Adverbials of Degree, Range, and Amount

Roger Schwarzschild, Rutgers University

**ABSTRACT:** *alot* can be adverbial: *run alot, eat alot, like it alot.* It can also be used in non-verbal contexts eg *alot taller, alot of foam.* A similar pattern is found with related expressions eg *too much, very much.* Various kinds of interpretations have been identified for these expressions when used adverbially depending on the verb or verb phrase they occur in. I use analyses of these expressions in non-verbal contexts to elucidate their adverbial uses. I also list some grammatical facts that are tied to the various interpretations.

**Section I. Introduction**

Consider the sentences in (1) below:

(1)   a.   Jack sings *alot.*  
      b.   Jill works *too much.*  
      c.   I learnt *so much* in that course.  
      d.   I annoyed him *more than anyone else.*  
      e.   They extended the show by *two weeks.*  
      f.   They didn’t lengthen it *enough.*  
      g.   I like him *very much.*

In each of these sentences, I underlined what I will call *magnitude expressions.* These magnitude expressions happen to be used in conjunction with verbs in (1), but they all occur in non-verbal contexts, as illustrated in (2):

(2)   a.   *alot younger.*  
      b.   *too much mustard.*  
      c.   *so much sweeter.*  
      d.   *more intelligent than anyone else.*  
      e.   *two weeks past the deadline.*  
      f.   *enough mustard.*  
      g.   *very careful.*

The cross-categorial nature of magnitude expressions is one reason to view them as a natural class and, by extension, the verb phrases in (1) that contain them. There is also some syntactic motivation. The magnitude expressions all occur postverbally and unlike semantically similar expressions, cannot be used preverbally:

(3)   a.   Jack sings *alot.*

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1 This paper benefited from the participants in the Seminar in Degree and Amount, Fall 2005 at Rutgers. I also benefited greatly from discussion of these matters with Xiao Li and Jessica Rett. This paper was written in 2006 based on a talk by the same name given at the Chicago Workshop on Scalar Meaning, University of Chicago, May 2006.
b. *Jack alot sings.

(4)  
a. Jack sings often.
b. Jack often sings.

Doetjes(1997:ch 4) similarly discusses the unique syntax of these expressions in Dutch and French verb phrases.²

While there is reason to treat the occurrences of magnitude expressions in (1) as a natural class, it has been argued that the class is semantically diverse. The examples differ ‘ontologically’, that is, in the kinds of things whose magnitude is at issue and they differ ‘logically’ meaning that the semantic relation between the verb or verb phrase and the magnitude expression differs across examples. Various kinds of interpretations have been catalogued and described. I will be following Bosque and Masullo(1999)’s discussion most closely although I will not be adopting their theoretical conclusions.³ My main purpose will be to view this diversity through the lens of my work and recent work of others on the semantics of magnitude expressions in non-verbal contexts like (2). In the remainder of this introduction I will introduce various types of readings, showing how I use the labels that occur in the title of this paper. I should also note that I am using the term ‘adverbial’ in a liberal sense, but a sense that is compatible with the semantics literature which recognizes the possibility that some adverbials bind or saturate an argument of the verb (eg McConnell-Ginet 1982) and some share an argument with the verb (Davidsonian event adverbs).

Consider the examples in (5)-(7):

(5)  Jack ate alot at home before going to the party.
(6)  Jill eats at home alot.
(7)  We enjoyed the meal alot.

In (5), *alot* comments on the amount of food that Jack ate, while in (6) it reports on the number or frequency of events of eating at home that Jill participates in. For the former interpretation, I use the label *amount of stuff* and for the latter I use the label *amount of events*. In (7), alot reports the degree to which the meal was enjoyed and this will be called a *degree* interpretation.

There is a fourth kind of interpretation which I label *range*. It occurs in, among other places, the degree achievements discussed in Hay et al:

(8)  They widened the road alot.

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² I read the following on the internet that “A lot: two words. A lot of people make the mistake of writing them as one.” You shouldn’t trust everything you read on the internet.
³ others: Doetjes, Nakanishi…?
In (8), *alot* tells us how far apart the road’s pre-widening and post-widening widths are. *Range* interpretations always involve two points and the magnitude expression always reports the size of the range of points between these two.

Summarizing now, in all of the examples in (5)-(8), *alot* is a magnitude expression and in each case it says of some degree, amount or range that it is large or high. The examples differ with respect to the kind of thing whose magnitude is at issue. In (7), it’s a degree, in (5) and (6) it’s an amount and in (8) it’s a range.

In the following sections, I will define the terms *degree*, *amount* and *range* and briefly discuss relations between them. Following that, I will cover some uses of magnitude expressions in adjectival and nominal contexts followed by their uses in verbal contexts. It is one thing for a semanticist to distinguish possible readings of a sentence and it is quite another thing to show that these distinctions play a role in the grammar of the language. The final sections of the paper will be devoted to aspects of the grammar of the different readings.

