

# ON PROPORTIONAL AND CARDINAL ‘MANY’\*

Sveta Krasikova ([contact@svetakrasikova.eu](mailto:contact@svetakrasikova.eu))

## 1. INTRODUCTION

The quantity expressions ‘many’ and ‘few’ are known to be ambiguous between a strong proportional and a weak cardinal reading. On its proportional reading, the sentence in (1) conveys that a small *proportion* of faculty children came to the party. Intuitively, to determine what counts as few in that case, one considers the overall number of individuals in the extension of ‘faculty children’ and decides on what cardinalities can be judged small relative to it. The cardinal reading of (1) says that a small *number* of faculty children came to the party, and it is left to the context to provide some standard of comparison for fixing what counts as small. The ambiguity in question has sometimes been viewed as an instance of pragmatic underspecification, cf. Bennett (1974), Löbner (1987), that is, proportional readings can be regarded as a special case of cardinal readings with the standard of comparison depending on the extension of the noun the quantity word combines with.

(1) Few faculty children came to the party.

In her influential paper, Partee (1989) considers logical and distributional properties of ‘many’ NPs to show that under cardinal readings they behave like weak quantifiers, while under proportional readings they pass standard tests for being strong ones. Weak quantifiers are known to introduce new referents into discourse. This distinguishes them from strong quantifiers, which presuppose a contextually given set of entities. According to Milsark (1974), good diagnostics for a quantifier being weak are its occurrence in a ‘there’-insertion construction and its incompatibility with individual-level predicates. Quantity words in English are remarkable in that they occur in ‘there’-insertion constructions and can be subjects of individual-level predicates. Moreover, they are unambiguously cardinal in one case and proportional in the other. For example, ‘few faculty children’ in (2a) can only be proportional, that is, it can only mean “a small part of faculty children”. This becomes clear if we consider a situation in which all or almost all faculty children have siblings, but they constitute an insignificant number, say, compared to the overall number of children with siblings. Example (2a) is false in this scenario, which implies that it excludes a cardinal interpretation. In contrast, ‘few faculty children’ in (2b) does not have a

---

\* I am indebted to Lucas Champollion for intensively discussing this topic with me from the very beginning and having eventually joined this project. I also thank Doris Penka for her very helpful comments and suggestions. All errors are mine. Support for this research was provided by Deutsche Forschungsgemeinschaft (DFG).

proportional reading; it asserts that there was a small number of faculty children at the party, whatever might be considered a small number in a given context. To see this, note that a cardinal ‘few’ is downward-entailing in the NP slot, while the proportional one is not, cf. Partee (1989). If it is true that there were few faculty children at the party, it is also true that there were few faculty children under 4 at the party. The validity of this inference indicates that ‘few’ in (2b) is cardinal. The reader may convince themselves that the inference pattern does not go through for (2a).<sup>1</sup>

- (2) a. Few faculty children have siblings.  
b. There were few faculty children at the party.

Based on these tests, Partee tentatively concludes that the two interpretations of quantity words correspond to two lexical items. The strong/proportional ‘many’ has a genuinely *quantificational* meaning, relating the cardinalities of the sets expressed by its restriction and nuclear scope, as shown in (3a). The weak/cardinal ‘many’, on the other hand, has a meaning of an *adjective* that can be combined intersectively with the property expressed by the head noun. As the lexical entry in (3b) shows, it expresses a property of having a large cardinality.

- (3) a.  $\llbracket \text{many} \rrbracket = \lambda P \lambda Q |P \cap Q| / |P| \geq n$ , where  $n$  is a large fraction in the context.  
b.  $\llbracket \text{many} \rrbracket = \lambda x |x| \geq n$ , where  $n$  is a large number in context.

Partee thus goes against the pragmatic underspecification view by posing an ambiguity in the interpretation of ‘many’. She remarks that the lexical ambiguity hypothesis might receive some support if there existed a language lexicalizing the two putative senses of ‘many’ differently. As observed in Babko-Malaya (1998), Russian is such a language, as it realizes proportional and cardinal readings of ‘many’ by two different words. Babko-Malaya points out that English ‘many’ corresponds to two morphologically distinct forms in Russian and she uses Milsark’s diagnostics to show that one of them is proportional and the other one is cardinal. Proportional ‘mnogie’ looks like an attributive adjective in that it agrees with the NP in case, cf. (4).

- (4) Mnogie        deti                    bolejut        gripom.  
many.Nom    children.Nom    be.ill        flu  
‘A big proportion of children have the flu.’

Cardinal ‘mnogo’ is adverbial, which is reflected in its adverbial morphology and the absence of agreement with the NP, see (5).<sup>2</sup> Another indication of the adverbial character of ‘mnogo’ is that, unlike ‘mnogie’, it is not restricted to determiner positions, cf. (6).

- (5) Mnogo        detej                    boleet        gripom.  
many        children.Gen    be.ill        flu  
‘A big number of children have the flu.’

<sup>1</sup> ‘Many’ has reversed inferential properties, that is, cardinal ‘many’ is upward-entailing.

<sup>2</sup> ‘-o’ is an adverbial suffix in Russian.

- (6) Svidetel’ slishkom mnogo znaet.  
 witness too many knows  
 ‘The witness knows too much.’

‘Mnogo’ passes Milsark’s tests for weak quantifiers while ‘mnogie’ has all characteristics of being strong. Of the two, only ‘mnogo’ is acceptable in ‘there’-insertion sentences, see (7).<sup>3</sup>

- (7) a. V lesu bylo mnogo razbojnikov.  
 in wood was many-ADV outlaw  
 ‘There were many outlaws in the wood.’  
 b. \*V lesu byli mnogie razbojniki.  
 in wood was many-ADJ outlaws

On the other hand, ‘mnogo’ cannot be a subject of an individual-level predicate, while ‘mnogie’ is just fine in this environment, as shown in (8).

- (8) a. Mnogie razbojniki byli vorami.  
 many-ADV outlaws were burglars  
 ‘Many outlaws were burglars.’  
 b. \*Mnogo razbojnikov byli vorami.  
 many-ADV outlaws were burglars

Prima facie the Russian data strongly suggest that ‘many’ is lexically ambiguous as argued by Partee. However, on a closer look, the shape that the two Russian ‘many’s take is unexpected under Partee’s approach. It is the weak ‘many’ in (3b) expressing a property of individuals that is expected to look like an adjective. However, Russian chooses to assign the weak adjectival meaning in (3b) to the adverbial variant of ‘many’, and the strong quantificational meaning in (3a) to the adjectival one. This paper aims to meet the challenge that the Russian data present for an analysis of ‘many’.

We will argue that the “adjectival/proportional” and the “adverbial/cardinal” mappings observed in Russian are not surprising under a pragmatic approach to the ambiguity of ‘many’. As already mentioned, a pragmatic approach holds that both readings can be subsumed under a cardinal reading by treating a proportional reading as a special case of what counts as a large number. Adopting this view leads us to the treatment of quantity words as vague predicates, along the lines of existing analyses of gradable adjectives. Against this background, a notion that suggests itself for encoding the difference between proportional and non-proportional readings is that of a comparison class. The goal of this paper is to elaborate an analysis based on comparison classes within a degree-based approach to quantity words, which has been pursued in much recent work on comparative and superlative forms of ‘many’ and ‘few’ starting with the pioneering proposal in Hackl (2000), and has also been explored in connection with the absolute forms of ‘many’ and ‘few’, cf. Schwarzschild (2006), Solt (2009).

<sup>3</sup> Henceforth ‘mnogo’ will be glossed as many-ADV and ‘mnogie’ as many-ADJ.

