the cardinality-predicate status of proportional *many* with the strong status of the DP in which it occurs.

3. IS PROPORTIONAL *MOST* A QUANTIFICATIONAL DET OR AN ADJ?

Under the quantificational analysis, proportional *many* would be a proportional quantifier like *most*, whereas under the choice functional analysis it would be a cardinality predicate, like the weak *many*. But note now that *most* itself is the superlative form of *many*, which has led Hackl (2009) to propose that the quantificational analysis of *most* is inadequate. Under Hackl's analysis, proportional *most* occupies the syntactic position of an adjective and its semantics is that of absolute superlative adjectives. In what follows I will bring up some problems with Hackl's proposal and argue in favour of the quantificational analysis of proportional *most*. I will then come back to our main concern in this paper, the proportional reading of *many*.

3.1. Hackl (2009): proportional MOST as an Adj

The empirical generalizations in (14a-b) seem to support the adjectival analysis of MOST:

(14) a. *Most* has the morpho-syntactic form of the superlative of *many/much*.

b. *Most* has both proportional and relative readings e.g., *Most men arrived late* (proportional reading of *most*) vs. *who (among your students read the most books?* (relative meaning of *the most*) which seen parallel to the absolute and relative readings of superlative qualitative adjectives (*the best, the nicest, the highest*) e.g., *The highest mountain is in India* (absolute reading) vs. *who (among your students) climbed the highest mountain?* (relative meaning).

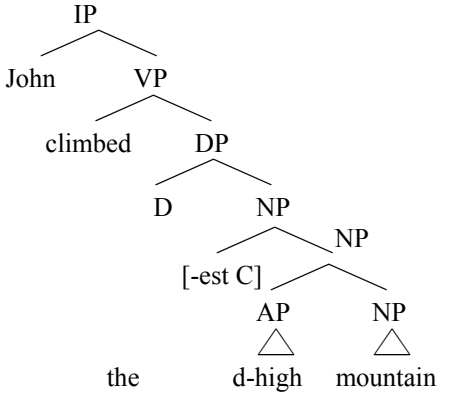
Based on these observations, Hackl (2009) proposed that the proportional reading of *most* has both the syntax and the semantics of an absolute superlative adjective. According to Hackl's syntactic analysis, proportional *most* sits in an adjective position, just like *highest*, the Det position being filled with an empty categ interpreted as ∃; in the case of qualitative superlatives, the D position is occupied by the definite article *the*:

(15) a. John climbed [[$_{D}$the] [[$_{AdjP}$highest] [$_{NP}$mountain]].

b. John climbed [[$_{D}$Ø] [[$_{AdjP}$most] [$_{NP}$mountains]].

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(16)



a. the d-high mountain
b. – d-many mountains

Assuming this syntactic representation, Hackl proposes that the compositional semantics of proportional MOST mimics the compositional semantics of absolute qualitative adjectives (see § 3.5 below).

In what follows I will show that Hackl's analysis of proportional MOST is problematic, which will lead us to go back to the generalized-quantifier analysis, according to which MOST is a quantificational Determiner (rather than an adjective).

3.2. The impossibility of the proportional reading of *le plus*

The contrast below is not expected under Hackl's analysis:

(17) a. C'est Jean qui a lu le plus de livres.
'It's John who read the most [of] books.' (relative reading)
b. *Le plus d'enfants sont intelligents. (proportional reading)
'The most [of] children are intelligent.'

In a nutshell, the data in (17a-b) will be explained based on the following two generalizations:

(18) a. *Le plus* is necessarily a superlative measure phrase rather than a determiner.
b. Superlative measure phrases are quantitative properties (type <e, t>).

(18a) distinguishes *le plus* in French from *most* in English, which will be argued to be able to function not only as a measure phrase, but also as a quantificational Det.

3.3. *Le plus* is necessarily a measure phrase

The measure-phrase status of *le plus* (and of *beaucoup*) is related to its being an adverb, which correlates with the syntactic form of its sister constituent. Let me draw the attention of the reader to the fact that the generalization in (19) holds for constituents of the form *XP of/de NPs*, not for *XP of/de DPs*:

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(19) In constituents of the form *XP of/de NP*, XP is necessarily a measure phrase.