Given the emphasis on nomenclature in this paper, I want to briefly explain my introduction of the new term *magnitude expression*. Many of these expressions are called ‘degree quantifiers’ (cf. Doetjes) or just ‘degree expressions’. I eschew these terms for two reasons. I want the term *degree* to have a particular meaning in the semantics, one that is too narrow for the various uses of these expressions in (1). Worse, the term “degree” has come to be used as a label for a syntactic category, which includes *too*, *so* and *as* but not *much* or *little*. The term *measure phrase* has already been taken. It refers to noun phrases headed by a measure term such as *inches*. Measure phrases are one kind of magnitude expression. *Quantifier* is at once too broad and too narrow. The term is applied to expressions like *some* and *some boy* neither of which is a magnitude expression. The syntactic category *Quantifier* or *Q* includes a subset of magnitude expressions -- *much*, *little*, *many* and *few* -- but excludes others -- degree words and measure phrases.

**Section II. Degree, Range, Amount**

Let a *scale* be a set of strictly ordered points. A *degree* is a point on a scale. Examples of scales that are relevant here are the set of all possible heights (ordered in the usual way from 0 on up), the set of all possible weights and the set of all points in time. Equally relevant are scales for which we don’t have measure terms including the set of all extents to which someone could be famous and the set of all levels of pain one can experience.

A *range* is a set that contains two degrees on a particular scale as well as all the degrees that lie in between them. An example of a range would be the set composed of the weight of my head, the weight of my car and all the weights in between. A *zero-point* on a scale is a degree below which there is no other degree on that scale. If a scale has a zero-point then there is a very natural mapping from degrees to ranges. Each degree corresponds to the range bounded by zero and that degree.
An **amount** is a kind of range. It must include a zero-point and it must be the result of a special kind of mapping from portions of stuff to ranges on a scale. The mapping must be done in such a way that the size of the range reflects the size of the portion mapped. In order to reflect the size of the portion mapped, the mapping must satisfy at least two requirements. The domain of the mapping must include at least two portions, one of which is a proper part of the other. And it must be the case that if x is a proper part of y, then the range that x is mapped to is smaller than (i.e. included in) the range that y is mapped to. I lump these two requirements together under the title **monotonicity** -- they guarantee that, non-trivially, as the portion size increases, the range size increases. Suppose now that I have some soup in my bowl. ‘The amount of soup in my bowl’ refers to a range on some scale. If you have the **same** amount of soup in your bowl, then we don’t have the same soup, but the range assigned to your soup is the same as the one assigned to mine. If the range is on a scale of volumes, then I inform you of the size of the amount-range by telling you that I have 14 ounces of soup.

Some readers may be wondering why I take amounts to be ranges and not degrees. This question is encouraged by the popular idea that an expression like 14 **ounces** refers to a degree. As I will explain below, I take measure phrases like 14 **ounces** to be predicates of ranges and not names of degrees, so amounts as ranges comes naturally. But given that amounts always include a zero-point, there is a natural one-to-one correspondence between amounts and degrees, so the choice is not really that crucial. I mention it here to avoid misunderstanding. To keep the amount-as-range view in mind, think of how we talk of large and small amounts. Ranges are size-ordered by set-inclusion whereas degrees do not come in different sizes. Identifying amounts as ranges, allows us to say that amount size corresponds to portion size. This type of metaphorical extension is common in language.

**Section III. Scalar notions in non verbal contexts**

**III.a Adjectival constructions**

I assume that gradable adjectives have degree arguments and that these arguments are bound by degree-words such as *as, so, that, too*, *enough* and the comparative morphemes –*er, more and less*. There are two views on the role of the degree argument. Cresswell(1976) adopts what one could call the ‘nominalization perspective’. On that view, ‘x is d-heavy’ says that d is the weight of x and ‘x is d-old’ says that d is x’s age, weight and age being nouns that correspond to the adjectives heavy and old. I will follow the other view (Lewis, Kamp, Klein, McConnell-Ginet) which takes as fundamental the **vagueness** of gradable adjectives. Language does not determine once and for all what is heavy and what isn’t. The boundary between heavy and not-heavy is not fixed. What is fixed is the relation between an individual and a given boundary. Degree arguments correspond to boundaries and a semantic rule for a gradable adjective looks something like this:

(9) \[ \| heavy \| \text{ is a function of type } <d,<e,t >> \]
\[ \forall d \ \forall x: \ ||heavy||(x)(d) = 1 \iff x \text{ is heavy relative to the boundary } d. \]

The following rule connects the ordering of boundaries and the extension of heavy:

\begin{align*}
(10) \quad & a. \ (d' > d \ \& \ ||heavy||(x)(d') = 1) \rightarrow ||heavy||(x)(d) = 1 \\
& b. \ (||heavy||(x)(d) = 1 \ \& \ ||heavy||(y)(d) = 0) \rightarrow \exists d' \ (||heavy||(x)(d') = 0 \ \& ||heavy||(y)(d') = 1)
\end{align*}

There is an important logical difference between the approaches. On the nominalization perspective, an adjective relates an individual to a unique degree, while on the vagueness view, an adjective relates an individual to multiple degrees, as (10)a. For readers who are used to the first view, it helps to think about how nominalizations are defined when degrees are viewed as boundaries. Here's a statement relating heavy to weight:

\[ \forall x,d: \ ||heavy||(x)(d) = 1 \iff ||weight||(x) > d \]

Now that we have fixed on an account of degrees, we can briefly look at degree words. In (12) below, I give simple paraphrases for some degree words showing in what sense they bind degree arguments:

(12) Jack is very heavy.