To give an informal preview of our results, we will claim that Russian proportional ‘mnogie’ patterns with attributive gradable adjectives, which choose the extension of their head NP to fix the value of the comparison class. For example, ‘mnogie razbojniki’/‘many outlaws’ is interpreted as “large in number relative to the average number of outlaws in the given context”. Likewise, on its non-intersective reading, ‘vysokie razbojniki’/‘tall outlaws’ is interpreted as “tall relative to an average height of outlaws in the given context”. As for the Russian cardinal counterpart of ‘many’, we will claim, building on Schwarzschild (2006) and Solt (2009), that ‘mnogo’ is not a gradable predicate of individuals but a focus-sensitive degree adverb. Its comparison class is not lexically determined by the head noun, as in the case of ‘mnogie’, but depends on the focus-structure of the utterance. The overall outcome will be that the ambiguity in quantity words is anchored in the choice of the comparison class, which is important for determining the contextual standard of comparison. In this sense, our approach is pragmatic. However, the choice of the comparison class is grammatically constrained and results in the lexical ambiguity.

The paper is structured in the following way. In section 2, we develop an analysis of ‘many’ as a gradable adjective and elaborate on how the proportional/ cardinal ambiguity of ‘many’ can be derived as a matter of selecting a comparison class building on Hackl (2009). The gist of the proposal is that ‘many’ is a vague predicate whose meaning involves a reference to the absolute standard provided by the delineation function. The value of the standard depends on the individual domain that the adjective applies to, or the comparison class. If this domain corresponds to the extension of the noun that ‘many’ combines with, the resulting reading is proportional; otherwise it is cardinal. In the second part of this section, we propose an alternative analysis treating ‘many’ as a degree operator, motivated by some well-known distributional evidence. Section 3 deals with Russian: we first propose to analyze the proportional ‘mnogie’ as a gradable adjective and the cardinal ‘mnogo’ as a degree operator; in subsection 3.2 we turn to the question of why an adjectival and an degree-operator ‘many’ coexist in Russian and, in particular, discuss various grammatical mechanisms of constraining comparison classes; subsection 3.3. is a brief discussion of the cross-linguistic landscape. Section 4 concludes and formulates some questions for future research.

## **2. BACKGROUND: DEGREE-BASED ‘MANY’**

A straightforward way to capture the context-sensitivity of ‘many’ is to treat it as a gradable adjective, on a par with ‘tall’. The interpretation of gradable adjectives in the absolute form is known to depend on the comparison class salient in the context which establishes the standard of comparison. In this section, we will lay out an approach according to which the value of the comparison class associated with a quantity word determines whether the resulting interpretation is proportional or cardinal. We will present two implementations of such approach. In subsection 2.1, we will develop an analysis of ‘many’ as a property of individuals depending on the contextually given delineation. In subsection 2.3, we will demonstrate how the same kind of dependence can find its way into a degree-operator semantics of ‘many’ argued for in much of the recent literature on quantity expressions, cf. Schwarzschild (2006), Solt (2010). The ultimate goal of this section is to set the stage for the treatment of the Russian data where both the individual-

based and the degree-operator analyses are called for.

## 2.1. Quantity Words as Gradable Adjectives

### 2.1.1. Basic Lexical Entry

There are numerous approaches to the analysis of relative gradable adjective. We are going to endorse the view of gradable adjectives as relations between individuals and abstract objects called degrees, which goes back to Cresswell (1976). This kind of approach assumes that the semantic ontology includes entities of type *d* (degree). Degrees may be seen as equivalence classes of individuals that possess this or that gradable property to an equal extent. Unlike individuals, they may be ordered by a linear ordering. Degrees are projected into the syntactic representation by gradable predicates, which are treated as expressions of type *d(et)*, relating individuals to degrees. For example, ‘tall’ relates entities to their heights.

$$(9) \quad \llbracket \text{tall} \rrbracket = \lambda d \in D_d \lambda x \in D_e x \text{ is } d\text{-tall}$$

By analogy ‘many’ can be treated as a relation between plural individuals and their cardinalities. A degree-based analysis along these lines was first developed in Hackl (2009) building on the proposal in Hackl (2000). To be precise, Hackl treats ‘many’ as a relation between a plural individual and the number of its atoms, adopting the standard analysis of plural individuals, according to which they can be measured in terms of their atomic parts, cf. Link (1983).<sup>4</sup>

$$(10) \quad \llbracket \text{many} \rrbracket = \lambda d \in N \lambda X \in D_e X \text{ consists of } d\text{-many atoms}$$

To sharpen the parallel, we may define relations expressed by ‘tall’ and ‘many’ in terms of measure functions. Measure function is a term for a function assigning a unique degree of some sort to an individual. For instance, ‘tall’ can be defined by means of the measure function HEIGHT mapping individuals to their heights, and ‘many’ can be defined by using the cardinality measure function CARD, that maps individuals to the number of atoms they consist of, see (11).<sup>5</sup>

$$(11) \quad \begin{array}{l} \text{a.} \quad \llbracket \text{tall} \rrbracket = \lambda d \in D_{\text{tall}} \lambda x \in D_e \text{HEIGHT}(x) \geq_{\text{tall}} d \\ \text{b.} \quad \llbracket \text{many} \rrbracket = \lambda d \in N \lambda X \in D_e \text{CARD}(X) \geq d \end{array}$$

Negative-pole ‘short’ and ‘few’ can be defined as operating with inversely ordered degrees in the range of HEIGHT and CARD, respectively. Having established the parallel between antonyms, we will concentrate on the positive-pole ‘many’ in the rest of the paper, referring to its negative-pole counterpart only occasionally.

<sup>4</sup> To be more precise, Hackl analyzes ‘many’ as an intersective modifier of a plural NP; semantically, the definition given in (10) is equivalent to his.

<sup>5</sup> The following lexical entries incorporate a standard assumption that adjectives are monotone in their degree argument; nothing in the present discussion hinges on this assumption.

- (12) a.  $\llbracket \text{short} \rrbracket = \lambda d \in D_d \lambda x \in D_c \text{HEIGHT}(x) \geq_{\text{short}} d$   
 b.  $\llbracket \text{few} \rrbracket = \lambda d \in N \lambda X \in D_c \text{CARD}(X) \leq d$

Hackl (2009) is primarily concerned with the analysis of ‘most’, which he takes to be the superlative form of ‘many’, cf. Bresnan, (1973). He proposes that in a superlative construction the degree argument of ‘many’ is bound by the superlative morpheme, first applying to a comparison class variable C, see (13).

- (13)  $\llbracket \llbracket \text{-est } C \rrbracket \text{ many} \rrbracket \llbracket \text{faculty children} \rrbracket$

To deal with a positive case, where ‘many’ is not morphologically marked by the superlative or comparative, we assume that there is an option of binding its degree argument lexically. This means that the lexicon contains two lexical entries for ‘many’: the neutral ‘many’ with an open degree argument that has to be bound in the syntax, e.g. by the superlative, viz. (11b); and the absolute ‘many’ whose degree argument is saturated in the lexicon. Following Barker (2002), we assume that an absolute adjective relates an individual to a standard degree that is provided by the delineation function **std**, see (14).<sup>6</sup> Delineation functions map adjective meanings to degrees.<sup>7</sup>

- (14)  $\llbracket \text{many} \rrbracket = \lambda X \in D_c \text{CARD}(X) \geq \mathbf{std}(\llbracket \text{many} \rrbracket)$ ,  
 where **std** is a delineation function. (preliminary)

Let us consider example (15a). Assuming that the absolute ‘many’ combines with ‘faculty children’ by Predicate Modification, see Heim and Kratzer (1998), the entire NP has the interpretation in (15b), that is, it expresses a property that applies to plural individuals that are faculty children and consist of a number of atoms that corresponds to the absolute standard for ‘many’ returned by the delineation, that is, a number considered large a given context, cf. (15b).

