
Many and Diverse Cases: Q-adjectives and Conjunction^{*}

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Abstract

This paper analyzes the conjunction of the ‘adjectives of quantity’ *many* and *few* with ordinary gradable adjectives. It is shown that the facts surrounding this construction support an analysis of adjectives of quantity as ‘degree predicates’: predicates of intervals on the scale of cardinality. It is further shown that gradable adjectives also have a secondary interpretation as degree predicates.

1 Introduction

The subject of this paper is the construction exemplified in (1), in which an ordinary gradable adjective is conjoined with *many* or *few*, words that I will refer to as adjectives of quantity (Q-adjectives for short).

- (1) a. Professor Jones’ **many and important** contributions to the field...
b. The flaws in the proposal were **many and serious**
c. The stains on the shirt were **few and small**
d. The ingredients are **simple and few**

Examples such as these are not entirely colloquial, ranging in register from the slightly formal to the poetic; but they are nonetheless quite common, and as such require some sort of account.

My goal at the simplest level is to provide a semantic analysis of this construction. While this is perhaps a small question, I believe it is nonetheless interesting, for two reasons: first, because cases such as (1) have not, to my knowledge, been the subject of any serious semantic investigation; second, and more importantly, because the

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availability of conjunctions of this form yields insights into the semantics of Q-adjectives, and of gradable adjectives more generally. I will show that the facts surrounding this construction support an analysis of Q-adjectives as ‘degree predicates’ – predicates of intervals on the scale of cardinality – and furthermore point to the existence of a secondary interpretation of this type for ordinary gradable adjectives.

The organization of the paper is the following. In Section 2, I outline the broader question that these data are relevant to. In Section 3, I present the crucial data on the availability of conjunctions of the sort in (1). Section 4 develops an analysis of these facts, and Section 5 discusses some implications of this analysis. Section 6 summarizes with conclusions and remaining questions.

2 The Broader Question

What makes the data in (1) interesting is that they yield insight into the correct semantic analysis of Q-adjectives. As has been observed repeatedly in the literature (e.g. Hoeksema 1983; Partee 1989; Kayne 2005), *many* and *few* are notable in that their behaviour straddles that of quantifiers and adjectives. They may occur in the same syntactic positions (in a pretheoretic sense) as quantifiers such as *most* (2):

- (2) a. Many/few lawyers are greedy
b. All/most/some/no lawyers are greedy

But they inflect like gradable adjectives, having comparative and superlative forms (3); and like ‘ordinary’ adjectives they may occur as (apparent) attributive modifiers and sentential predicates (4):

- (3) more, most; fewer, fewest

- (4) a. His many/few good qualities....
b. His good qualities are many/few

One approach to these facts holds that Q-adjectives in fact have the semantic type of adjectives, perhaps in addition to a quantificational type (Milsark 1977; Hoeksema 1983; Partee 1989). That is, they denote cardinality predicates – predicates of groups or plural individuals that hold true if the group is large (for *many*) or small (for *few*), as shown in the entries in (5a), or the more explicitly gradable entries in (5b):

- (5) a. $\llbracket \text{many} \rrbracket = \lambda X. |X| \text{ is large}$ $\llbracket \text{few} \rrbracket = \lambda X. |X| \text{ is small}$
b. $\llbracket \text{many} \rrbracket = \lambda d \lambda X. |X| \geq d$ $\llbracket \text{few} \rrbracket = \lambda d \lambda X. |X| \leq d$

On this view (particularly with the representations in (5b)), the semantics of Q-adjectives are directly parallel to what is commonly assumed for gradable adjectives:

$$(6) \quad \llbracket \text{expensive} \rrbracket = \lambda d \lambda x. \text{COST}(x) \geq d$$

This analysis also aligns to a broader tradition in which cardinal numbers are analyzed as predicates or modifiers (Krifka 1999; Landman 2004; Ionin & Matushansky 2006).