For some rather high degree d: heavy'(j,d)

(13) Jack is heavy enough to sit in the front.

\[ \exists d \ (\forall x: \ x \text{ can sit in the front} \rightarrow \text{heavy}'(d,x)) \ \& \ \text{heavy}'(j,d). \]

(14) Jack is as heavy as Karl

For any d, heavy'(k,d) \rightarrow heavy'(j,d)

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4 The general rule would look like in (1):

(1) **Adjectival Nominalization.** Let nom-\( \alpha \) be the nominalization of an adjective \( \alpha \) of type \(<d,<e,t>>\). Then:

\[ ||\text{nom-}\alpha|| = \lambda x. \text{LUB}\{d: \ ||\alpha||(d)(x) = 1\}\]

Let R be a range on the scale S. \( \text{LUB}(R) \) is defined as the lowest point in S that lies above all the points in R.
The analysis for the comparative turns on the observation that if Jack is heavier than Karl, then there are boundaries relative to which Jack is heavy but Karl is not (Lewis 1983). Following McConnell-Ginet(1973) and Klein(1982), we can capture this idea with the following formula:

\[(15) \text{ Jack is heavier than Karl is true iff: } \{d: \text{ heavy'}(j,d) & \neg \text{ heavy'}(k,d)\} \neq \emptyset.\]

According to (15), the comparative picks out a set of degrees. Recall from above, that a set of degrees is a range. Using (11), we can describe the degrees picked out by (15) as the range of degrees between Jack’s and Karl’s weights. According to (15), that range is non-empty if Jack is heavier than Karl. How much heavier Jack is than Karl will determine the size of the range picked out by the comparative. It is possible to use magnitude expressions to indicate the size of that range. We can say that the range is large, as in (16)a,b below, or small, as in (16)c. It is also possible to use a measure phrase to say precisely what the size of the range is, as in (16)d.

\[(16) \begin{align*}
(a) & \text{ Jack is much heavier than Karl.} \\
(b) & \text{ Jack is alot heavier than Karl.} \\
(c) & \text{ Jack is a bit heavier than Karl.} \\
(d) & \text{ Jack is 3 lbs heavier than Karl.}
\end{align*}\]

Excessive constructions also allow for the use of magnitude expressions:

\[(17) \begin{align*}
(a) & \text{ Jack is 2 lbs too heavy.} \\
(b) & \text{ Jack is much too heavy to lift.}
\end{align*}\]

This means that excessives also pick out ranges. (18) illustrates how the range is picked out (see Hacquard, Meier for discussion of the semantics of this construction). (18) makes use of a world variable for heavy’ since excessives are modal constructions (Nelson):

\[(18) \text{ x is too heavy to lift is true in world a iff: } \{d: \text{ heavy'}(d)(x)(a) & \neg \text{ heavy'}(d)(x)(w^*) \} \neq \emptyset \]

where w* is a world similar to a where x can be lifted

Bare-adjectives have degree arguments and combine with degree operators. Comparatives and excessives pick out ranges and combine with range predicates. As (12)-(14), (16) and (17) show, there are quite a few expressions that function as degree operators and not as range predicates and vice versa. The chart in (19) gives a list of some of the expressions in both of these semantic categories:

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5 Assuming that weights form dense scale, we need to allow for ranges that are do not contain their bounds. The set in (15) doesn’t contain Jack’s weight, but it does contain all the weights up to it.

6 PPs also take range predicates (2inches past the barn). The range-predicate analysis is roughly what you find in Zwarts and Winter’s work.
In (19), I’m making a distinction that I will cash out in terms of type labels, which is probably the wrong tool. Let me at least explain what I’m trying to get at. I take *alot* to be type \(<r,t>\), where ‘r’ is the type of ranges. Given what I’ve said so far, it would seem to follow that ‘r’ is just an abbreviation for type \(<d,t>\), which means that \(<r,t>\) is just short for \(<<d,t>,t>\). But I want to keep ‘r’ as a separate type – something like the way we distinguish pluralities of type \(e\), from say one-place verbs or nouns of type \(<e,t>\), even though pluralities are set-like. I want to reserve type \(<d,t>\) for derived predicates based on gradable adjectives. I have in mind possible LFs such as (20) below:

(20)  *Jack is too heavy* ⇒ too \(\lambda t_d\) Jack \([t_d \text{ heavy}]\)

where the degree operator combines with a predicate of type \(<d,t>\). Given rules like in (10)a, \(D_{<d,t>}\) (domain of type \(<d,t>\)) only includes a limited subset of the possible sets of degrees. Predicates of type \(<d,t>\) can’t pick out sets ‘in the middle’ of the scale. \(D_{<r>}\), on the other hand, includes any convex set of degrees. This in turn means that range-predicates of type \(<r,t>\) would differ from degree operators of type \(<<d,t>,t>\). There is another difference between predicate operators and range predicates. Range-predicates involve a measure on the size of the range while degree operators, even if they are type \(<<d,t>,t>\) – as in (20) – say something about which degrees are in the set denoted by their argument (see (12)-(15)).