- (15) a.  $\llbracket \text{many} \llbracket \text{faculty children} \rrbracket \rrbracket$   
 b.  $\lambda X X \text{ are faculty children} \ \& \ \text{CARD}(X) \geq \mathbf{std}(\llbracket \text{many} \rrbracket)$

To compose the meaning in (15) with the rest of the clause, several options are available. ‘Many’ NPs can be treated as Heim-style indefinites, which introduce new individual variables bound by an unselective existential closure at a sentential level, or assumed to be headed by a silent existential determiner, cf. Hackl (2009).

### 2.1.2. *Resolving Proportional/Cardinal Ambiguity*

By treating ‘many’ as a gradable adjective we have a mechanism for capturing its interpretational

<sup>6</sup> Delineation functions go back to Lewis (1970). On a par with a variable assignment function, a delineation is a parameter of evaluation, see Barker (2002) for more details.

<sup>7</sup> Strictly speaking, the delineation depends on the evaluation context; for simplicity, we ignore the intensional aspect as it does not hinge on the present discussion.

variability, that is the availability of proportional and non-proportional readings. This mechanism is the dependence of delineations on contextually salient comparison classes. The idea that proportional readings are the result of constraining the comparison class is worked out in Hackl (2009) for ‘most’. Like ‘many’, ‘most’ has a proportional and a non-proportional reading, called relative. Consider the pair of sentences in (16). In (16a) salient people are compared according to the number of mountains they climbed, which corresponds to a relative reading. In (16b) ‘most’ is interpreted proportionally and can be paraphrased by ‘more than half’.

- (16) a. John climbed the most mountains.  
 b. John climbed most mountains.

Hackl suggests that the two readings of ‘most’ due to the context-sensitivity of the superlative which depends on the value of a property type contextual variable. The relative interpretation is associated with the value given in (17a), that is, the set of pluralities of mountains that have been climbed by some salient individual. By virtue of using this comparison class, (16a) conveys that John climbed a plurality of mountains with a higher cardinality than pluralities climbed by other salient individuals. The proportional interpretation is the result of setting this value to the set of pluralities of salient mountains, as shown in (17b). This brings about a comparison of non-overlapping pluralities of mountains, more precisely, the assertion that John climbed a more numerous plurality than any plurality distinct from it, which amounts to a ‘more than half’ reading.

- (17) a.  $C = \{X: X \text{ are mountains climbed by a salient individual in the context}\}$   
 b.  $C = \{X: X \text{ are salient mountains}\}$

This analysis of the relative/proportional ambiguity of ‘most’ can be straightforwardly extended to the cardinal/proportional ambiguity of ‘many’. While in superlatives ambiguity stems from the value of the comparison class variable on the superlative morpheme, in positive constructions it is related to the absolute standard. There is agreement in the literature that the value of an absolute standard of comparison depends on what entities are salient in the discourse, that is, on the comparison class. However, there is no standard procedure on relativizing the standard to a comparison class, see Klein (1980), von Stechow (1984), Kennedy (2007). Following Kennedy (2007), we assume that the comparison class does not serve as a parameter of the delineation function, but is rather an implicit restriction on the individual domain of a gradable adjective. Concretely, ‘many’ takes as its first argument a property of individuals which is used to restrict the domain of individuals that the adjective applies to. The delineation function applies to an adjective with the same kind of constraint on its individual domain, cf. (18). The domain restriction  $C$  on ‘many’ in (18) is akin to implicit quantifier domain restrictions, cf. Kennedy (2007).

- (18)  $[[\text{many}]] = \lambda C \in D_{et} \lambda x \in D_e: x \in C.$   
 $CARD(x) \geq \mathbf{std}(\lambda d \in D_d \lambda x \in D_e: x \in C. CARD(X) \geq d),$

where **std** is a delineation function.

Let us work through an example to see how proportional and cardinal readings arise. Consider example (19a). Suppose that we are interested in how many mountains John, Mary and Bill climbed. This context provides us with a comparison class corresponding to the set in (19b), that is, the set of plural mountains that John, Bill or Mary climbed. Given this value of *C*, (19a) is true if and only if John climbed a plurality of mountains whose cardinality is large relative to the pluralities of mountains climbed by the salient individuals. This is a cardinal reading. The crucial part is that **d** does not provide the absolute standard for plain ‘many’ but for ‘many’ defined on mountains climbed by salient individuals, cf. the resulting truth conditions in (20a). To get a proportional reading, suppose that the context makes salient a certain set of mountains. This could be the set of all mountains in Switzerland, see (19c). Under this assignment, (19a) asserts that the cardinality of a plurality of mountains climbed by John constitutes a large number relative to the overall number of Swiss mountains, which corresponds to a proportional reading, cf. (20b). Again, the delineation returns an absolute standard for ‘many’ with a restricted domain; this time only Swiss mountains are related to their cardinalities.

- (19) a. John climbed many mountains.  
 b.  $C = \{X: X \text{ are mountains} \ \& \ \exists y \in \{j, b, m\}[y \text{ climbed } X]\}$   
 c.  $C = \{X: X \text{ are Swiss mountains}\}$
- (20) a.  $\exists X[\text{John climbed } X \ \& \ X \text{ are mountains} \ \& \ \text{CARD}(X) \geq \text{std}(\lambda d \in D_d \lambda X \in D_e : X \text{ are mountains} \ \& \ \exists y \in \{j, b, m\}[y \text{ climbed } X]. \text{CARD}(X) \geq d)]$   
 b.  $\exists X [\text{John climbed } X \ \& \ X \text{ are mountains} \ \& \ \text{CARD}(X) \geq \text{std}(\lambda d \in D_d \lambda X \in D_e : X \text{ are Swiss mountains. } \text{CARD}(X) \geq d)]$

The analysis we have just sketched is certainly too flat to capture all kinds of cardinal interpretations one may encounter. In a dynamic approach, the value of the comparison class would keep track of the flow of information and change correspondingly. A famous example by Partee, given in (21a), illustrates how a comparison class can be reset within an utterance. On its natural reading, this sentence conveys that a large amount of men, say, in the US, are such that they date a number of women that is large regarding how many women an average man dates. That is, ‘many men’ is proportional, and ‘many women’ is cardinal. By virtue of being proportional, the first ‘many’ is not upward-entailing: from the fact that many men under 30 date many women it does not follow that many men date many women. The second ‘many’, in contrast, validates this kind of inference. The first ‘many’ is evaluated with respect to the salient pluralities of men, see (21b). The mention of the subject and the predicate may shift the topic and lead to a change of the comparison class. The second ‘many’ is interpreted relative to the comparison class in (21c). ‘Many women’ in this example is true of a plurality of women whose cardinality is large relative to cardinalities of groups of women dated by one man, which corresponds to the intuitively available interpretation.



- (21) a. Many men date many women.  
 b. {X: X are salient men}  
 c. {X: X are women &  $\exists y$ [y is a man & y dates X]}

Summing up, we proposed that the cardinal/proportional ambiguity of ‘many’ is due to a contextually unspecified domain restriction on its individual argument. Under this view, we are not dealing with a case of genuine lexical ambiguity but with context sensitivity inherent to gradable predicates.