On another (less established) view, Q-adjectives are analyzed as predicates, but not predicates of groups or individuals themselves. Rather, they are predicated of something in the domain of degrees – a degree or set of degrees associated with a group of individuals or situation (Schwarzschild 2006; Rett 2006; Heim 2006 on *little*; see also Kayne 2005 for a parallel syntactic analysis). This approach could be captured with the preliminary entries in (7), where I is a set of degrees (a scalar interval):

$$(7) \quad \llbracket \text{many} \rrbracket = \lambda I_{\langle dt, t \rangle}. I \text{ is large} \quad \llbracket \text{few} \rrbracket = \lambda I_{\langle dt, t \rangle}. I \text{ is small}$$

In other work (Solt 2007a, 2007b), I have argued that the predicate-of-degrees account represented in (7) overcomes several shortcomings of the predicate-of-individuals account in (5). One case involves the differential uses of Q-adjectives, as in (8); crucially, *many* in (8) cannot be analyzed as predicated of a group or plurality (there is no plurality that has the property of ‘many-ness’), but can readily be analyzed as predicated of the gap or interval between the number of students who attended and 100.

$$(8) \quad \text{Many fewer than 100 students attended the lecture}$$

Additionally, *many* and *few* as defined in (7) are degree operators, scope-taking elements that we would expect to interact scopally with other operators (cf. Heim 2006). This provides an approach to analyzing so-called split scope readings (as in (9a), whose preferred interpretation is that paraphrased in (9b)):

- (9) a. They need few reasons to fire you
 b. ‘it is not the case that they need a large # of reasons...’

The same mechanism also allows for the derivation of a quantificational interpretation for *few* via simple existential closure, without giving rise to what has come to be known as ‘van Benthem’s problem’ (van Benthem 1986), where application of existential closure to a monotone decreasing predicate incorrectly produces an ‘at least’ reading. The solution offered by the predicate-of-degrees (i.e., degree-operator) analysis in (7) is that for type-driven reasons, *few* necessarily takes scope over the existential quantifier, such that (10a) receives the correct representation in (10b), not the incorrect representation in (10c):

- (10) a. Few trees died
 b. $\text{few}(\{d: \exists X[\text{tree}(X) \wedge \text{died}(X) \wedge |X| \geq d]\})$ ✓
 c. $\exists X[\text{tree}(X) \wedge \text{died}(X) \wedge \text{few}(X)]$ ✗

The broader question that I address in this paper is which of these two accounts is the correct one. The relevance of the construction exemplified in (1) is that it provides evidence towards answering this question, in that the two theories discussed above seemingly make different predictions in this area. Specifically, under the predicate-of-individuals account, we would predict that conjunctions of ordinary adjectives and Q-adjectives would be possible, in that they would reflect the simple intersection of two properties:

$$(11) \quad \llbracket \text{many and important} \rrbracket = \llbracket \text{many} \rrbracket \cap \llbracket \text{important} \rrbracket \\ = \lambda X. \text{many}(X) \wedge \text{important}(X)$$

Conversely, under the predicate-of-degrees account, we would predict that this sort of conjunction would be disallowed, given the typical restriction of conjunction to elements of the same semantic type.

On the surface, then, the existence of examples such as (1) would appear to support the first of these possible theories (predicate-of-individuals), and to offer strong evidence against the second (predicate-of-degrees).

In what follows, however, I will argue that the situation is not as simple as this. An examination of the constraints on the conjunction of Q-adjectives with ordinary adjectives in fact supports the predicate-of-degrees account, and is incompatible with the predicate-of-individuals account. A corollary of the analysis will be the finding that gradable adjectives have a secondary interpretation of predicates of degrees.

3 The Data: Constraints on Conjunction

To start, a broad range of adjective types may be conjoined with Q-adjectives, including adjectives of size (12a), other physical characteristics (12b,c), age (12d), and cost or value (12e), as well as evaluative adjectives (12f,g):

- (12) a. The holes in the sail were **many and large**
 b. The fans were **many and loud**
 c. The lights in the room were **few and dim**
 d. The documents in the archive were **many and old**
 e. Air links to Europe and Asia are **few and expensive**
 f. The waiters were **few and surly**
 g. His **many and beautiful** possessions...
 h. The opportunities available to our students are **many and diverse**

Both collective and distributive interpretations are possible for the conjoined adjective. For example, *large* in (12a) distributes over the holes (they must be large individually, not just in aggregate), whereas in (12h) *diverse* true of the opportunities as a whole.