Let me end with a comment on the semantics of *much* which will be of relevance below. *much* is a range predicate, but it also has a degree argument. We know this because it combines with all of the degree operators listed in (19). So *much* is type \(<d, <r,t>>\). In the expression *much too much*, *too* binds the degree argument of the *much* on its right and it introduces a range, which explains the presence of *much* on its left. When *much* combines with the degree word that, the result is an expression of type \(<r,t>\). *alot* is a simple expression of type \(<r,t>\). Measure phrases (eg 5 *decibels*) are also type \(<r,t>\). The semantic contribution of an occurrence of *much* or *alot* is often described in terms of measure phrases. For example, one might say that *Jack is much heavier than Karl* is true if Jack is 20lbs heavier, but not if he is only 1lb heavier. However, the

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7 In Schwarzschild(2005), I argued that exceptional cases of measure phrases attaching directly to adjectives (eg 2 *feet tall*) are due to a lexical rule that makes use of the correspondence noted above between ranges and degrees on scales with zeros. See Kennedy and Svenonius(2005) for an alternative account.
semantics/pragmatics of *much* is more complicated than most measure phrase descriptions suggest. If instead of Jack and Karl, we consider two lumps of gold, one weighing 2 oz. and the other weighing l lb and 2 oz, then we would be inclined to say that the second is much heavier than the first. A difference of 1 lb is ‘much’ in the case of the lumps but not in the case of Jack and Karl. In other words, *much* can have a ‘proportional’ interpretation of the kind usually associated with *many*. Proportional readings of *many* arise in apparently non-compositional ways and usually have to do with probability theoretic notions like expectation (see Lappin 2000 and references therein) and I assume the same for *much*.

### III.6 Nominal constructions

In the following examples, the expressions in bold characterize amounts of stuff of a kind described by the following noun phrase:

(21) a. Jack used *alot* of soap.
    b. Jack used *2lbs* of soap.
    c. Jack used *too much* soap
    d. Jack used *more* soap by weight than Jill did.
    e. #Jack used *alot* of thing.

All the magnitude expressions in (21) are range predicates. This means that they predicate of a set of degrees. But which degrees? Given the nature of the range predicate in (21)b, the degrees in that case must be weights or equivalently the degrees that serve as arguments to the adjective *heavy*. In (21)d, the phrase ‘by weight’ makes the choice of degrees explicit while in (21)a and (21)c it is left open. Assuming that nouns do not have degree arguments (contra Cresswell 1976), I posit some hidden structure intervening between the noun (phrase) and the range predicate which creates a quantifier and adds a degree relation (cf. Parsons, Lønning). The structures are given in (22) and the meaning for the functional head is given in (23). The label ‘Mon’ is short for monotonicity.

