# Gradable Predicates and the Distribution of Approximators

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The goal of this paper is to identify and explain the asymmetries in the distribution of *approximately* and *about* exhibited in (3) and (4). The analysis provided finds the distribution of *approximately* to be a direct result of composition and argument types, and the narrower distribution of *about* is a result of its inability to coerce scalar readings.

## 1 Introduction

The approximators *approximately* and *about* can appear in constructions like (1) and (2), where they modify the number phrase *50 sandwiches*.

(1) a. John served approximately 50 sandwiches.
b. John served about 50 sandwiches.

(2) a. What John served was approximately 50 sandwiches.
b. What John served was about 50 sandwiches.

Approximators can also modify a noun if it is coerced into a scalar reading, as *beef stroganoff* is in the examples below. In this context, however, approximators are more restricted in their distribution. Additionally, the ostensible synonyms *approximately* and *about* pattern differently with coerced scalars.

(3) a. ??John served approximately beef stroganoff.
b. ??John served about beef stroganoff.

(4) a. What John served was approximately beef stroganoff.
b. ??What John served was about beef stroganoff.

Below we investigate these asymmetries. Specifically, we will address why coerced-scalar nouns pattern differently from numerals ((3),(4) v. (1),(2)) and why *approximately* and *about* pattern differently with coerced-scalar nouns but not with numerals ((3) v. (4)). For the former asymmetry, I will show that by following Hackl (2000), an approximator in combination with a scalar (e.g. *ap-*

*proximately beef stroganoff*) requires more arguments than are supplied in (3). For the latter, I will suggest that *approximately* and *about* have differing abilities to coerce scalars.

## 2 *Approximately*

### 2.1 Hackl on modified numerals

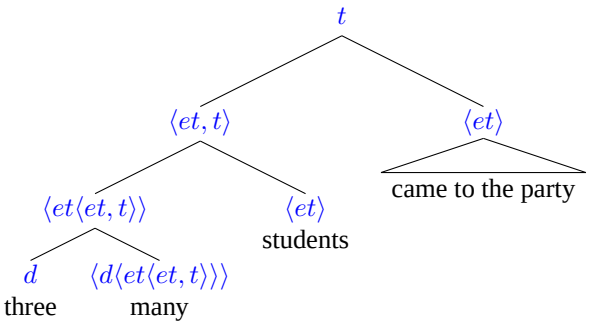
Hackl (2000) proposes that bare numerals combine with a phonologically-null 'degree function' *many*.

(5) $[\![\textbf{many}]\!] = \lambda d \in D_{Card}.\lambda\, {}^*f \in D_{\langle et\rangle}.\lambda\, {}^*g \in D_{\langle et\rangle}.\exists x\, {}^*f(x) = {}^*g(x) =$
$1$ & $x$ has $d$-many atomic parts in $f$ (Hackl, 2000, p. 213)

In the example in (6), *many* combines with the numeral *three* (which for simplicity I will treat as type $d$(egree)) and two predicates ranging over pluralities (*students* and *came to the party*) and asserts that there is some $x$ that is true of both predicates which has three atomic student parts.

(6) a. Three students came to the party.

b.

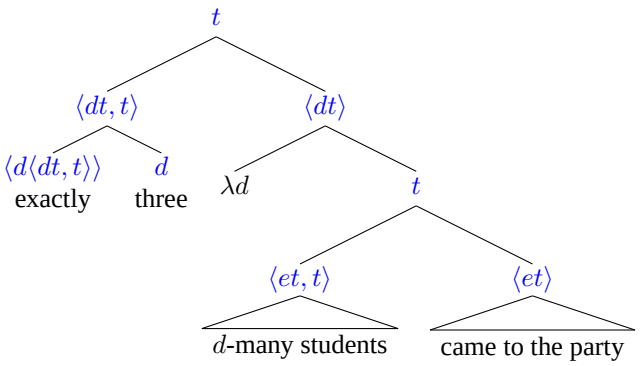



Numeral expressions can also involve 'degree quantifiers' like *at most* and *exactly*, which compose as in (8).