I will not try to explain why the generalization in (19) should hold, I will merely illustrate it below. Note that English and French behave exactly alike, and so do all the languages I know, e.g., Romanian as shown in (20e).

(20) [$_{MeasP}$XP] de NP
a. [trois grammes] de beurre, [deux verres] de vin, [trois mètres] de tissu
b. [trois douzaines] d'enfants, [beaucoup] de beurre, [beaucoup] d'enfants
c. [le plus] d'enfants, [le plus] de beurre
d. [treizeci] de copii, [trei sute] de copii
three tens of children, three hundreds of children
'thirty children, three hundred children'
e. cel mai mare număr de copii
the largest number of children

Compare constituents of the type XP NP, in which XP can be either a MeasP or a Det :

(21) a. [$_{MeasP}$XP] NP
i deux enfants, trois cents enfants
ii many children, much butter
iii the most children (relative superlative reading), the most butter (relative superlative reading)
b. [$_{Det}$XP] NP
i this child, the child
ii every child, most children

We may thus conclude that

(22) *Le plus* is to be analyzed as a superlative quantitative Measure Phrase.

3.4. The Relative Reading of *le plus de NP*

The relative reading of the superlative quantitative *le plus* illustrated in (17a), repeated below (in 23a), is parallel to the relative reading of superlative qualitatives illustrated in (23b):

(23) a. C'est Jean qui a lu le plus de livres.
'It's John who read the most [of] books.' (relative reading)
b. C'est Jean qui a lu le plus long livre.
'It's John who read the longest book.' (absolute reading; relative reading)

The example in (23b) allows both an absolute and a relative reading of the superlative adjective. On the absolute reading of *le plus long* 'the longest', the book read by John is the longest out of a contextually given set of books (e.g., the books on my book-shelves), whereas on the relative reading of *le plus long* 'the longest', the book read by

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John is the longest out of the set of books read by (a contextually given set of) people other than John. Theoreticians unanimously agree on the following two empirical generalizations: (i) the absolute reading of superlatives involves a comparison class that is a contextually determined sub-set of the NP-set whereas on the relative reading, the superlative is evaluated with respect to a set that is computed at the level of the sentence; (ii) on their relative reading, superlative DPs, e.g., *the longest book*, show some properties of non-specific (i.e., weak) indefinites (Szabolcsi 1986).

There is however no agreement regarding the precise analysis of relative superlatives: according to Heim (1999), (2000), followed by many others and in particular by Hackl (2009), the relative reading of superlatives is read off an LF configuration in which the *–est* operator takes sentential scope as a result of raising (by QR) out of its host DP; Farkas & Kiss (2000) agree that the relative reading depends on the sentential scope of the superlative, but argue against obtaining wide scope via QR; Sharvit, Stateva (2002) propose a pragmatic analysis. For our present purposes it is not necessary to propose an explicit representation of the relative readings of superlatives. All that we need is the following descriptive generalization, which is beyond dispute:

(24) A relative superlative is interpreted DP-externally.

This says that relative superlatives qualify the entity that they modify as having the highest degree compared to a set of entities that is determined by taking into account the whole sentence, and not just the NP. The semantics of relative superlatives relies on evaluating comparisons of the type given in (25) for the relative meaning of the example in (23b); C is an abbreviation for 'comparison class', which in this case is the set made up of book-readers other than John:

(25) $\forall y \in C\ [y \neq \text{John} \rightarrow \max\{d\text{: John read d-long book}\} > \max\{d\text{: y read d-long book}\}]$

In words, (25) says that the degree of length of the book read by John is higher than the degrees of length of the books read by any book-reader different from John.

The relative reading of the quantitative superlative *le plus* (see 23b) is parallel to the relative reading of qualitative superlatives:

(26) $\forall y \in C\ [y \neq \text{John} \rightarrow \max\{d\text{: John read d-many books}\} > \max\{d\text{: y read d-many books}\}]$

In words, (26) says that the cardinality of the plurality of books read by John is higher than the cardinalities of the pluralities of books read by any book-reader different from John.