(22)

```
\[
\begin{array}{c}
\text{too much soap} \\
\text{more soap}
\end{array}
\]
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(23) \( \text{Mon}^\circ \rightarrow \lambda P \lambda Q \lambda D_{\text{st.p}} \lambda D_{\text{T.d}} \exists X P(X) \& Q(X) \& \alpha(X,d) \)
can be paraphrased as in (25), in a context where \( \alpha \) gets the meaning of ‘voluminous’ (or whatever meaning relates entities and volumes):

\[
(24) \quad \lambda \alpha \lambda d \, \exists x \, \text{Jack-used-X} \, \& \, \text{soap}(X) \, \& \, \alpha(d,X)
\]

\[
(25) \quad \text{“The range of volumes from 0 up to the total volume of soap that Jack used is large.”}
\]

Since this analysis treats much as it does in the comparative, it inherits the proportional interpretation discussed in the last section. Here’s a relevant example that uses the compared form of much namely more:

\[
(26) \quad \text{His mother uses more sugar in her cakes than Entenmanns does.}
\]

Here we are not comparing volumes or weights directly but proportions\(^8\). His mother’s cakes might in general be smaller than Entenmanns’ so that the volume of sugar in one of her cakes is always smaller than the volume of sugar in an Entenmanns cake. However, it is possible that:

\[
\begin{align*}
(a) & \quad \text{the volume of sugar in one of her cakes is } d \text{-much relative to the size of the cake} \\
(b) & \quad \text{the volume of sugar in an Entenmann’s cake is } d’ \text{-much relative to the size of the cake} \\
(c) & \quad d > d’.
\end{align*}
\]

This way of understanding the proportional interpretation has it coming in in the interpretation of the range-predicate much. An alternative to consider is that it comes in in the interpretation of \( \! \) in Mon°.

In Section II, it was claimed that not just any range is an amount. The size of the range must be reflective of the size of the portion of stuff mapped into the range. This requirement is stated as a requirement presupposed\(^9\) to hold of \( \alpha \) and \( P \), where by ‘P’ I mean the variable that occurs inside the meaning for Mon° in (23):

\[
(27) \quad \text{Definedness Conditions on } \alpha, P:\
\]

\[
\begin{align*}
\text{Let: } < \text{ stand for the part-whole relation.} \\
i. & \quad \forall x \forall y \, (P(x) \, \& \, P(y) \, \& \, x < y) \rightarrow \{d: \alpha(x,d)\} \subset \{d: \alpha(y,d)\} \quad \text{Monotonicity}
\end{align*}
\]

\(^8\) Partee(1989)’s examples below make the same point about cardinalities:

\begin{quote}
[37] There are more illiterate people in small rural towns than in large cities.
[38] Small programs give financial support to more of their students than large programs do.
[39] Some small programs support more students than some large programs do.
\end{quote}

\(^9\) I follow Chris Kennedy’s suggestion to treat this requirement as a presupposition.
ii. $\exists x,y \ P(x) \ & \ P(y) \ & \ x < y$

The first requirement will rule out an interpretation of (21)c *Jack used too much soap* where $\alpha$ is interpreted as ‘pure’. A portion of soap can have the same degree(s) of purity as subportions of it. This entails that (21)c can’t mean that Jack used soap whose purity was excessive. The second requirement insures that the first is not vacuous. It also rules out (21)e, on the assumption that the count-noun grammar of *thing* excludes any interpretation where the extension includes an object as well as its proper parts.

Section IV. Scalar notions in verbal contexts

In section I, I claimed that magnitude expressions give rise to amount, range and degree readings when attached to verbs. I went on to describe the semantics of these kinds of readings in non-verb contexts. I follow the spirit of Bosque and Masullo in taking the non-verb cases to be primary. But they take this idea very literally, proposing the presence of adjectives and nouns in the lexical structure of any verb that combines with a magnitude expression. I am pursuing a different approach in which I model the analysis of magnitude expressions in verb contexts on the adjectival and nominal cases.

IV.a Degree verbs

Adverbials of degree are magnitude expressions that combine with verbs and operate on degrees. So an example like (28) should serve as our guide to understanding (29):

(28) Jack is very heavy.
(29) Jack likes Jill very much.

Just as *very* in (28) says that Jack is among the heavy things relative to some high boundary between heavy and not-heavy, likewise *very much* in (29) says that the pair $<$Jack, Jill$>$ is among the liking-pairs relative to some high boundary between liking and not-liking. Given the rule for *heavy* in (9), we propose the following for *like*:

(30) $||like||$ is a function of type $<e,<d,<e,t>>$  

$$\forall d \ \forall x \ \forall y: \ ||like||(x) \ (d) \ (y) = 1 \ \text{iff} \ x \text{ likes } y \text{ relative to the boundary } d.$$

For concreteness, let’s assume that *very much* is a degree quantifier of type $<<d,t>,t>$. In that case we have an LF of the form:

(31) *very much* $\lambda t_d$ (Jack (likes Jill) $t_d$)

IV.b Range verbs

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10 I’m assuming the *much* is vacuous here. See section V.b.2 for some motivation.
Isn’t *prefer* supposed to have syntax of comparatives.

Following Hay et al, I take a sentence like (32) to describe an event characterized by the difference in the size of the universe at the start of the event and its size at the end.

(32)  The universe expanded.

Since these verbs have range arguments, our guide for their semantics will be the comparative (see (15) above). In this rule, I use ‘s’ as the type whose domain is events:

(33)  \[ \|\text{expand}\| \text{ is a function of type } <s, <r, <e, t >> >\]

\[ \forall r \, \forall x \, \forall e : \|\text{expand}\|>(e)(r)(x) = 1 \text{ iff} \]

\[ r = \{ d : \text{big }'(x, d, \text{End}(e)) \land \neg \text{big }'(x, d, \text{Start}(e)) \} \]

The range argument in (32) is existentially quantified and asserted to be non-empty, as in the case of comparatives without magnitude expressions. When a magnitude expression is combined with a range verb, it indicates the size of the range:

(34)  The earth’s forest cover expanded by 36 million hectares.

Since predicates of ranges are type \(<r, t>\), their meanings cannot combine with a range verb by function-argument application, rather they must share a common argument, as with Davidsonian event adverbs as in the following formula intended to be synonymous with (34) (the constant \(f\) stands for the earth’s forest cover):