(7) $[\![\textbf{exactly n}]\!] = \lambda D_{\langle dt\rangle}.D(n) = 1$ & $\neg\exists d[d > n$ & $D(d) = 1]$

(8) a. Exactly three students came to the party.

b.




Here, *exactly* functions to assert that the number of students who came to the party is three and no more than three.

Hackl notes a restriction on *many*: unlike other degree functions like *tall*, *many* can only be used attributively. This is apparent in the complement of *look* and *consider*, which require predicative $\langle et\rangle$ arguments (Partee, 2008).

(9) a. John looks tall. (Hackl, 2000, p. 97)
b. *The guests look many.

(10) a. Mary considers John tall. (Hackl, 2000, p. 98)
b. *Mary considers the guests many.

The difference, Hackl proposes, is that *many* cannot be type-shifted to behave predicatively, whereas *tall* can.

A possible objection to this can be seen in (11), where *many* occurs in what may appear to be a predicative post-copular position. Hackl, however, claims copular constructions do not provide reliable tests for predicate status.

(11) The guests were many women. (Hackl, 2000, p. 97)

### 2.2 Extension to *approximately*

I treat *approximately* as a degree quantifier (cf. *exactly*, (7)) which feeds *many* a degree that falls within some contextually-determined distance $\sigma$ of n. This composes just as *exactly* does in (8).

(12) $[\![\textbf{approximately n}]\!] = \lambda D_{\langle dt\rangle}.\exists x_d \in \{y | n + \sigma \geq y \geq n - \sigma\} : D(x)$

I treat coerced scalars as degrees such that the coerced scalar *beef stroganoff* denotes a degree on some scale or set of scales representing beef stroganoff.

Note that we cannot use *many* with these constructions, since it requires plural predicates and involves counting over atomic parts. Instead I assume what here is called *much*, which references scales, not cardinalities.

(13) $[\![\textbf{much}]\!] = \lambda d \in D_d.\lambda f \in D_{\langle et\rangle}.\lambda g \in D_{\langle et\rangle}.\exists x : f(x) = g(x) = 1$ & $x$ falls at $d$ on the relevant scale in $f$

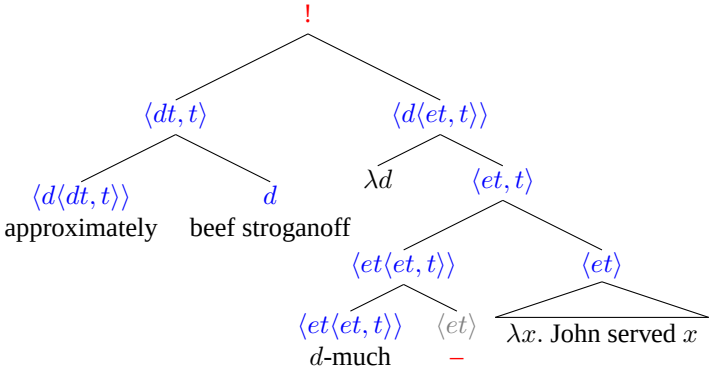
In (3), *much* can take *beef stroganoff* (type $d$) and $[\lambda x.$ John served $x]$ (type $\langle et\rangle$) as arguments, but it is still missing an argument of type $\langle et\rangle$ and is therefore unacceptable.[1] This is illustrated below, where *much*'s (missing) $\langle et\rangle$ arguments are underlined.

(3) ??John served approximately beef stroganoff *much* _____.

The failed composition is shown in (14), with – in place of the missing argument.

(14) a. ??John served approximately beef stroganoff.

b.