3.5. No absolute reading for superlative quantitatives

Turning now to the absolute readings of superlatives, and continuing to assume the set-up in this paper, let us consider the representation in (27') for (27):

(27) Jean a lu le plus long livre. (absolute reading)
(27') λx [John read (x)] (the longest book)

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The interpretation of absolute superlatives must be computed DP-internally, which means that the comparison class of the superlative is given by the NP (with possible implicit context-restrictions, e.g., the set of books denoted by *livre* in (27) may be contextually restricted to a salient set, e.g., the set of books in my library). We thus get the interpretation of absolute superlatives: *le plus long livre* in (27) denotes the singleton set that contains the book that is longest among the books (in my library):

(27") [[[-est C]$_i$ [$\mathbf{d_i}$**-long** book]]] = λx. ∀y∈C [y≠ x → max {d: x is a d-long book} > max {d: y is a d-long book}]

The singleton set is shifted to the unique entity that it contains either by applying the definite article (in languages such as English, where the definite article is outside the superlative constituent) or via a type-shifting rule (in languages such as Romance, where the definite article is arguably inside the superlative constituent).

Hackl (2009) proposes to extend this analysis to superlative quantitatives with proportional readings: the superlative quantitative applies to the set of pluralities denoted by the plural NP and yields the singleton set that contains the plurality that has the highest cardinality, i.e., a plurality that is larger than any other plurality in the NP-set:

(28) John climbed most mountains.
(28") [[[-est C]$_i$ [$\mathbf{d_i}$**-many** mountains]]]=λx. ∀y∈C[y≠ x → max{d:mountains(x) = 1 & |x| ≥ d} > max{d: |y| ≥ d}]

According to Hackl, this superlative semantics of *most* yields 'truth conditions that are equivalent to a proportional meaning' if three conditions are met: ‘there are only two sets that are compared in terms of their cardinality, the two sets are disjoint [this means that the non-identity requirement in the formula (28") must be read as a non-overlap requirement], and together they exhaust the extension of the noun phrase that MOST combines with. Claiming that one of the sets is more numerous than its complement will result in proportional truth conditions [this is so because when x and y are the two non-overlapping parts that exhaust the overall set of mountains, the cardinality of x is greater than the cardinality of y iff x contains at least 51% of the mountains]’.

Note that the three conditions needed in order for the proportional reading to be read off a superlative semantics are stipulated, they do not follow from the semantics of superlatives: the non-identity requirement in the semantic composition of absolute superlatives has to be changed into non-overlap and the NP-set must be assumed to be partitioned into two non overlapping pluralities. No comparable restrictions apply for superlative qualitatives (see the discussion of (27)) nor for the relative readings of superlative quantitatives (see § 3.4).

The 'null hypothesis' is to assume that the semantic composition of absolute superlatives cannot be changed when moving from qualitatives to quantitatives. But if the conditions stipulated by Hackl are dropped, the semantic composition gives rise to a maximality problem: since the sets of pluralities denoted by modified NPs have the algebraic structure of join semi-lattices, the plurality that has the highest cardinality in the

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set is the supremum of the join semi-lattice. This means that if we leave aside Hackl's conditions, the semantics of absolute superlatives requires that all (rather than most) mountains be climbed by John in order for (28) to be true. But this does not correspond to the interpretation of (28).

We are thus led to conclude that the semantics of absolute superlatives is incompatible with quantitative modifiers (measure phrases):

(29) Superlative quantitative modifiers cannot take absolute readings.

It is this incompatibility that explains the ungrammaticality of the absolute construal of *le plus de NP* in French (see (17 b) repeated here):

(17) b. *Le plus d'enfants sont intelligents.
'The most [of] children are intelligent.'

This example is built with an i-level predicate, which forces *le plus* 'the most' to take an absolute reading, and if Hackl's analysis of *most* were right, we would expect (17b) to be grammatical and interpreted as involving a proportional reading of *le plus*. What we see is that (17b) is ungrammatical, and this is predicted by the uninterpretability of the absolute readings of superlative quantitatives.