## 2.2. Quantity Words as Degree Operators

### 2.2.1. *Distributional Tests*

Treating ‘many’ as an adjective accounts for its adjectival features such as its ability to combine with the superlative and comparative morphology, however, its distribution is quite different from that of adjectives. In his seminal paper on measurement in the nominal domain, Schwarzschild (2006) draws a parallel between the quantity words ‘many’/‘much’ and ‘few’/‘little’, on the one hand, and measure phrases and numerals, on the other, on the basis of their syntactic and semantic affinity. The first observation he makes is that quantity words pattern with measure phrases and numerals rather than gradable adjectives in their distribution. Like measure phrases they combine with the comparative form of adjectives to measure the difference between the compared items; this use is often called differential, e.g. (22).

- (22) a. John climbed many/five more mountains than I expected.  
 b. John consumed much/2 litres more beer than Bill.  
 c. John is much/5 cm taller than Bill.

Schwarzschild goes on to point out another context that quantity words share with measure phrases and in which adjectives do not occur, namely, the partitive construction, where they specify the amount of substance expressed by a nominal.

- (23) a. many/few/five/\*heavy of the rocks  
 b. much/little/two liters of the beer

The seemingly attributive uses of ‘many’ and ‘few’ we have been considering so far are not different in this respect, they can be subsumed under the so called pseudo-partitives, which differ from true partitives in that they do not require the “substance noun” to be definite.

- (24) a. many/few/five rocks  
 b. much/little/two litres of beer

On the semantic side, there is also a striking similarity between quantity words and measure phrases, setting them apart from attributive gradable adjectives. Following Krifka (1989),

Schwarzschild points out that quantity words, measure phrases and numerals occurring in nominal constructions are only associated with dimensions monotonic on the part-whole relation, while attributive adjectives require dimensions to be non-monotonic on the part-whole relation. A dimension has the relevant property if it tracks the part-whole ordering, that is, if an object  $x$  is part of an object  $y$ , then the degree of  $x$  on the relevant dimension is smaller than the degree of  $y$  on the same dimension. For example, weight is monotonic on the part-whole relation, while temperature is not. Consider the partitives with a quantity word and measure phrase in (25a). Both measure a substance by volume, which is a monotonic dimension. In contrast, the attributives in (25b) involve non-monotonic dimensions.

- (25) a. much/two litres of the beer (volume)  
 b. deep/two-litre water (depth/volume per bottle)

Another pair of examples from Schwarzschild (2006), given in (26) – (27), demonstrates, that a quantity word is unacceptable if the involved dimension is non-monotonic, whereas a quantity word is fine but an adjective is unacceptable if a monotonic dimension is at play. That is, the star on (26b) signals that ‘much’ cannot talk about depth, and the star on (27b) signals that ‘deep’ cannot be associated with volume.

- (26) a. She is standing in deep water. (depth)  
 b. \*She is standing in so much water. (depth)  
 (27) a. They reported that New York got too much snow last night. (volume)  
 b. \*They reported that New York got deep snow last night. (volume)

### 2.2.2. *A Unified Analysis of Quantity Words and Measure Phrases*

Drawing on these distributional similarities of quantity words and measure phrases, Schwarzschild suggests that they should have similar semantic denotations. In a number of papers, he defends the view that measure expressions are predicates of intervals. Their function is to characterize the size of a degree interval of some dimension in terms of a unit of measurement appropriate for that dimension. For example, ‘2 litres’ denotes a property of intervals that measure two litres in volume. Likewise, the quantity word ‘much’ in ‘much beer’ may be treated as a property of intervals that measure a large amount in volume.

In the rest of this subsection, we will develop an analysis of quantity words in the spirit of Schwarzschild. To avoid controversial ontological assumptions, we continue to work with degrees, and define measure phrases and quantity words as predicates of degree sets rather than of intervals. ‘Two litres’ is defined in (28a) as a property of degree sets, the distance between the minimum and the maximum of which is 2 litres.<sup>8</sup> Hence the logical type of measure phrases corresponds to functions from degree sets  $D_{dt}$  to truth values, that is  $(dt)t$ . Likewise, quantity words denote a property of degree sets the distance between whose bounds corresponds to a large

<sup>8</sup> Our entries differ from Schwarzschild’s in that they are degree - not interval-based, hence the use of the function DISTANCE which is not used by Schwarzschild.

degree, cf. (28b) – (28c). They take an additional comparison class argument. ‘Much’ and ‘many’ differ in their selectional properties; ‘many’ is used when the relevant dimension is cardinality, while ‘much’ is used with all other appropriate dimensions, cf. Solt (2009).

- (28) a.  $[[\text{two litres}]] = \lambda P \in D_{dt} \text{LITRES}(\text{DISTANCE}(\min(P), \max(P))) \geq 2$ ,  
 where LITRES is a unit function from degrees to numbers, and DISTANCE maps two numerical degrees to a degree representing the distance between them.
- b.  $[[\text{many}]] = \lambda C \in D_{et} \lambda P \in D_{dt} \text{DISTANCE}(\min(P), \max(P)) \geq \mathbf{std}(\lambda d \in D_d \lambda X \in D_e : X \in C. \text{CARD}(X) \geq d)$ , where **std** is a delineation function.
- c.  $[[\text{much}]] = \lambda C \in D_{et} \lambda P \in D_{dt} \text{DISTANCE}(\min(P), \max(P)) \geq \mathbf{std}(\lambda d \in D_d \lambda X \in D_e : X \in C. F(X) \geq d)$ , where **std** is a delineation function and F is a salient measure function.

These definitions can be applied to the analysis of differential quantity words. Glossing over details of the treatment of the comparative, we assume that it expresses the “>” relation between degrees, see e.g. Heim (2006), Krasikova (2011), and can be modified by a differential adverbial with the semantics given in (29a). The truth conditions of example (29b) are given in (29c). While the comparative existentially binds the cardinality of mountains climbed by John and relates it to 5, the differential modifier specifies that the difference between them is a large number, cf. the underlined part of line (29c).

- (29) a.  $[[\text{BY many}]] = \lambda d \in D_d \lambda d' \in D_d [[\text{many}]](C)(\{n \mid d < n < d'\})$
- b. John climbed many more than 5 mountains.
- c.  $\exists d \exists x [\text{John climbed } X \ \& \ X \text{ are mountains} \ \& \ \underline{\text{CARD}(X) \geq d} \ \& \ d > 5 \ \& \ \underline{\text{DISTANCE}(d, 5)} \geq \mathbf{std}(\lambda d \in D_d \lambda X \in D_e : X \in C. \text{CARD}(X) \geq d)]$

Having defined measure phrases as gradable predicates of degrees, we face the task of explaining how they combine with predicates of individuals in nominal constructions, which Schwarzschild categorizes as a variety of pseudo-partitives. This task includes locating the source of the cardinality measure function, which in Hackl’s analysis is part of the meaning of a quantity word. Following much of the literature on measurement, we assume that nominal constructions, like ‘much/two litres of beer’ and ‘many/2 rocks’, involve an abstract functional head MEAS, the role of which is to introduce a dimension along which objects in the extension of the nominal are measured. The definition of MEAS, as given in (30), makes it similar to the treatment of ‘of’ in Champollion’s (2010) analysis of pseudo-partitives. It combines with a noun to return a gradable predicate, that is, a relation between a degree and an individual based on a contextually salient measure function.

- (30)  $[[\text{MEAS}]] = \lambda P \in D_{et} \lambda d \in D_d \lambda x \in D_e P(x) \ \& \ F(x) \geq d$ ,  
 where F is a salient measure function.