As seen above, the Q-adjective is typically the first conjunct, though the reverse is possible (as in (1d)). Finally, conjunctions of this sort may occur in predicative (13a) and attributive (13b) positions, though are less felicitous when *many* or *few* has a quantificational use (13c):

- (13) a. The problems were **many and serious**
 b. The **many and serious** problems...
 c. ?? We discovered **many and serious** problems

But despite the broad availability of Q-adjective/adjective conjunctions, there are two crucial semantic constraints on this construction. First, only gradable adjectives can be conjoined with Q-adjectives, as illustrated by the contrasts in (14)-(16):

- (14) a. The fans were **many and loud**
 b. ??The fans were **many and American**
- (15) a. The tables in the hall were **many and large**
 b. ??The tables in the hall were **many and octagonal**
 c. ??The tables in the hall were **many and wooden**
- (16) a. The stains on the shirt were **few and small**
 b. ??The stains on the shirt were **few and green**

Already we see the behavior of Q-adjectives diverging from that of ordinary gradable adjectives: While there are some constraints on how adjectives may be conjoined, there is no general prohibition against the conjunction of the gradable adjectives with their non-gradable counterparts, as seen below:

- (17) a. The tables in the hall were **large and octagonal**
 b. The stains on the shirt were **small and green**
 c. The floor was **wooden and smooth**
 d. I got the shoes because they were **red and cheap**
 e. We had heard that most of the guests were **American and rude**

The gradability restriction can be overridden if a non-gradable adjective is coerced into a gradable interpretation, or interpreted as a point on a scale. Thus (18a) is fine on the interpretation of *black* as serious (cf. *his sins are blacker than mine*), while (18b) is acceptable with *mostly American* describing the proportion of Americans in the crowd. Even the initially bizarre (18c) is perfectly acceptable if we imagine ourselves in the world of Flatland (Abbott 1884), where everyone and everything is two-dimensional, and the more angles one has, the higher his or her social status.

- (18) a. His sins were **many and black**
 b. The attendees were **few and mostly American**

c. Her friends were **many and octagonal**

The second constraint has to do with the interpretation that Q-adjective/adjective conjunctions may receive. In each of the examples introduced above, the conjoined Q-adjective and adjective are in a sense interpreted jointly. Specifically, the adjective is interpreted as in some way amplifying the cardinality established by the Q-adjective (or vice versa). In (12a) the holes were not only numerous, but large as well; in (12c), the lights were not only few in number, but dim as well; in (12e), not only are there few air connections to Europe, but those that exist are expensive; and so forth.

To put this another way, in each case the Q-adjective/adjective conjunction can be interpreted as positioning the subject relative to some compound dimension formed on the basis of cardinality and a dimension consistent with the gradable adjective: in (12a) the total area of the holes (a function of their number and the size of each); in (12c) the total intensity of the lights (a function of their number and their individual intensity), in (12e) perhaps the availability of good air links to Europe and Asia (a function of their number and cost). Appropriate compound dimensions can likewise be found in the other examples introduced above.

In the cases discussed up to this point, the relationship between the dimensions could be termed multiplicative. A different sort of relationship, which might be termed causal, is exemplified below. (19a) implies that the clothes you pack need to be versatile because they must be few. Similarly, in (19b), a line from a once-popular song, we likewise get the impression that the moments we can share are precious precisely because they are few; if they were fewer still they would be even more precious. Here too it seems that we have a single compound dimension, in that the two components vary together, not independently.

- (19) a. The clothes you pack should be **few and versatile**
 b. **Precious and few** are the moments we two can share

As evidence that some relationship between dimensions is actually required for the interpretation of Q-adjective/adjective conjunctions, consider the following example:

- (20) ?The senators supporting the proposal were **many and tall**

On first reading (20) is quite odd, there being no obvious way that the senators' height amplifies their 'many-ness' (or is correlated with it). But it improves considerably when we imagine a scenario in which the number of votes a senator has is proportional to his or her height, such that a group of senators who are many and tall has greater voting power than a group who are many but average height or short. In other words, (20) is rescued by inferring some complex dimension on which the subject can be measured.

Turning again to a comparison with ordinary gradable adjectives, we see a different pattern: While there may sometimes be a similar sort of relationship between the dimensions referenced by two conjoined adjectives, it is relatively easy to find or construct examples in which this is not the case, as in the examples below (this is also particularly true of the examples in (17)):

- (21) a. The villages in the surrounding area are small and beautiful
 b. Our conversations were short and friendly

Thus the behaviour of Q-adjective/adjective conjunctions differs from that of conjunctions of ordinary adjectives in two significant respects. This is unexpected under the predicate-of-individuals analysis, in which Q-adjectives are taken to have the same semantic type as gradable adjectives such as *expensive*. Below, I will argue that these facts receive a neat account under the predicate-of-degrees analysis.

4 The Analysis

The basic idea behind the analysis is the following: Q-adjective/adjective conjunctions are predicates of **degrees on the scale of a compound dimension** formed on the basis of **number** and a dimension associated with the gradable adjective.