3.6. The proportional reading of (THE) MOST

Given the conclusion of the previous section, Hackl's analysis must be abandoned: proportional MOST in English cannot be analyzed as an absolute superlative adjective. Which leads us back to the generalized quantifier analysis:

(30) Proportional MOST is a quantificational Det (type <<e,t>,<<e,t>,t>>)

The proportional construal of *most NP* is possible in English (see also the superlatives of *many/much* in Romanian, German and Hungarian) because the NP constituent is not preceded by *de/of*, and therefore *most* need not be interpreted as a measure phrase (type <e,t>) but may also be interpreted as a quantificational Det. For English, this analysis of the proportional *mpst* is supported by the distribution of the definite article:

(31) a. John climbed *(**the) most** mountains. (relative reading)
'the group of mountains climbed by John is more numerous than the groups of mountains climbed by other people (out of a contextually given set)'
b. John climbed (***the) most** mountains in Romania. (proportional reading)
'the number of mountains climbed by John is bigger than the number of mountains that John did not climb (out of a contextually given set of mountains)'

In (31a) the definite article sits in the Det position and *most* in an adjectival position, a syntactic configuration that underlies the relative superlative reading, which is allowed not only for qualitative but also for quantitative modifiers: no maximality problem arises,

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because the groups of mountains that are compared are individuated relative to their respective climbers (in other words, the superlative operator applies to an unordered set of groups rather than to a join semi-lattice).[4] In (31b), on the other hand, the absence of *the* allows *most* to occupy the Det position:

(31') a. $[_{DP}[_{Det}$the$]\ [_{XP}[_{Adj}$most$]\ [_{NP}$mountains$]]]$ (relative most)
b. $[_{DP}\ [_{Det}$most$]\ [_{NP}$mountains$]]$ (proportional most)

(31b) resembles the absolute reading of superlatives insofar as the superlative DP combines with a λ-abstract over its syntactic position. However, (31b) is crucially different from absolute superlatives insofar as *most* is not an NP-modifier and correlatively the DP does not denote an entity. Instead, the DP is a generalized quantifier (hence the QP label used in (31"b)) that takes the main predicate as an argument:

(31") b. $[_{DP/QP}\ [_{Det/Q}$most$]\ [_{NP}$mountains$]]$ ((λx.John climbed (x))

Given this LF representation, *most* itself is a quantificational determiner that denotes the relation between the NP-set and the set obtained by abstracting over the position of *most NP* (Mostowski 1957, Rescher 1964). Thus, (31b) is true iff (32) holds, i.e., iff the cardinality of the mountains climbed by John is bigger than the cardinality of the mountains that John did not climb:

(32) $|\{x: \text{mountains}(x) \wedge \text{climb}(\text{john},x)\}| > |\{x: \text{mountains}(x)\} - \{x: \text{climb}(\text{john},x)\}|$

This analysis was attacked by Hackl on the grounds that it is not compositional, i.e., that the superlative morpho-syntax is not taken into account. Note however, that the formula in (30) does take into account the semantics of superlatives, which involves two pieces of meaning: the comparative operator and another component that roughly means 'than all others'. The comparative component is exactly as in run-of-the-mill superlatives, but the 'than all others' bit is different: whereas absolute qualitative superlatives single out one element (singular or plural entity) in the comparison class determined by the (contextually restricted) NP, proportional *most* compares the cardinality of one set (the NP-set that satisfies the main predicate) to the cardinality of its complement set (the NP-set that does not satisfy the main predicate).

Since the two sets together exhaust the NP-set, to say that one set is larger than the other is equivalent to saying that that set is the largest of the two sets. Crucially, this semantics depends on *most* being a semantic determiner, i.e., an element that denotes a relation between two sets, rather than a modifier. If *most* sits in a modifier-position (as in the relative reading), it cannot have the semantics of quantificational Det's (it cannot compare two complement sets), but instead it has the semantics of superlative modifiers, i.e., it applies to a set that contains an indefinite number of pluralities and yields the singleton set that contains the plurality with the highest cardinality.