(35)  \[ \exists e \, \exists r \, \text{expand}'(e)(r)(f) \land 36\text{-million-hectares'}(r) \]

A fully worked out system would ideally be capable of capturing the entailment from (34) where the range is introduced with a verb to (36) or (37) where the range is introduced with a comparative:

(36)  As a result of the expansion, the earth’s forest cover is bigger by 36 million hectares.

(37)  At the end of the expansion, the earth’s forest cover was 36 million hectares bigger than at the beginning.

I take measure verbs like *weigh* (10 lbs), *cost* (5 dollars) or *last* (2 days) to be range verbs as well.

*IV.c Amount of Events*

(38) illustrates the amount of events reading of a magnitude expression:
(38) Jack runs alot.

On this reading, the amount of running by Jack is said to be large. Since this is an amount reading, we need an operator like Mon°. This one works on events and doesn’t create a quantifier. $E$ is a variable true of several events:

(39) $\text{Mon}_s° \rightarrow \lambda P \lambda D_{<,> \epsilon} D(\lambda d. \exists E \ P(E) \ & \ \alpha(E,d))$

In (38), $\text{Mon}_s°$ needs to combine with a predicate of events that, one way or another, picks out all and only events of Jack’s running. How that works depends on how one’s event semantics works in general. On a simple function-argument approach, the Agent argument of the verb would have to be saturated before Mon° applies. This will be true for other types of arguments of other, more complex verbs (e.g. he sells coconuts to Canadians alot). This doesn’t of course mean that the magnitude expression takes scope over argument expressions or other adjuncts. These other expressions could bind into MonP, with the event predicate saturated with variables. The following pair suggests that in some cases they must:

(40) Jack smoked cigarettes alot.
(41) ?Jack smoked a cigarette alot.

Following Carlson’s account of similar (well-known) facts with durational adverbs, I assume that singular count quantifiers generally take scope over non-count or plural quantifiers and that the quantifier inside of $\text{Mon}_s°$ is non-count or plural. The following formula gives the intended interpretation for (41):

(42) $\exists x \ \text{cigarette’}(x) \ & \ \text{alot’}(\lambda d. \exists E \ \text{smoke’}(j)(x)(E) \ & \ \alpha(E,d))$

(43) “There is a cigarette x and the range of numbers from 0 up to the total number of events of Jack smoking x is large.”

In order to satisfy the Non-Vacuity requirement (27), the set of events of Jack smoking cigarette x must include some event and its part -- both would have to be events of smoking x. The unlikelihood/impossibility of such circumstance is reflected in the oddness of (41).

The possibility of a proportional interpretation for amount predication carries over into the verbal context. The sentence in (44) is ambiguous:

(44) Jack answered the phone more than Karl did.

It has a cardinal/iterative interpretation according to which we compare the number of phone calls answered. It also has a proportional interpretation in which we compare the proportion of calls answered. The two readings could lead to different truth-values. Suppose we’re talking about Jack and Karl’s respective stays at Jill’s house and suppose
that Jack answered the phone every time it rang but he stayed only one week, while Karl answered only every tenth call, but he stayed for a year.

hmm…

I’m assuming that the proportional reading is coming from the interpretation of much/more. In other words, MonP delivers sets of cardinalities and much assigns different values to them based on expectations given the length of stay. Another possibility is that α inside MonP relates sets of events to a frequency, depending how they are distributed in time. Going this route leads to an interesting conclusion about how we view recurring events. The monotonicity requirement from (27) is repeated here:

(45) Let: < stand for the part-whole relation.

∀x∀y (P(x) & P(y) & x < y) → \{d: α(x,d)\} ⊂ \{d: α(y,d)\}

Monotonicity

Suppose that α relates a group of events to a degree based on their distribution in time. Whether or not the requirement is satisfied, depends on how the part-whole relation is defined. If we cut things up in temporally contiguous blocks, monotonicity fails. If Jack runs every day in some year-long period, then he runs with the same frequency in every month-long part of that period. The alternative is to cut habits up into subhabits, preserving the temporal interval. On this view, Jack’s habit of running every day is composed of subhabits, one of which is the habit of running every Monday and another of which is the habit of running every Tuesday and so on. On this view, frequency is monotonic on part-whole relation. The Monday habit has a frequency of once per week, while the Monday-Tuesday habit has a frequency of twice per week.

IV.d Amount of Stuff

I assume that Mon° plays a role in amount of stuff readings (Jack ate alot). It follows that there has to be some meaning of type <e,t> that picks out the stuff and that combines with Mon°. Nothing we have so far gives us any guide as to the source of that meaning. The simplest account takes the amount of stuff readings to arise when a MonP has a null-NP inside it. If that’s correct, then we have a ready-made analysis of amount of stuff readings. As far as the subject of this paper is concerned, Jack ate alot is interpreted just like Jack ate alot of food. Whether or not this is correct is a subject for the next section.

Section V. The Grammar of Degree, Range and Amount ad-verbials.

Having described the four different types of readings, I turn now to a catalogue of grammatical characteristics of the different readings. I have pointed towards analyses of
the different readings. But these need to be fleshed out. The hope is that the observations in this section can be incorporated in the final analysis.

\textit{V.a Amount of Stuff}

What evidence is there for or against the view that amount of stuff readings come about when a magnitude expression is part of (a partially null) noun phrase argument of the verb?

The magnitude expression has the external syntax of an argument NP:

\begin{enumerate}
  \item [46] a. Jack ate alot at home. (amount of stuff reading possible) 
  \hspace{0.5em} b. Jack ate salami at home.
  \item [47] a. Jack ate at home alot. (amount of stuff reading hard to get) 
  \hspace{0.5em} b. *Jack ate at home salami.
\end{enumerate}

When the verb is passivizable, the magnitude expression can passivize:

\begin{enumerate}
  \item [48] a. Jack ate alot 
  \hspace{0.5em} b. Alot was eaten by Jack.
\end{enumerate}