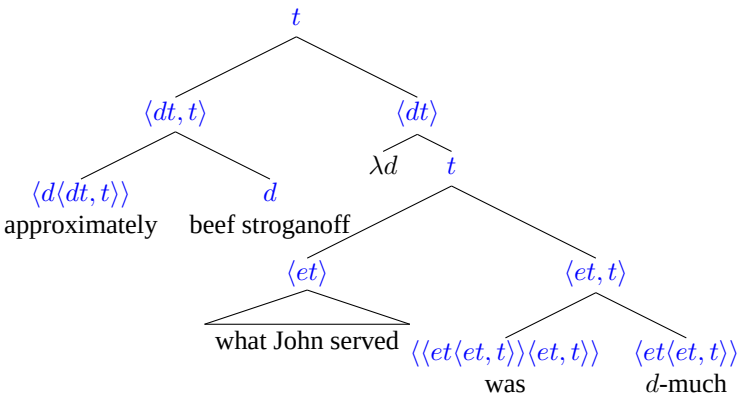

Given this explanation for the unacceptability of (3), the acceptability of (4) becomes mysterious, since it too seems to be missing an argument of type $\langle et\rangle$.

(4) What John served was approximately beef stroganoff *much* _____.

Recall, however, that Hackl does not consider post-copula positions to be strictly $\langle et\rangle$. A possible explanation for why these forms are permitted in copular constructions is to propose a copula-specific type shift, somewhat similar to Partee (2008).[2]

(15) a. What John served was approximately beef stroganoff.

b.




Note that coerced scalars are acceptable in other approximated copular expressions, not just pseudoclefts.

(16) This is approximately beef stroganoff.

Furthermore, *approximately* with a coerced scalar is unacceptable as the complement of *look* and *consider*, mirroring the behavior of *many* in (9) and (10). This supports the idea that this type-shift is tied to the copula such that *many* cannot behave predicatively without a copula.

(17) *That dish looks approximately beef stroganoff.

(18) *I consider that dish approximately beef stroganoff.

In sum, I assume that *approximately* is a Hackl-style degree quantifier which combines with *much* and requires two arguments of type $\langle et\rangle$. The unacceptability of (3) is due to a missing argument of *much*. The the acceptability of (4) is due to a copula-specific type-shift such that *much* is no longer missing an argument.

### 2.3 A note on adverbs

There is, however, a potential alternative to this Hackl-style analysis.[3] Consider (19) and (20), where the comparison with *frequently* highlights the adverbial status of *approximately* in the sentences we have been considering.

(19) What John served was frequently/approximately beef stroganoff.

(20) a. John served ??frequently/??approximately beef stroganoff.
b. John frequently/approximately served beef stroganoff.

Adverbs typically follow a light verb, as *frequently*/*approximately* do in (19), and they typically precede a lexical verb, as they do in (20b). *Approximately*'s acceptability in (19) (=(4a)) and unacceptablilty in (20a) (=(3a)) now appear to fall out

from the general structural position of adverbs.

Concerning interpretation, the approximative reading of *beef stroganoff* can result indirectly from modification of the copula (cf. *What John served approximately equaled beef stroganoff*). In (20a), the only acceptable reading of *approximately* is one in which it modifies *served*, not the noun *beef stroganoff*, which is what we expect from an adverb. Note that *approximately* sounds even better with an inherently scalar lexical verb, like *doubled*.

(21) a. John frequently/approximately doubled his income.
b. This frequently/approximately {corresponds to/matches} that.
c. This is frequently/approximately the same as that.

These examples, however, highlight a contrast in prosody between *approximately* and other adverbs. Some speakers prefer *doubled* to be prosodically prominent when modified by *approximately*, but not by *frequently*. This might suggest scope differences as in (22).

(22) a. John [frequently [doubled his income]]
b. John [approximately [**doubled**]] his income

Similarly, note the differences in the potential paraphrases in (23). While (23a) is a reasonable paraphrase of the *frequently* version of (21a), (23b) is not such a close paraphrase of the *approximately* version of (21a). Instead, (23c) is a much closer match.

(23) a. What John frequently did was double his income.
b. What John approximately did was double his income.
c. What John did was approximately double his income.

It seems then that while adverbs like *frequently* quantify over events, adverbs like *approximately* are instead more direct scalar modifiers, as they are under a Hackl-style analysis.[4]

## 3 *About*

We now have an explanation for why *approximately* is acceptable in (4) but not (3). Next we address why *about* is not acceptable in either of these examples.