Let us work through the analysis of example (31a). The LF is given in (31b). To avoid a type-mismatch ‘many’ moves to the edge of the clause leaving behind a trace of type  $d$ . We assume that the NP is headed by a silent existential determiner.

- (31) a. John climbed many mountains.  
 b.  $[[\text{many } C \lambda d [\exists [\text{et } d [\text{d(et)} \text{ MEAS mountains}]]] \lambda x[\text{John climbed } x]]]$

By stipulation, ‘many’ is defined on numbers, that is, degrees in the range of the measure function CARD, as a result MEAS can select only CARD in this example. The main steps in the derivation are illustrated below.

- (32)  $[[\text{many}]](C)(\lambda d \exists X[[\text{MEAS mountains}]](d)(x) \& \text{John climbed } X) =$   
*(by definition (30))*  
 $= [[\text{many}]](C)(\lambda d \exists X[X \text{ are mountains} \& \text{CARD}(X) \geq d \& \text{John climbed } X]) =$   
*(by definition (28b))*  
 $= \text{DISTANCE}(\min(\lambda d \exists X[X \text{ are mountains} \& \text{CARD}(X) \geq d \& \text{John climbed } X]), \max$   
 $(\lambda d \exists X[X \text{ are mountains} \& \text{CARD}(X) \geq d \& \text{John climbed } X]) \geq \mathbf{std}(\lambda d \in D_d \lambda X \in$   
 $D_e : X \in C. \text{CARD}(X) \geq d), \text{ where } \mathbf{std} \text{ is a delineation function}$   
 $= \max(\lambda d \exists X[X \text{ are mountains} \& \text{CARD}(X) \geq d \& \text{John climbed } X]) \geq \mathbf{std}(\lambda d \in D_d \lambda X$   
 $\in D_e : X \in C. \text{CARD}(X) \geq d), \text{ where } \mathbf{std} \text{ is a delineation function}$   
 $= \exists X[X \text{ are mountains} \& \text{John climbed } X \& \text{CARD}(X) \geq \mathbf{std}(\lambda d \in D_d \lambda X \in D_e : X \in$   
 $C. \text{CARD}(X) \geq d)], \text{ where } \mathbf{std} \text{ is a delineation function.}$

The resulting interpretation is identical to the one that would have been derived by the analysis presented in section 2.1. This is an expected outcome since the current analysis preserves all semantic ingredients of the previous analysis and merely involves a different mapping of syntax to semantics. Anything else being the same, the current analysis is to be preferred for English, as it fares better with respect to the distributional facts. We will see in the following section that to account for availability of two morphological forms in Russian we need both the Hackl-style adjectival meaning and the Schwarzschild-style degree-operator entry.

### 3. THE CASE OF RUSSIAN

The analysis of proportional and cardinal ‘many’ in terms of comparison classes, fleshed out in the previous section, relies on an independently motivated notion of comparison classes as implicit domain restrictions of gradable adjectives, in order to resolve ambiguity. We demonstrated that the information about the comparison class can be incorporated in both the adjectival and the degree-operator meaning of ‘many’, and we argued for the latter meaning in view of the distributional evidence. In this section, we will consider the possibility of having both kinds of meanings within one language, focusing on Russian. The task of the section is to motivate the availability of two lexical entries in Russian. Our claim will be that the choice

between two lexical entries allows Russian to control for the resulting reading. Specifically, we will propose that the attributive ‘mnogie’ in Russian expresses a non-intersective predicate modifier and the adverbial ‘mnogo’ is a focus-sensitive degree operator.

### 3.1. Two ‘Many’s

#### 3.1.1 ‘Mnogo’ as an Adjective and ‘Mnogie’ as a Degree-Operator

The two realizations of ‘many’ in Russian map neatly to the two lexical entries discussed in the previous section. Recall that Russian morphologically marks the cardinal ‘mnogo’ as an adverb and the proportional ‘mnogie’ as an adjective. Nominal constructions with ‘mnogo’ have the form of pseudo-partitives. The construction marker of a pseudo-partitive in Russian is the genitive case on the “substance noun”. Accordingly, NPs occurring with ‘mnogo’ are in the genitive case, cf. (33a). Another piece of evidence for the non-adjectival status of ‘mnogo’ is that, like English ‘many’, it can be a differential modifier in a comparative construction, cf. (33b).

- (33) a. pjat’ kilogram/ pjat’/ mnogo jablok  
 5 kg/ five/ many-ADV apple.pl.Gen
- b. Ekzamen sdavalo namnogo bolshe sta studentov.  
 exam took by\_many-ADV more 100 student.pl.Gen  
 ‘Many more than 100 students took the exam.’

The attributive ‘mnogie’ patterns with attributive adjectives and measure phrases carrying adjectival morphology, cf. (34). It does not have a function of a differential modifier.

- (34) vysokie/ dvuxmetrovye/ mnogie studenty  
 tall.pl.Nom/ two\_metre.pl.Nom/ many.pl.Nom student.pl.Nom

In view of these facts, it is plausible to adopt a Schwarzschild-style analysis for the adverbial ‘mnogo’. Like numerals and measure phrases occurring in partitives and differential comparatives, it expresses a predicate of degree sets. On the other hand, ‘mnogie’, like regular gradable adjectives, expresses a gradable predicate of individuals. This is captured by the preliminary definitions in (35), which correspond to (28b) and (14), respectively.

- (35) a.  $[[\text{mnogo}]] = \lambda C \in D_{\text{et}} \lambda P \in D_{\text{dt}} \text{DISTANCE}(\min(P), \max(P)) \geq \mathbf{std}(\lambda d \in D_d \lambda X \in D_e : X \in C. \text{CARD}(X) \geq d)$ , where **std** is a delineation function.
- b.  $[[\text{mnogie}]] = \lambda C \in D_{\text{et}} \lambda X \in D_e \text{CARD}(X) \geq \mathbf{std}(\lambda d \in D_d \lambda X \in D_e : x \in C. \text{CARD}(X) \geq d)$ , where **std** is a delineation function.

Why does Russian make available two types of meaning? As the definitions in (35) stand, one would not expect both of them to be lexically realized within one language, as they result in the same interpretation. Obviously, some mechanism has to map the two realizations to the two

interpretations they are unambiguously associated with. We propose that the crucial property that semantically distinguishes ‘mnogo’ from ‘mnogie’ and is responsible for the lack of ambiguity is focus-sensitivity.

### 3.1.2. *Focus-Affected Readings*

‘Mnogo’, like the weak cardinal ‘many’, is focus-sensitive. Babko-Malaya (1998), following the earlier work by Herburger (e.g. Herburger (1997)), shows that the truth conditions of sentences with ‘many’ may depend on their focus value. Likewise, the kind of interpretation obtaining with ‘mnogo’ can be determined by the focus. Consider the following pair of sentences differing in the placement of focus.<sup>9</sup>

- (36) a. Mnogo detej boleet [gripom]<sub>F</sub>.  
           many-ADV children be\_ill flu  
       b. Gripom boleet mnogo [detej]<sub>F</sub>.  
           flue be\_ill many-ADV children  
           ‘Many children have the flu.’

Example (36a) conveys that the number of children having the flu is large compared to the number of children suffering under other illnesses. Example (36b) has a different kind of cardinal interpretation: it conveys that the number of children with the flue is large relative to the other age groups with the flu. Apparently, our judgement of what counts as large is affected by the intonational prominence.