Finally the amount-of-stuff interpretation becomes degraded or impossible when we try to fill the relevant argument position with another noun phrase, even a bare-plural:

\begin{enumerate}
  \item [49] Jack ate cherries alot. (only amount of events reading)
  \item [50] *Jack ate cherries too much.
  \item [51] Jack ate cherries more than Jill did.
\end{enumerate}

The last example comes closest to having an amount of stuff reading. But it somehow seems to require a situation in which there is a cherries-eating task that Jack did better at then Jill. This could be one of those ‘metalinguistic’ uses of the comparative. Possible exceptions to the generalization that amount-of-stuff readings require the magnitude expression to in argument position involve verbs like \textit{rain} or \textit{bleed} (\textit{it rained alot}, \textit{he bled alot}). But these verbs do admit objects, albeit in a limited way (\textit{it rained cats and dogs}, \textit{he bled green blood}).

On the assumption that amount-of-stuff adverbials include a null-NP attached to the magnitude expression, one would like to know how the null-NP is interpreted. It does not behave like a common anaphor. There does not have to be an antecedent providing the content of the noun phrase, at least not another noun phrase.\footnote{Vos\textit{(1999) even claims for the relevant Dutch examples that an antecedent is impossible (fn 20, p107):}} In this respect, these

\begin{enumerate}
  \item [i] \textit{We hebben veel gelezen} 
  \hspace{0.5em} we have much read
  \hspace{0.5em} \textit{we read a lot}
\end{enumerate}
examples differ markedly from examples with bare-quantifiers. None of the examples is in (52)-(55) is possible without an antecedent in prior discourse:

(52)  Jack has eaten some already.
(53)  I spoiled him by giving him too many.
(54)  I haven’t read any.
(55)  None follow from that assumption.

Corresponding amount-of-stuff adverbials are possible antecedentlessly:

(56)  Jack has eaten a little already.
(57)  I spoiled him by giving him too much.
(58)  I haven’t read as much as you have.
(59)  Alot follows from that assumption.

The putative null-NP has other special properties. It cannot have a +human extension:

(60)  They hired alot in the first year.
(61)  *Much admired Kennedy.
(62)  *Alot were looking for the treasure.

This could be related to the mass/count distinction, although there are +human mass nouns like hospital staff or personnel. Why can’t the null-NP be assigned their meanings?

Bosque and Masullo observe that Spanish mucho/a ‘much, many’ agrees in gender with the head noun it governs. mucho/a can also be used anaphorically in which case it agrees in gender with the antecedent. But when mucho is used as an amount of stuff adverbial, it takes neuter marking.

Not all verbs equally allow for an amount-of-stuff adverbial. I find most of these difficult to understand without an antecedent for the missing NP:

(63)  a.  I keep alot in my office.
   b.  I poured as much into the pitcher as I did into the glass.
   c.  The bartender mixed alot.

Bosque and Masullo seem to suggest that the determining factor is whether the verb participates in what Levin(1989) called the Indefinite Object Alternation. Thus compare:

(64)  Jack ate  ~  Jack ate alot.

if there is an understood count noun then you have to have:

(ii)  We hebben er veel gelezen
     we have  er many read

if there is an understood mass noun, then (i)  is no good (of course, (ii) isn’t either).
(65) *Jack mixed.  ~ Jack mixed alot.

In fact, the connection goes at most one-way. If the verb can be used absolutely, then it can combine with an amount-of-stuff adverbial, but the implication does not go in the other direction as the following examples show. All of them become ungrammatical if the magnitude expression is omitted (and the verb’s interpretation is kept fixed):

(66) a. They were able to grow alot in their victory garden.
    b. I put as much in the suitcase as I did in the trunk
    c. You are wearing too much.
    d. I learned alot in the first course.
    e. He knows more than he is saying.
    f. I spoiled him by giving him too much
    g. His theory predicts so little.
    h. So little follows from that assumption
    i. The policy guarantees so little.

I hope I have established that there is something to explain in these cases\(^\text{12}\), even if I haven’t shown that the explanation lies within the semantics of magnitude expressions in general, as opposed to the grammar of anaphora and control. Bosque and Masullo propose that the missing NP in amount-of-stuff adverbials is to be found inside the sublexical structure of the verb. One could imagine semanticized versions of that idea according to which the verb (or an event-semantics conjunct in the verb’s meaning eg ‘Theme(e)’) serves as the antecedent for a null-NP. Restrictions on the interpretation of the null-NP might be explained by the fact that there are kinds of meanings that nouns have that verbs can’t have.

\section*{V.b Degree and Range}

\begin{quote}
depend very much on the education level of their parents
\end{quote}

a) so depend is degree verb.  note the position before the (subcategorized?) PP. try comparing this to other cases.

b) can replace very much with heavily.  this is not however true for other case: *heavily loves her,  Bosque and Masullo make some point about adverbs being finicky.

\section*{V.b.1 AKTONSART (≈ ASPECTUAL CLASS)}

As noted earlier, the Non-Vacuity requirement entails that in an amount of events reading, the verb phrase has to characterize multiple events. This requirement is not imposed on range or degree readings and it is therefore diagnostic of these readings.  The

\textsuperscript{12} For all I know, this has all been explained already.  Apparently Kester(1996) discusses this issue but I haven’t seen that work.
Adverbials of Degree, Range and Amount    ~    Schwarzschild

aktionsart of like, resemble and surprise and the use of one-time all point to degree/range readings for (67)-(70).

(67) Jack likes Jill very much.
(68) Jack very much resembles his father.
(69) The color surprised him more than anything else.
(70) One time, the tailor lengthened the pants so much that …

Aktionsart is the only factor in labeling (69) degree or range, and nothing but raw intuition points to degree over range. (67)-(68), on the other hand, have very much which only works with degree readings. Compare:

(71) a. *Jack runs very much.
   b. The universe expanded very much.
   c. My car costs very much.
   d. He taught us very much.