[4] Nothing rules out some overlap between the groups of books (some books may have been read by more than one reader) so long as each group of books is related to a different reader.

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We may conclude that the superlative morpho-syntax of *most* does not force us to assume that proportional *most* is a modifier: this morphosyntax is compatible with the Det analysis of *most*. Moreover, the impossibility of the proportional construal of *le plus* was explained by making crucial use of its superlative morpho-syntax, combined with its modifier status. In sum, the contrast between *most* and *le plus* provides strong evidence in favour of analyzing proportional *most* as a superlative quantitative Det; *le plus* cannot take a proportional reading because (i) its syntax (adverbial status correlated with the *de-NP* form of its sister) does not allow it to function as a Det, and (ii) the semantics of absolute superlatives is incompatible with quantitative modifiers (due to the maximality problem).

4. PROPORTIONAL MANY IS NOT A QUANTIFICATIONAL DET: *BEAUCOUP DE* VS *LE PLUS DE*

We may now go back to proportional *many*. If no contrast is found between proportional *many* and *most*, we may conclude that proportional *many* is a quantificational determiner. If some contrast is found, we may conclude that proportional *many* is a cardinality predicate, in contrast to proportional *most*, which, as argued in the previous section, is a quantificational determiner. In order to support that view, we need to show that the observed contrast can be explained based on the distinction between cardinality predicates and quantificational determiners.

4.1. The data

The examples in (33) show that the proportional reading of *beaucoup* is allowed in those contexts in which the proportional reading of *le plus* is ruled out:

(33) a. Beaucoup d'enfants sont intelligents.
Much of children are intelligent.
'Many children are intelligent.'
b. *Le plus d'enfants respectent leurs parents.
the more of children respect their parents.

Because *beaucoup* obligatorily takes a *de NP* as a complement, it necessarily functions as a Measure Phrase (on a par with *le plus)*, i.e., as a modifier that restricts a set of plural entities, yielding a set of plural entities that have a large Measure.

4.2. The Interpretations of Measure Phrases

As explained in § 3.5 above, (31b) is unacceptable because the semantics of absolute superlative modifiers is incompatible with quantitatives. Since it does not involve superlative morpho-syntax, *beaucoup* does not occupy the Det position, and therefore it does not encounter the maximality problem which blocks the proportional reading of *le plus*.

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Leaving aside the explanation, the empirical result obtained in this paper can be summarized as in (34), where MANY and MOST (written with capitals) stand for the crosslinguistic counterparts of the English *many* and *(the) most*:

(34) Proportional MOST is a quantificational Det, whereas proportional MANY is not a quantificational Det, but rather occupies a modifier (adjectival or adverbial) position and correlatively has the semantics of a cardinality predicate.

We still need to provide an explicit analysis for the proportional reading of *beaucoup,* which is not easy because we need to reconcile the non-Det status of proportional MANY stated in (34) with the strong-indefinite status of the DP in which proportional MANY occurs (this generalization goes back to Partee 1989; see the discussion of examples (10a-b) above).

Given our current knowledge of strong indefinite DPs, which was briefly reviewed in section 2 above, we need to choose between (13a) and (13b). However, both of these configurations are problematic. The quantificational representation in (13b) is contradicted by the main result of this paper, according to which proportional MANY is not a quantificational Det. According to (13a), on the other hand, the proportional reading of MANY would involve a choice function that applies to a set of plural individuals (in this case the set of pluralities of children that have a relatively high cardinality) and picks up a plurality in that set. The LF representation of (31a) would then be (31'a), in which *beaucoup* is a cardinality predicate and *beaucoup d'étudiants* is analyzed as an entity-denoting constituent (type e) that combines with the main predicate via predicate saturation:

(33') a. λx intelligent (x) (f_{choice} (beaucoup d'enfants))

The sentence is true iff the plural individual picked up by the choice function belongs to the set of pluralities that are intelligent. This analysis is however problematic if one believes, as I do, that the distributive readings of strong indefinites cannot be analyzed as relying on choice functions.