This kind of readings are called focus-affected readings by Herburger, who points out that they are impossible with strong quantifiers like the proportional ‘many’, that is, focus does not have a truth-conditional effect in those cases. Russian is no different in this respect. ‘Mnogie’, unlike ‘mnogo’, does not give rise to focus-affected readings. Consider the variants of (36) with ‘mnogo’ replaced by ‘mnogie’, given in (37). Both examples talk about a large proportion of children. The focus can at best have a corrective function, as the given continuations suggest. It does not influence the interpretation of ‘mnogie’.

- (37) a. Mnogie deti bolejut [gripom]<sub>F</sub>, (a ne vetrjankoj.)  
           many-ADJ children be\_ill flu, but neg chickenpox  
           ‘Many children have the flu, not chickenpox.’  
       b. Gimpom bolejut mnogie [deti]<sub>F</sub>, (a ne vzroslye)  
           flu be\_ill many-ADJ children but neg adults  
           ‘Many children, not adults, have the flu.’

Having established this empirical difference between ‘mnogo’ and ‘mnogie’, we will now turn to the question of why it leads to the lack of ambiguity. More precisely, the goal is to explain why focus-sensitivity precludes proportional readings.

<sup>9</sup> Note that focussed elements tend to occupy sentence-final positions in Russian.

### 3.2. Grammatically Fixed Comparison Classes

In the following sections, we will revise the entries in (35), so as to block a cardinal reading with ‘mnogie’ and a proportional reading with ‘mnogo’. The main claim will be that a proportional reading is unavailable in pseudo-partitives because focus-sensitivity of ‘mnogo’ blocks the form of a comparison class required for this reading to arise. Therefore, Russian has to secure proportional readings in a different, non-pragmatic way, namely by making ‘mnogie’ non-intersectively modify the noun it combines with.

#### 3.2.1. *Non-Intersective Modification*

To see why non-intersective modification is useful for the purpose at hand, let us look at the parallel between non-intersective readings of gradable adjectives and proportional readings of ‘many’. If an attributive adjective is interpreted non-intersectively, its comparison class is constrained by the head noun. For example, in (38b) ‘smart’ is understood relatively to some norm of smartness for children. Analogously, if ‘many’ is interpreted proportionally, its comparison class corresponds to the noun it combines with. For example, in (38a) ‘many children’ means a large number relative to the overall number of children.

- (38) a. Many children are willful.  
 b. Smart children are willful.

To capture this parallel, we assume that the head noun always saturates the comparison class argument of ‘mnogie’. In (39) we define ‘mnogie’ as a modifier. Essentially, this has the effect of fixing the comparison class to the denotation of the noun.

- (39)  $[[\text{mnogie}]] = \lambda P \in D_{\text{et}} \lambda X \in D_e P(X) \ \& \ \text{CARD}(X) \geq \text{std}(\lambda d \in D_d \lambda X \in D_e : X \in C. \text{CARD}(X) \geq d)$ , where **std** is a delineation function.

To see that this indeed leads to a proportional interpretation, let us sketch the analysis of an example with ‘mnogie’. Consider sentence (4), repeated below.

- (40) Mnogie        deti                bolejut        gripom.  
 many.Nom    children.Nom    be.ill        flu  
 ‘A big proportion of children have the flu.’

The LF for this sentence is outlined in (41a). ‘Mnogie’ applies to ‘deti’/‘children’, which guarantees that the delineation function operates on a measure function with the domain consisting of children only. As a result, the standard degree that the delineation function provides is a large number relative to the cardinalities in the extension of ‘children’, see the main derivation steps in (41b).

- (41) a.  $[_t \exists [_{et} [_{(et)(et)} \text{mnogie}] \text{deti}]] \lambda x [_t x [_{et} \text{bolejut gripom}]]$   
 b.  $\exists X [ [ [ \text{mnogie} ] ] ( [ [ \text{deti} ] ] ) ( X ) \ \& \ X \text{ have the flu} ] =$   
 $= \exists X [ X \text{ are children} \ \& \ X \text{ have the flu} \ \& \ \text{CARD}(X) \geq \mathbf{std}(\lambda d \in D_d \lambda X \in D_e : X \text{ are children. CARD}(X) \geq d) ]$ , where **std** is a delineation function.

To sum up, we proposed that a proportional reading of ‘mnogie’ is a result of its being a non-intersective modifier. It turns a property expressed by a noun into a vague predicate, with the meaning of the noun serving as its comparison class.

### 3.2.2. Focus Sensitivity

To approach the lack of proportional readings with ‘mnogo’, we should first pin down the kinds of comparison class that are compatible with this reading. We can then gain a handle on the issue by considering the factors that force this or that kind of comparison class. Drawing on the discussion in the previous sections, a proportional reading comes about if the comparison class corresponds to a property expressed by the nominal that ‘many’ combines with. The general schema is given in (42).

- (42) Comparison classes for proportional ‘many NP’:  
 $\{x: [ [ \text{NP} ] ] (x)\}$

Given this kind of a comparison class, we infer what counts as ‘many’ by looking at the cardinalities of all entities in the extension of the NP. As soon as some additional properties are factored into the definition of a comparison class, the picture changes. In the schema given in (43), members of the comparison class are said to stand in some relation R to other entities, or have some property P.

- (43) Comparison classes for non-proportional ‘many NP’:  
 $\{x: \exists y [ [ [ \text{NP} ] ] (x) \ \& \ R(x,y) ]\}$  or  
 $\{x: \exists P [ [ [ \text{NP} ] ] (x) \ \& \ P(x) ]\}$

For example, if the comparison class on ‘many’ in (44) corresponds to pluralities of salient mountains, cf. (45a), the resulting reading is proportional. If we add the property of being climbed by somebody, cf. (45b), we do not consider pluralities of salient mountains any longer, but pluralities of mountains climbed by this or that salient individual, which corresponds to a cardinal reading. That is, if there are only three individuals who climbed ten mountains, example (45a) is bound to have a truth value different from the one it has when we are looking at the set of relevant mountains, say the set of all mountains in Switzerland.

- (44) John climbed many mountains.  
 (45) a.  $\{x: \text{mountains}(x)\}$   
 b.  $\{x: \exists y [ \text{mountains}(x) \ \& \ \text{climbed}(x, y) ]\}$



A comparison class is associated with the topic of a sentence since it corresponds to what has been introduced in the previous discourse. Topics have long been known to depend on the focus structure of a sentence and this dependence has been exploited to restrict quantifier domains, cf. von Stechow (1994). The focus-sensitivity of ‘mnogo’ discussed above suggests that focus can also constrain the comparison class.

Consider the following example from Herburger (1997) to see the effect of focus on the comparison class.

(46) Few [competent]<sub>F</sub> cooks applied.

Under the focus-affected reading of ‘few’, this sentence states that among the applications from cooks, there was a small number from competent ones. Descriptively, the defocused part of the sentence serves as a restriction of ‘few’, whereas the focussed element determines its scope. Translated into the comparison class talk, the value of the comparison class corresponds to the part of the sentence that is not stressed. This is, in fact, how focus is generally interpreted: if there is an element that bears focus, the part of a sentence to the exclusion of this element, also called background, corresponds to the topic, cf. e.g. Büring (1996).

Abstracting over the focussed element in (46), we derive the set  $C = [\lambda x \exists P[P(x) \ \& \ \text{cooks}(x) \ \& \ \text{applied}(x)]]$ , that is, a set of pluralities of cooks who applied and have some salient property. By the rules of focus interpretation, this set corresponds to the topic, which means that it determines the comparison class and, specifically, what counts as few in the context. Assuming that  $P$  is either the property of being competent or the property of being incompetent, the maximal cardinality of pluralities in  $C$  corresponds to the overall number of applications from cooks. Determining what counts as few relative to this number, we arrive at the focus-affected reading reported by Herburger.