I begin with some formal preliminaries. I assume an ontology that includes degrees as a primitive type (type *d*). A scale *S* consists of a set of degrees *D* ordered by some ordering relationship $>$ relative to some dimension *DIM*. Dimensions include amount dimensions (the monotonic dimensions of Schwarzschild 2006), such as volume and weight, and non-amount dimensions such as height, area, cost, etc. A special case of an amount dimension is cardinality (number), whose associated scale is the set of natural numbers (or perhaps the rational or real numbers; cf. Fox & Hackl 2006).

Here, I take degrees to be points, contra recent interval-based accounts such as that of Kennedy (2001). But as suggested above, the notion of an interval is a crucial one. I therefore define an interval as an uninterrupted set of degrees, expressed formally as:

- (22) A set of degrees $I \subset D$ is an **interval** iff
 $\forall d, d', d'' \in D$ such that $d > d'' > d'$, $(d \in I \wedge d' \in I) \rightarrow d'' \in I$

Let us then take (23) as the lexical entries for the Q-adjectives *many* and *few*¹:

¹To be precise, the entries in (23) should be viewed as the result of the composition of more basic gradable entries for *many/few* with a null positive morpheme POS (von Stechow 2006; Heim 2006). For simplicity of representation, I do not show this step.

- (23) a. $\llbracket \text{many} \rrbracket = \lambda I_{\#}. I \text{ is 'large'}$
 $= \lambda I_{\#}. N_{\#} \subset I$ b. $\llbracket \text{few} \rrbracket = \lambda I_{\#}. I \text{ is 'small'}$
 $= \lambda I_{\#}. N_{\#} \subset \text{INV}(I)$

Here, the subscript # indicates that the interval in question lies on the scale of cardinality. $N_{\#}$ is the ‘neutral range’ on that scale, the range of values that would be considered neither large nor small with respect to the context (von Stechow 2006; Heim 2006). Finally, INV is a function that maps an interval to the join complementary interval. On this view, *many* is true of an interval if it is ‘large’, defined as fully containing the neutral range; *few* is true of an interval if it is ‘small’, defined as fully excluding that same neutral range.

Turning now to how Q-adjectives (predicates of scalar intervals) may combine with nominal expressions (predicates of individuals), I follow Schwarzschild (2006) in taking the linking function to be played by a phonologically null functional head *Meas*, whose semantic content is the measure function in (24):

- (24) $\llbracket \text{Meas} \rrbracket = \lambda X \lambda d. \text{Meas}_{\text{DIM}}(X) \geq d$

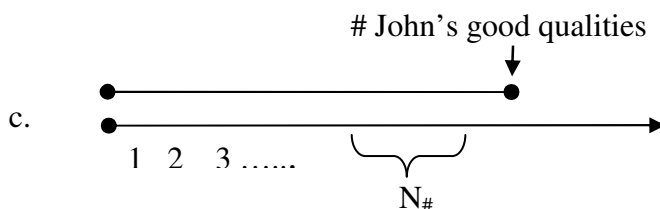
Meas associates a (possibly plural) individual X with a set of degrees on the scale associated with some dimension DIM . As will become clear below, *Meas* does not encode a specific dimension; the specific dimension must be ‘filled in’ on interpretation.

To see how these pieces come together, consider a simple case of predicative *many*:

- (25) John’s good qualities are many

I propose that here, the subject is a *MeasP*, such that the logical form is that in (26a). The semantic interpretation is then that in (26b), which corresponds to the situation depicted visually in (26c):

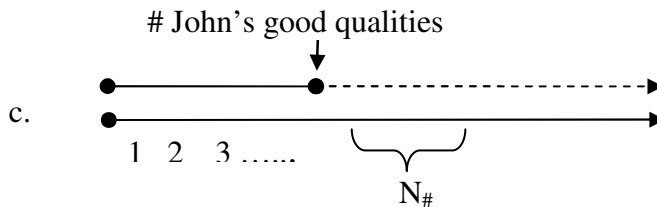
- (26) a. $\llbracket [\text{MeasP Meas} [\text{DP John’s good qualities}]] \text{ are many} \rrbracket$
 b. $\llbracket \text{many} \rrbracket (\llbracket [\text{MeasP Meas} [\text{DP John’s good qualities}]] \rrbracket)$
 $= \exists \text{DIM} [(\lambda I_{\#}. N_{\#} \subset I)(\lambda d. \text{Meas}_{\text{DIM}}(\text{John’s good qualities}) \geq d)]$
 $= \exists \text{DIM} [N_{\#} \subset \{d: \text{Meas}_{\text{DIM}}(\text{John’s good qualities}) \geq d\}]$
 $= N_{\#} \subset \{d: \text{Meas}_{\#}(\text{John’s good qualities}) \geq d\}$



Here, the formal representation can be taken to involve existential quantification over the dimension introduced by *Meas* (as in the second line of (26b)); but since *many* itself is restricted to operating on intervals of cardinality, this can be translated to a simpler cardinality-based representation can be given (as in the fourth line of (26b)).