### 3.1 Coercion

The difference between *approximately* and *about*, I propose, is that unlike *approximately*, *about* does not coerce scalar readings. *About*, therefore, cannot combine with non-inherently-scalar terms like *beef stroganoff* (see also prepositions *around* and *near*). Why this is the case is not immediately clear but may be related to the availability of non-scalar forms of *about*[5]:

(24) a. It's about to rain.
b. It's about time.
c. Tom moved about the room.
d. John talked about Mary.

An asymmetry in the distribution of *approximately* and *about* has been noted before. For example, Sauerland and Stateva (2007) claim that *approximately* freely combines with non-endpoint scalars, while *about* can only combine with non-endpoint scalars in the form of numerals and temporal expressions, as shown in (25) and (26) below.

(25) a. #approximately dry/pure/white
b. approximately three/north/the same
c. #approximately beef stroganoff/a heap of wood

(26) a. about three, at about noon, at about midnight, at about the same time
b. #about clean/open/north

Note that Sauerland and Stateva intentionally avoid coerced scalar readings, so for their purposes *approximately beef stroganoff* is infelicitous. If we assume that *beef stroganoff* in (3) and (4) is coerced into a non-endpoint scalar reading, this distinction would account for the asymmetries in question: *beef stroganoff* as a non-endpoint scalar should be felicitous with *approximately*, but it is neither a numeral nor a temporal expression and therefore should be infelicitous with *about*, as is indeed the case.

### 3.2 Additional restrictions

Sauerland and Stateva's characterization of *about*, however, is both too inclusive and too restrictive. There are many temporal expressions that *about* cannot modify.[6]

(27) a. ??He'll arrive on about Tuesday.
b. ?It's about Thanksgiving.

Additionally, there are non-numeral non-temporal expressions that *about* can occur with, particularly certain gradable adjectives.

(28) a. about full/empty/straight/?dry/?certain/?closed/#invisible/#pure
b. about #wet/#visible

Maximum-standard adjectives (Kennedy and McNally, 2005; Kennedy, 2007), shown in (28a), seem more felicitous than minimum-standard adjectives, shown in (28b). This may be because approximating a minimum-standard adjective results in something relatively trivial. That is, if any non-zero amount of water will cause something to be 'wet', the laxer *about wet* could be true of everything; a similar

pattern holds for *approximately* and *exactly*.[7]

Still, not all maximum-standard adjectives are acceptable with *about* (e.g. *pure*). The explanation I pursue here involves comparison with similar *just about* forms. Note that with the addition of *just*, *about* has a wider distribution.

(29) a. just about full/empty/straight/dry/certain/closed/?invisible/pure
b. just about ?wet/?visible

Below I will refer to those maximum-standard adjectives acceptable with bare *about* as AFMs (*about*-felicitous maximum-standard adjectives, e.g. *full*), and I will refer to those maximum-standard adjectives not acceptable with bare *about* as AIMs (*about-in*felicitous maximum-standard adjectives, e.g. *pure*).

Given the wider distribution of *just about* compared with bare *about*, I pursue the idea that when bare *about* appears with an AFM, it is a conventionalized abbreviation of *just about*. If *about* appears with an AIM, no such conventionalized form is available. I argue for this in two ways below. First, I show that the interpretation of *about* with AFMs mirrors that of *just about* and not that of numeral-/temporal-expression-modifying *about*. Second, I bring in corpus data to suggest that *just about* occurs more often with AFMs than with AIMs, and I argue that such use is consistent with the conventionalization of a *just*-less form of *just about* for AFMs but not for AIMs.

### *3.2.1 Conventionalization and the interpretation of* about

*Just about* is, as described by Morzycki (2001), an '*almost* modifier', a class that includes terms such as *almost*, *virtually*, *nearly*, *damn near*, *pretty much*, *not quite*, and *just about*. *Almost*, as described by Nouwen (2006), has both a proximal and a polar component, which can be seen in the sentence in (30). This sentence expresses that Travis came close to dying (proximal), but that he did not die (polar).