Turning back to the schemata in (42) and (43), the additional quantificational component of (43) can be seen as a contribution of focus. If we assume that adverbial ‘mnogo’ is evaluated with respect to a comparison class that tracks the focus structure of the utterance, we predict that it never receives a proportional reading. A proposal to treat ‘many’ as a focus-sensitive expression is not new. It was first put forward by Babko-Malaya (Babko-Malaya (1998)) who was concerned with context-sensitivity of cardinal readings. The core of her proposal is that ‘many’, like other focus-sensitive elements, takes a covert comparison class argument the value of which is presupposed to be restricted by the focus structure of the scope of ‘many’. Babko-Malaya treats ‘many’ along the lines of the Roothian analysis of ‘only’ within an alternative-based theory of focus, see e.g. Rooth (1996).

Instead of elaborating Babko-Malaya’s analysis, we are going to wire focus-sensitivity into the Schwarzschild-style analysis of ‘many’ presented above.<sup>10</sup> According to the revised entry in (47), ‘mnogo’ requires that the focus semantic value of its prejacent, that is, the degree property in its scope, determine the domain of the adjective that is passed to **std**. To be precise, it restricts the domain to those entities whose cardinality is in the union of the focus semantic value of the prejacent.

<sup>10</sup> Babko-Malaya’s entry is based on Partee’s definition of the cardinal ‘many’ and is essentially adjectival.

- (47)  $[[\text{mnogoc}]] = \lambda P \in D_{dt} \text{DISTANCE}(\min(P), \max(P)) \geq \mathbf{std}(\lambda d \in D_d \lambda X \in D_e: \text{CARD}(X) \in \cup C. \text{CARD}(X) \geq d)$ , where **std** is a delineation function.

In this entry, the focus semantic value corresponds to the contextual variable on ‘*mnogo*’.<sup>11</sup> A focus semantic value is a set of expressions of the type of the prejacent varying in the value of the focussed element. In this case, the prejacent denotes a set of degrees, therefore the union of its focus semantic value is also of type *dt*. For concreteness, let us apply this analysis to the examples in (36), repeated below.

- (48) a. *Mnogo detej boleet [gripom]<sub>F</sub>.*  
           many-ADV children be\_ill flu  
       b. *Gripom boleet mnogo [detej]<sub>F</sub>*  
           flue be\_ill many-ADV children  
           ‘Many children have the flu.’

The LFs are derived by moving ‘*mnogo*’ out of the pseudo-partitive to the left edge of the clause. It consequently applies to the degree abstract formed of the entire sentence, see (49).

- (49) a.  $\text{mnogoc} [\sim C \lambda d [t \exists [et d [d_{(et)} \text{MEAS detej}]]] \lambda x [t x \text{boleet [gripom]}_F]]$   
       b.  $\text{mnogoc} [\sim C \lambda d [t \exists [et d [d_{(et)} \text{MEAS [detej]}_F]]] \lambda x [t x \text{boleet gripom}]]$

In the example at hand, the scope of ‘*mnogo*’ is the following degree property.

- (50)  $\lambda d \exists X [X \text{ are children} \ \& \ X \text{ have the flu} \ \& \ \text{CARD}(X) \geq d]$

According to definition (47), the comparison class corresponds to those individuals whose cardinality is in the intersection of the focus semantic value of the set in (50). The two LFs give us two different values of *C*. If the focus is on ‘*flu*’, as in (49a), the union of the focus semantic value of the prejacent is the following set.

- (51)  $\cup \{D: \exists P [D = \lambda d \exists X [P(X) \ \& \ X \text{ are children} \ \& \ \text{CARD}(X) \geq d]]\} =$   
 $= \lambda d \exists X \exists P [P(X) \ \& \ X \text{ are children} \ \& \ \text{CARD}(X) \geq d]$

Since we are considering the alternatives to ‘*flu*’, this is a set of cardinalities of the pluralities of children having this or that disease. By the definition of ‘*mnogo*’, the absolute standard returned by the delineation function is relativized to this set. As a result, the LF in (49a) is predicted true iff the number of children having the flu is large relative to the cardinalities of groups of children suffering under this or that illness.

<sup>11</sup> This variable is usually assumed to be a free variable whose value is restricted by value of the variable on the focus-evaluating operator, see Rooth (1996).

If the focus is on ‘children’, as in (49b), the comparison class corresponds to the degree set given in (52). This is a set of cardinalities of plural entities having flu and some additional salient property. This could be a set including cardinalities of groups of children, adolescents and grown-ups having flu. The delineation function applies to the adjective whose domain includes only plural individuals having such cardinalities. Consequently, the truth conditions are met iff the number of children having the flu is large compared to the other age groups suffering under the flu.

$$(52) \quad \cup \{D: \exists P[D = \lambda d \exists X[P(X) \ \& \ X \text{ have the flu} \ \& \ \text{CARD}(X) \geq d]]\} = \\ = \lambda d \exists X \exists P[P(X) \ \& \ X \text{ have the flu} \ \& \ \text{CARD}(X) \geq d]$$

Evidently, neither of the two representations in (49) leads to the proportional reading. To see this, consider a situation in which the overall number of children is 100, the number of children having flu is 15, the number of grown-ups having flu is 7, and the number of children having chickenpox is 5. Assuming for simplicity that the absolute standard corresponds to the average, both (49a) and (49b) come out true in this scenario but the proportional reading is false. For the proportional reading to be true the comparison class would have to correspond to the domain restriction in (53), which is incompatible with any of the possible focus-affected readings.<sup>12</sup>

$$(53) \quad \lambda d \exists X[X \text{ are children} \ \& \ \text{CARD}(X) \geq d]$$

To conclude, to account for the absence of a proportional reading with Russian adverbial ‘mnogo’, we proposed that it associates with focus to restrict the range of the assignment function that provides a value for its anaphoric variable. As a result of this restriction, ‘mnogo’ can only be evaluated with respect to a comparison class which is incompatible with a proportional reading.

### 3.3. Two Strategies

In the rest of the section, we will lay out two options for expressing proportional and non-proportional readings that might be realized cross-linguistically.

To recapitulate the main points, we considered a language that provides both an adjectival and a degree-operator ‘many’. Russian links proportional readings with the adjectival ‘many’, which fixes its comparison class to the head noun, and cardinal readings with a focus-sensitive degree operator ‘many’, whose comparison class reflects the focus-structure of its prejacent.

Given these results, one can distinguish two potential strategies a language can adopt in lexicalizing proportional and cardinal interpretations. A language in which ‘many’ patterns with a measure phrase in its distribution is expected to provide an adverb-type lexical entry for ‘many’. If the adverb-type ‘many’ happens to be focus-sensitive it fails to express a proportional reading

<sup>12</sup> If the focus semantic value of the prejacent were a set of properties exhaustively characterizing the property of being children, this would correspond to the set in (53) and result in the proportional reading. For example, this option could be realized by the value of C containing the property of having the flu and not having the flu. I remain agnostic here as to whether this option is empirically attested.

and the language has to make available an adjectival ‘many’ which combines with a noun non-intersectively and triggers a proportional reading. This is a strategy pursued by Russian. In Russian, proportional and cardinal readings result from two distinct interpretative mechanisms: the focus sensitivity of adverbial ‘mnogo’ is used to fix the comparison class in such a way that only cardinal readings can obtain; and the non-intersective modification by attributive ‘mnogie’ is used to set the comparison class to the extension of the NP, which is only compatible with a proportional reading. The second strategy could be adopted by a language without a focus-sensitive ‘many’. Such a language would map both cardinal and proportional readings to a single lexical entry, a Schwarzschild-like ‘many’ expressing property of degree sets.