The derivation is identical in the case of *few*, with the exception that the *INV* function maps the original interval to the join complementary interval, as in (27b) and the diagram in (27c):

- (27) a. $\llbracket \llbracket \text{MeasP Meas [DP John's good qualities]} \rrbracket \text{ are few} \rrbracket$
 b. $\llbracket \text{few} \rrbracket (\llbracket \llbracket \text{MeasP Meas [DP John's good qualities]} \rrbracket \rrbracket)$
 $= \exists \text{DIM} [(\lambda I_{\#}. N_{\#} \subset \text{INV}(I))(\lambda d. \text{Meas}_{\text{DIM}}(\text{John's good qualities}) \geq d)]$
 $= \exists \text{DIM} [N_{\#} \subset \text{INV}(\{d: \text{Meas}_{\text{DIM}}(\text{John's good qualities}) \geq d\})]$
 $= \exists \text{DIM} [N_{\#} \subset (\{d: \text{Meas}_{\text{DIM}}(\text{John's good qualities}) \leq d\})]$
 $= N_{\#} \subset \{d: \text{Meas}_{\#}(\text{John's good qualities}) \leq d\}$



Importantly, in (26) and (27) it is the presence of the Q-adjective *many* or *few* that allows us to infer that the dimension in question is cardinality. In the presence of a different expression of quantity, such as a measure phrase, a different dimension will be inferred. For example, in (28a) we assume a dimension on which wine can be measured, and whose measure can be two gallons; that dimension is of course volume:

- (28) a. We drank two gallons of wine
 b. $\exists \text{DIM} [2\text{-gallons} \subset \{d: \exists X[\text{wine}(X) \ \& \ \text{drank}(\text{we}, X) \ \& \ \text{Meas}_{\text{DIM}}(X) \geq d]\}]$
 $= 2\text{-gallons} \subset \{d: \exists X[\text{wine}(X) \ \& \ \text{drank}(\text{we}, X) \ \& \ \text{Meas}_{\text{VOLUME}}(X) \geq d]\}$

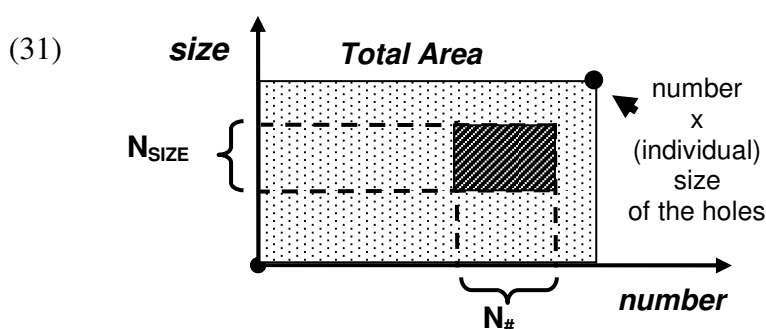
To apply this approach to the Q-adjective/adjective conjunctions that are the subject of this paper, we need only to introduce one further extension: the dimension introduced by *Meas* may be a complex dimension formed on the basis of two component dimensions. Thus in the 'multiplicative' cases exemplified in (12), we may view the measure function *Meas* as associating an individual with a set of degrees each of which is analyzable as the product of two component degrees. Equivalently, *Meas* itself may be viewed decomposable into two component measure functions:

- (29) $\llbracket \text{Meas} \rrbracket (X) = \lambda d. \text{Meas}_{\text{DIM}}(X) \geq d$, where $d = d_1 \times d_2$
 $= \langle \lambda d_1. \text{Meas}_{\text{DIM}_1}(X) \geq d_1, \lambda d_2. \text{Meas}_{\text{DIM}_2}(X) \geq d_2 \rangle$

With this in place, we are now ready to provide a formal analysis of Q-adjective/ adjective conjunctions. Consider again an example such as (12a), repeated below, which as discussed earlier can be interpreted as asserting that the total area of the holes (a function of their number and their individual size) was large.