Note: degree verbs that are modified by well (eg understand, cook, know) don’t take very much. This may be an instance of blocking of the kind Doetjes(1997, 2001) discusses.

V.b.2 DEGREE OPERATORS

Given the proposed semantics for adjectives, nouns and verbs, it follows that degree operators should combine with all (gradable) adjectives, no nouns and some verbs, namely those that have degree arguments. This picture is far from an accurate description of English. There are in fact no operators from the set in (19) above that combine with verbs. very much is the closest one gets with underived verbs. Interestingly, some present participles do combine with degree words and when they do, a degree reading seems appropriate. Here are some examples:

(72) a. *It is very confusingverb me.
   b. It is very confusingparticiple to me.

(73) a. *It was a very running joke.
   b. *He is very listening to me.

(74) a. a very expanding, shrinking (universe)
   b. *a very widening, lengthening, process
   c. very relaxing
   d. very annoying, irritating
   e. very loving, appealing, disturbing
   f. *very hating, enjoying, liking

As (74)f shows, not all degree verbs combine with very.
Outside English, we do find operators with the expected distribution. Bennis & Wehrman (1990) note that Dutch *zeer* ‘very’ combines with certain verbs (‘enjoy’, ‘gratify’) but not ‘sleep’ or ‘snore’ and they liken it to Hebrew *me’od* ‘very’ discussed by Borer (1990). Hebrew *dey* ‘quite’ and *kol-kax* ‘too/so’ have a similar distribution. In Chinese, (some?) degree verbs form combine with several degree expressions normally found together with adjectives.

With respect to the range/degree distinction, it should be noted that range verbs often combine with range-predicates in a *by* phrase:

(75) He lengthened it by alot.
(76) It expanded by more than we had expected.
(77) *He resembled his dog by alot.

In this respect, range verbs are like the comparative *(bigger by alot)* as expected.

**V.B.3 Light Verbs**

Bosque and Masullo point out an interesting property of adverbials of degree that depends on their special logic as opposed to the ontology. Recall that degree adverbials bind a degree argument in the verb, as compared with amount of events adverbials in which the verb or verb phrase serves as an argument for Mon⁰. In the case of adverbials of degree, the verb has to have a degree argument, while for amount of events readings, the verb or verb phrase has to be a predicate of events. Bosque and Masullo (page 23) observe a difference between *temer* ‘to fear’ which admits adverbials of degree versus *tener miedo* ‘have fear’ which does not.

   ‘John has fear much of the dark.’

   b. Juan teme mucho la oscuridad.
   ‘John fears much the dark.’

Assuming that nouns do not have degree arguments and that *tener* ‘have’ is a light verb without a degree argument, *temer* and *tener miedo*, while nearly synonymous, differ in argument structure in way that affects the possibility of having an adverbial of degree. The English pair in (79) helps to illustrate the difference.

(79) a. She influenced me alot.
    b. *She had an influence on me alot.

By contrast, switching from *to shower* to the corresponding light verb construction *to take showers* doesn’t disrupt the possibility of having an amount of events reading.

(80) He showers alot / more than anyone I know / too much.
(81) He takes showers alot / more than anyone I know / too much
Note: you need to have the bare-plural *showers* to allow it to scope inside MonP. See discussion of (41) above.

**V.c Duration**

In the introduction I discussed two amount readings, a degree reading and a range reading. Bosque and Masullo identify a fifth kind of reading where the magnitude expression describes a *duration*. These include:

(82) a. Jack slept *alot* last night.
    b. No permanecer *mucho* en un lugar. (BM [28c, page 26])
    ‘do not stay in one place too long’

If this is an independent reading then it must be one where a single event or state is described, as opposed to multiple events. A sentence like *Jack smoked alot when he was young* might imply/entail that he smoked for a long time, but it describes multiple smoking events and hence falls under the rubric of amount of events. A true duration reading would have to be one involving a single event. There are theoretical and empirical reasons why I excluded this reading. These are also reasons to distinguish duration adverbials in general (eg. *for an hour*) from the purview of our discussion.

To say that the magnitude expression in (82)a describes the duration of an event, is to say it means something along the lines of:

(83) \( \exists e \) sleep(e) & past(e) & last-night(e) & *alot*(e)

The problem comes in the last conjunct. *alot* is not a predicate of events, it’s a predicate of ranges. This means that something must connect ‘e’ and *alot*. In a restrictive theory, this would be Mon\(^o\). But Mon requires a predicate of type \(<e,t>\) as its argument. So at the very least, the duration reading entails a new kind of interpretation, one that has no precedent in adjectival or nominal semantics.

The duration reading is one in which a magnitude expression is used in pretty much the same way as a (common) durational adverbial is used. This means that we should find durational readings of magnitude expressions wherever durational adverbials are used, but we don’t, as the following examples show:

(84) a. He fed the dog more than she did.  (amount of food/feedings, not duration)
    b. He fed the dog for a year/\(\ast\)an hour.

(85) He ran every day \{for a year/ \(\ast\)more than I did\}
(86) \(\ast\)I stayed at home \{for three hours/ \(\ast\)alot\} yesterday.
(87) We drank wine \{for an hour/ \(\ast\)too much / ?2 more than you did\}
We could explain these examples by denying the existence of a durational reading of magnitude expression, as long as we could make a case for including the putative durational examples in (82) under the categories already established.

**Section VI. Conclusion**

By way of conclusion let me describe the semantic heterogeneity of magnitude expressions in verb phrases somewhat differently than at the beginning. If we keep event and object arguments on a par and we adopt the idea that amount-of-stuff interpretations involve a quantifier in an e-type argument position, we can distinguish the different readings by the kind of position in the verb’s argument structure that is bound: degree, range, event, object.

Obviously many questions remain. Perhaps the biggest is why the semantic diversity is not reflected in the syntax.

**References**