Let us then go back to the quantificational analysis of strong indefinite DPs and attempt to reconcile it with the non-Det status of MANY (and its correlated cardinality-predicate semantics). We also need to make clear the difference between the strong (proportional) reading of MANY NP illustrated in (31a) above and the weak reading of MANY NP illustrated in (35) below:

(35) Jean a lu beaucoup de livres.
John has read MUCH of books.
'John read many books.'

In intuitive terms, my proposal is to assume that the semantic import of MANY (on both the weak and the proportional reading) can be decomposed into the semantics of the plural indefinite *some* and the semantics of a cardinality predicate. More concretely, the examples in (33a) and (35) would be interpreted as in (36a-b):

(36) a. Some students are intelligent and their number is large. (see (33a))
b. John read some books and their number is large. (see (35))

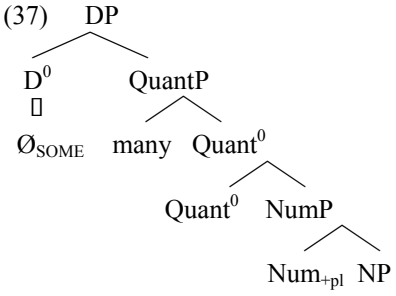
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The strong vs the weak readings of MANY NPs would be parallel to the strong vs weak readings of *some NPs*, which are contextually restricted much in the same way as the strong vs weak reading of MANY NPs: i-level predicates trigger the strong distributive (D-linked) reading of *some NPs* (e.g., *Some students are intelligent)*[5], and *there*-sentences trigger the weak reading, e.g., *There are some books on the table*.[6]

Before suggesting a somewhat more formal account of the line of investigation envisaged here, let me briefly explain why the strong reading of *beaucoup NP* correlates with the so-called 'proportional reading', which means (for the examples examined here) that the cardinality of the NP-set[7] is relevant for calculating the truth-conditions of the sentence. My suggestion is that under the strong construal, the existence of the NP-set is presupposed,[8] and the standard of comparison of *many* is the cardinality of the NP-set. The weak construal introduces no presupposition of existence, and as a consequence the standard of comparison of weak MANY is exclusively determined by pragmatic factors.

Let us finally suggest a possible implementation of the informal account sketched above. Is it possible to obtain the interpretations in (34a-b) compositionally? A quite simple answer comes to mind, which relies on assuming that the Det position of MANY NPs is filled with a null Det, which has the semantics of the English *some* (notated as ØSOME in the representation below); *many* itself sits in Spec, Quant°, which is a modifier-like position:

(37)



[5] This example can be interpreted as either generic, i.e., as saying that students in general are such that some of them are intelligent, whereas others are not, or as D-linked/specific, i.e., as saying that a contextually restricted set of students is such that some of its elements are intelligent, whereas others are not. Both readings are distributive, which is the landmark of quantificational indefinites (compare strong non-quantificational indefinites such as the Spanish *unos* 'some', which allow only collective readings).

[6] The weak reading of *some* is signaled by the possibility of deaccenting it.

[7] Our proposal extends to examples of the type *Many Scandinavians have won the Nobel prize of literature*, in which *many Scandinavians* is strong (due to the presence of the i-level predicate *win the Nobel prize*) but the standard of comparison for *many* is the cardinality of the set of Noble prize winners, rather than the cardinality of the set of Scandinavians. More precisely, the standard of comparison is the ratio of number of Nobel prize winners of a given nationality per number of Nobel prize winners of all nationalities. The sentence is true iff the ratio of /Scandinavian Nobel prize winners/ : /Nobel prize winners of all nationalities/ is large compared to the alternative ratios obtained by replacing Scandinavian with Romanian, French, etc.

[8] The *'many Scandinavians'* example invoked in the preceding footnote presupposes the existence of a set of Nobel prize winners, and it is the cardinality of this set that is relevant for calculating the truth conditions of the strong MANY occurring in this type of example.

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The strong or weak reading of DPs of the type shown in (37) is contextually constrained exactly in the same way as the weak and strong reading of the English *some* itself.

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