(30) The holes in the sail were many and large

In the interval-based approach developed here, we can in turn interpret this as stating that on the scale associated with the compound dimension total area (a product of number and individual size), the two-dimensional ‘interval’ corresponding to the number and size of the holes was large. Large, again, can be formalized as fully containing the relevant neutral range (here, a two-dimensional one). Visually:



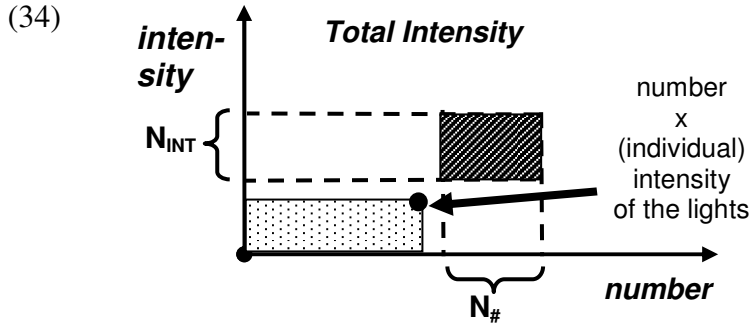
Formally, the semantic derivation proceeds as follows:

$$\begin{aligned}
 (32) \quad & \llbracket \text{many and large} \rrbracket \left(\llbracket [\text{MeasP Meas [the holes]}] \rrbracket \right) \\
 & = \exists \text{DIM} \left[\llbracket \text{many and large} \rrbracket (\lambda d = d_1 \times d_2. \text{MEAS}_{\text{DIM}}(\text{the holes}) \geq d) \right] \\
 & = \exists \text{DIM} = \text{DIM}_1 \times \text{DIM}_2 \left[\llbracket \text{many} \rrbracket (\lambda d_1. \text{MEAS}_{\text{DIM}_1}(\text{the holes}) \geq d_1) \right. \\
 & \quad \left. \wedge \llbracket \text{large} \rrbracket (\lambda d_2. \forall x \in \text{the holes} [\text{MEAS}_{\text{DIM}_2}(x) \geq d_2]) \right] \\
 & = \exists \text{DIM} = \text{DIM}_1 \times \text{DIM}_2 \left[N_{\#} \subset \{d_1 : \text{MEAS}_{\text{DIM}_1}(\text{the holes}) \geq d_1\} \right. \\
 & \quad \left. \wedge N_{\text{SIZE}} \subset \{d_2 : \forall x \in \text{the holes} [\text{MEAS}_{\text{DIM}_2}(x) \geq d_2]\} \right]
 \end{aligned}$$

Here, Meas introduces some dimension *DIM*, which we interpret as total area. *DIM* is then factored down into its two component dimension *DIM*₁ and *DIM*₂, allowing *many* and *large* to be predicated of intervals on their respective scales; here, note that the second dimension (size) distributes over the elements of *the holes*. The final representation describes the situation in (31).

The derivation proceeds identically in the case of *few* and a negative adjective, with the exception that here the relevant two-dimensional interval is stated to be small (defined as excluding the compound neutral range):

(33) The lights in the room were few and dim



(35) $\llbracket \text{few and dim} \rrbracket$ ($\llbracket \llbracket \text{MeasP Meas} [\text{the lights}] \rrbracket \rrbracket$)

$$= \exists \text{DIM} [\llbracket \text{few and dim} \rrbracket (\lambda d = d_1 \times d_2. \text{MEAS}_{\text{DIM}}(\text{the lights}) \geq d)]$$

$$= \exists \text{DIM} = \text{DIM}_1 \times \text{DIM}_2 [\llbracket \text{few} \rrbracket (\lambda d_1. \text{MEAS}_{\text{DIM}_1}(\text{the lights}) \geq d_1) \wedge \llbracket \text{dim} \rrbracket (\lambda d_2. \forall x \in \text{the lights} [\text{MEAS}_{\text{DIM}_2}(x) \geq d_2])]$$

$$= \exists \text{DIM} = \text{DIM}_1 \times \text{DIM}_2 [N_{\#} \subset \text{INV}(\{d_1 : \text{MEAS}_{\text{DIM}_1}(\text{the lights}) \geq d_1\}) \wedge N_{\text{INT}} \subset \text{INV}(\{d_2 : \forall x \in \text{the lights} [\text{MEAS}_{\text{DIM}_2}(x) \geq d_2]\})]$$

$$= \exists \text{DIM} = \text{DIM}_1 \times \text{DIM}_2 [N_{\#} \subset \{d_1 : \text{MEAS}_{\text{DIM}_1}(\text{the lights}) \leq d_1\} \wedge N_{\text{INT}} \subset \{d_2 : \forall x \in \text{the lights} [\text{MEAS}_{\text{DIM}_2}(x) \leq d_2]\}]$$

Again, the result of this derivation matches the situation depicted in (34).