The first strategy seems more feasible to us, as it avoids ambiguity without introducing new machinery but relying on independently motivated grammatical tools, such as semantic association with focus and non-intersective modification. However, we cannot give conclusive arguments in its favor and exclude the possibility of a language pursuing the second strategy. Nor can we conclusively decide on the status of English here. To do this, one has to consider more empirical data to gain an insight into how comparison classes are constrained.

#### 4. CONCLUSION

We started out with the long-standing puzzle about the source of proportional and cardinal readings of ‘many’. The goal was to explore how the putative ambiguity of English ‘many’ meshes with the availability of two ‘many’s in Russian. The way Russian lexicalizes cardinal and proportional readings does not seem to support the thesis that ‘many’ is genuinely ambiguous between a quantificational and non-quantificational meaning. Nor does it settle the related question addressed in Partee (1989) about whether a proportional reading of ‘many’ is the result of its being a generalized quantifier. We suggested that the Russian data support a different, degree-based analysis of ‘many’ under which a proportional reading is just a special case of a cardinal reading with the comparison class constrained in a specific way.

We proposed that ‘many’ has degree semantics, and so resembles gradable predicates. When it does not carry superlative or comparative morphology, the value of its degree argument is determined by the context in the form of a salient comparison class, which in turn depends on the topic of the utterance. A proportional reading of a ‘many NP’ arises when the comparison class is set to the extension of the NP. Any other value of the comparison class results in a non-proportional reading.

This analysis of ‘many’ suggests a new way of accounting for Milsark’s distributional generalizations, which we did not go into here. The idea would be to reduce restrictions on the occurrence of weak and strong quantifiers in certain types of constructions to the special kind of focus/topic structure that these constructions might impose. For example, the subject position of individual level predicates may resist weak ‘many’ NP because it is required to be the topic and only allows for comparison classes corresponding to the extension of the NP. In contrast, in ‘there’-insertion constructions a ‘many’ NP cannot be strong and have a proportional reading because it does not make a good topic.

To answer the question of why Russian maps proportional readings to the attributive construal of ‘many’ and non-proportional readings to the adverbial one, we considered two

mechanisms that can restrict the value of a comparison class. We claimed that proportional readings correspond to the attributive ‘mnogie’ because by virtue of being a non-intersective modifier it constrains its comparison class to the extension of the modified noun. We further suggested that cardinal readings are inherent to the adverbial ‘mnogo’ because it is focus-sensitive and as such requires its comparison class be determined by the focus semantic value of the degree property in its scope. We demonstrated that focus-sensitivity is incompatible with proportional readings.

We have not presented empirical evidence in favor of the view that English ‘many’ is ambiguous between a focus-sensitive adverb and a non-intersective modifier. ‘Many’ may turn out to be different from true focus-sensitive adverbs like ‘only’ and correspond to a single entry allowing for cardinal as well as proportional readings. A question our study raises in this connection is what is the nature of ‘many’s association with focus and whether it determines the range of readings ‘many’ may give rise to.

## REFERENCES

- Babko-Malaya, O. (1998) "Context-Dependent Quantifiers Restricted By Focus", in Benedicto, E., Romero, M. and Tomioka, S. (eds.) *Proceedings of the Workshop on Focus*. 1–18. Amherst: GLSA.
- Barker, C. (2002) Dynamics of Vagueness. *Linguistics and Philosophy* 25(1): 1–36.
- Bennett, M. R. (1974) Some Extensions of a Montague Fragment of English. Ph.D. Thesis. University of California.
- Büring, D. (1996) “A Weak Theory of Strong Readings”, in Galloway, T. and Spence, J. (eds.) *Proceedings of SALT 6*. 17–34. Ithaca, NY: CLC Publications.
- Champollion, L. (2010) *Parts of a Whole: Distributivity as a Bridge Between Aspect and Measurement*, Ph.D. Dissertation. University of Pennsylvania.
- Cresswell, M. (1976) Partee (1989)The Semantics of Degree”, in Partee, B.H. (ed.) *Montague Grammar*. 261–92. New York: Academic Press.
- von Fintel, K. (1994) *Restrictions on Quantifier Domains*, Ph.D. Dissertation. University of Massachusetts.
- Hackl, M. (2000) *Comparative Quantifiers*, Ph.D. Dissertation. MIT.
- Hackl, M. (2009) "On the Grammar and Processing of Proportional Quantifiers: ‘Most’ Versus ‘More Than Half’”, *Natural Language Semantics* 17: 63–98.
- Heim, I. (1999) *Notes on Superlatives*. MIT. Unpublished manuscript.
- Heim, I. (2006) *Remarks on Comparative Clauses as Generalized Quantifiers*. MIT. Unpublished manuscript. URL <http://semanticsarchive.net/Archive/mJiMDBIN>.
- Heim, I. (2008) “Decomposing Antonyms?”, in Grønn, A. (ed.), 212–25. Oslo: Department of Literature, Area Studies and European Languages, University of Oslo.
- Heim, I. and A. Kratzer (1998) *Semantics in Generative Grammar*, Oxford: Blackwell.
- Herburger, E. (1997) “Focus and Weak Noun Phrases”, *Natural Language Semantics* 5(1): 53–78.
- Kennedy, C. (2007) Vagueness and Grammar: The Semantics of Relative and Absolute Gradable Adjectives. *Linguistics and Philosophy* 30(1): 1–45.

- Krasikova, S. (2011) *Modals in Comparatives*. Ph.D. Dissertation. Universität Tübingen.
- Krifka, M. (1989) Nominal Reference, Temporal Constitution, and Quantification in Event Semantics. In Bartsch, R., van Benthem, J. and van Emde Boas, P. (eds.) *Semantics and Contextual Expressions*. 75–115. Dordrecht: Foris.
- Lewis, D. (1970) General Semantics. *Synthese* 22: 18–67.
- Link, G. (1983) “The Logical Analysis of Plurals and Mass Terms: A Lattice–Theoretical Approach”, in Bäuerle, R., Schwarze, C. and von Stechow, A. (eds.) *Meaning, Use and Interpretation of Language*. 302–23. Berlin: Walter de Gruyter.
- Löbner, S. (1978) “Quantification as a Major Module of Natural Language Semantics”, in Groenendijk, J., de Jongh, D. and Stokhof, M. (eds.) *Studies in Discourse Representation Theory and the Theory of Generalized Quantifiers*. 53–85. Dordrecht: Foris.
- Milsark, G. (1974) *Existential Sentences in English*, Ph.D. Dissertation. MIT.
- Partee, B. (1989) “Many Quantifiers”, *ESCOL 89: Proceedings of the Eastern States Conference on Linguistics*: 383–402.
- Rooth, Mats. (1996) Focus. In *The handbook of contemporary semantic theory*, ed. Shalom Lappin, 271–297. London: Blackwell.
- Schwarzschild, R. (2006) “The Role of Dimensions in the Syntax of Noun Phrases”, *Syntax* 9(1): 67–110.
- Solt, S. (2009) *The Semantics of Adjectives of Quantity*, Ph.D. Dissertation. The City University of New York.
- von Stechow, A. (1984) “Comparing Semantic Theories of Comparison”, *Journal of Semantics* 3: 1–77.
- Partee, B. (1989). Many quantifiers. *ESCOL 89: Proceedings of the Eastern States Conference on Linguistics*: 383–402.