Before moving on, let me briefly examine the ‘causal’ conjunctions exemplified in (19). Consider again one of these examples, repeated below:

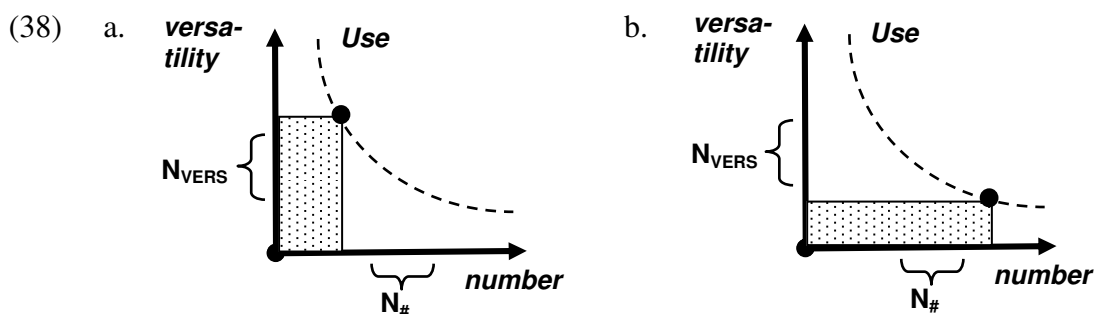
(36) The clothes you pack should be few and versatile

As discussed earlier, the relationship in (36) between the dimensions of number and versatility has a causal flavor: the clothes you pack must be versatile precisely because they must be few; if you could pack more, they would not need to be so versatile. As a first approximation we might capture this by allowing Meas to introduce a compound dimension that is factored into two causally related dimensions:

(37) $\llbracket \text{Meas} \rrbracket (X) = \lambda d. \text{Meas}_{\text{DIM}}(X) \geq d$, where $d = \langle d_1, f(d_1) \rangle$

I believe, however, that it is possible to assimilate this type of conjunction to the multiplicative cases discussed above. To continue with this specific example, we may again interpret the number and the versatility of the clothes as two components of a

compound dimension that we might loosely describe as ‘use’ (i.e. the use one gets from a set of clothes is a function of the number of items and the versatility of each). Then if we hold use constant (say, at what we need for our trip to Bermuda), then number of clothes is inversely correlated to their versatility: the fewer the clothes, the more versatile they must be to yield the same use. *Few and versatile* can then be interpreted as positioning the subject along the curve that results; (36) asserts that the situations should be that in (38a), not that in (38b):



The causal cases are thus a special case of the multiplicative cases discussed earlier, one in which the value of the primary dimension is held fixed.

Let us take stock of where we are. The predicate-of-degrees analysis developed in this section provides a framework that allows an account of Q-adjective/adjective conjunctions, which can be analyzed as predicates of ‘intervals’ on the scale of some compound dimension. Furthermore, and importantly, the constraints on this construction, which were puzzling under the predicate-of-individuals analysis, now receive a principled explanation. First, only gradable adjectives can be conjoined with Q-adjectives, because gradability is necessary to introduce a dimension that can combine with number to produce the required compound dimension. Secondly, a relationship must exist between number and the dimension associated with adjective; otherwise, it is not possible to infer the appropriate compound dimension.

To better appreciate this latter point, contrast the representations that we derive for a Q-adjective/adjective conjunction (as in (33)) and the equivalent sentential conjunction:

- (39) a. The lights in the room were few and dim
 b. $= \exists \text{DIM} = \text{DIM}_1 \times \text{DIM}_2 [N_{\#} \subset \{d_1: \text{MEAS}_{\text{DIM}_1}(\text{the lights}) \leq d_1\} \wedge N_{\text{INT}} \subset \{d_2: \forall x \in \text{the lights} [\text{MEAS}_{\text{DIM}_2}(x) \leq d_2]\}]$

- (40) a. The lights in the room were few, and they were dim
 b. $\exists \text{DIM}_1 [N_{\#} \subset \{d_1: \text{MEAS}_{\text{DIM}_1}(\text{the lights}) \leq d_1\}] \wedge \exists \text{DIM}_2 [N_{\text{INT}} \subset \{d_2: \forall x \in \text{the lights} [\text{MEAS}_{\text{DIM}_2}(x) \leq d_2]\}]$

(39b) and (40b) are truth conditionally equivalent; but the former imposes the additional condition that the two dimensions be interpretable as components of some compound

dimension. It is this that is responsible for the second of the constraints on conjunction discussed above (though we will see below that there is something to be said about the treatment of the gradable adjective *small* in (40b)).

5 Some Consequences

It has perhaps not escaped notice that the analysis presented in Section 4 rests on some non-standard assumptions about the semantics of gradable adjectives, and of conjunction. I turn to this now.

Most importantly, the preceding analysis requires that in conjunction with Q-adjectives, gradable adjectives must also be interpreted as predicates of scalar intervals; that is, they too require a predicate-of-degrees analysis. On the surface incompatible with the standard view of gradable adjectives as predicates of individuals (per (6) above). But importantly, this possibility is independently motivated. Examples such as the following demonstrate that a gradable adjective can be predicated of a degree (41), or of a dimension associated with an individual (42), rather than the individual itself:

- (41) a. Six feet is tall (cf. Fred is tall)
 b. Fifty dollars is expensive (cf. that shirt is expensive)
- (42) a. John's **tall height** made him a natural choice for the basketball team
 b. Although the **size** of the stains was **small**, they were so obvious that I couldn't wear the shirt
 c. Fred was wise despite his **young age**

We therefore must have a secondary interpretation for gradable adjectives, as in (43b):

- (43) a. $\llbracket \text{expensive}_{\langle d, et \rangle} \rrbracket = \lambda d \lambda x. \text{COST}(x) \geq d$
 b. $\llbracket \text{expensive}_{\langle d, \langle dt, t \rangle \rangle} \rrbracket = \lambda d \lambda I_{\text{COST}}. d \in I$

One might ask, then, whether the same sort of ambiguity could be present in the case of Q-adjectives. That is, could both the predicate-of-individuals and predicate-of-degrees accounts be correct? The answer, I would argue, is no. Using occurrence in the small-clause complement of *consider* as a test for predicative interpretations, the contrasts in (44) suggest that gradable adjectives have both predicate-of-individuals and predicate-of-degrees interpretations, while Q-adjectives have only the latter (though the precise reason for the ungrammaticality of (44c) requires further investigation).

- (44) a. I consider the shirt expensive
 b. I consider fifty dollars expensive
 c. *I consider the guests many
 d. I consider fifty many

A second question arises regarding the semantics of *and*. In the Q-adjective/adjective conjunctions under consideration, *and* cannot be analyzed in terms of set intersection; *many and large* is not the intersection of sets denoted by *many* and *large*. Rather, the effect of the conjunction is to form the set product of two degree predicates, though the result of this is ultimately expressed in terms of Boolean conjunction. Again this possibility is found elsewhere in the grammar; in particular, Heycock & Zamparelli (2005) show that NP conjunctions such as *father and grandfather* in (45) must be analyzed as involving an operation of set product formation:

(45) My father and grandfather were both sailors

In short, Q-adjective/adjective conjunctions not only provide evidence as to the correct semantic analysis of the Q-adjectives *many* and *few*, but also shed light on the interpretive possibilities available to ordinary gradable adjectives, and to conjunction.

6 Conclusions

I began this paper with an exploration of a little-studied type of conjunction, and a question about the correct semantic analysis of the adjectives of quantity *many* and *few*. I have shown that a pattern of constraints on the conjunction of Q-adjectives and ordinary adjectives can be explained by analyzing the former as predicates of scalar intervals. The facts from this small domain thus add to other evidence supporting the predicate-of-degrees account of Q-adjectives over the predicate-of-individuals account. This analysis further highlights the availability of a similar interpretation for gradable adjectives. Degree predication, as we might call this phenomenon, is thus one means by which natural language expresses quantity and degree.

Some questions arise from this analysis. What other types of expressions might have predicate-of-degrees interpretations? Cardinal numbers and vague quantity nominals such as *a lot* are obvious candidates, but only a fuller investigation will show if this is correct. And to the extent that an interpretation at this type is available to gradable adjectives, how is this constrained? I must leave these as questions for future study.

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