(30) Travis almost died.
a. Travis came close to dying (proximal)
b. Travis did not die (polar)

This polar component, while present, is not prominent, as can be seen in the infelicity of (31) (cf. *Fortunately, Travis did not die*).

(31) #Fortunately, Travis almost died.

Returning to AFMs, we see that bare *about* patterns with *almost* modifiers in expressing proximity. This is unsurprising, since that *about* expresses proximity when combining with numerals and temporal expressions as well.

(32) a. almost full
b. just about full

c. about full
d. (about ten)

More interestingly, these uses of *about* continue to pattern with *almost* modifiers with respect to polarity: *about full* seems to express *not full*. Note that this polarity is not expressed with numerals/temporals.

(33) a. almost full $\rightarrow$ not full
b. just about full $\rightarrow$ not full
c. about full $\rightarrow$ not full
d. (about ten $\not\rightarrow$ not ten)

Additionally, this polar component is not prominent with this use of *about*.

(34) a. #Fortunately, the glass was almost full when it fell.
b. #Fortunately, the glass was just about full when it fell.
c. #Fortunately, the glass was about full when it fell.

Overall, this use of *about* patterns with *almost* modifiers instead of with numeral/temporal *about*. This supports the idea that this use of *about* is an *almost* modifier with a phonologically null *just*.

### *3.2.2 Conventionalization and the frequency of* just about

Another way to address whether the use of *about* in (28) is a conventionalized form of *just about* is to examine its attested use with different gradable predicates.[8] In particular, we might predict the following: AFMs (e.g. *full*) may occur more frequently with *just about* than AIMs (e.g. *pure*), and this higher frequency with *just about* may then lead to the abbreviated null-*just* form. Below we examine whether AFMs do in fact occur more frequently with *just about* than AIMs do.

For maximum standard adjectives in the relevant proximal uses, we find the following counts from the Corpus of Contemporary American English (Davies, 2008):

(35)

| adjective | bare *about* | *just about* | all *about* | rating in (28) |
|---|---|---|---|---|
| full | 2 | 2 | 34 | |
| empty | 0 | 2 | 13 | |
| straight | 0 | 1 | 12 | |
| dry | 2 | 3 | 15 | ? |
| certain | 0 | 1 | 319 | ? |
| closed | 0 | 0 | 5 | ? |
| invisible | 0 | 1 | 13 | # |
| pure | 0 | 0 | 22 | # |

These numbers are quite low overall, but they may be trending in the right direc-

tion. Specifically, AFMs (notably *full*, ?*dry*) tend to occur more often with *just about* than AIMs do. A next step may be to collect more detailed acceptability ratings for a greater number of adjectives. The adjectives can then be accurately binned according to their level of *about*-felicity, allowing for higher/more reliable counts per bin.

To sum up, the analysis provided here is that *about* is unacceptable in (3) and (4) because it cannot coerce scalars. Instances where *about* appears to coerce scalar readings involve a null *just* and are *almost* modifiers.

## 4 Conclusion

In order to explain the difference of behavior of *approximately* in (1) and (2) v. (3) and (4), I have provided a Hackl-style analysis of *approximately* such that, in the absence of a copula, it can only act attributively.

(1) a. John served approximately 50 sandwiches.
b. John served about 50 sandwiches.

(2) a. What John served was approximately 50 sandwiches.
b. What John served was about 50 sandwiches.

(3) a. ??John served approximately beef stroganoff.
b. ??John served about beef stroganoff.

(4) a. What John served was approximately beef stroganoff.
b. ??What John served was about beef stroganoff.

The sentence in (3a) is unacceptable because *much* remains unsaturated, while the sentence in (4a) is felicitous due to a copula-specific type shift that obviates this 'missing' argument. *Approximately* and *about* pattern differently with coerced-scalar nouns but not with numerals because *approximately* can coerce scalar readings out of non scalars, but *about* cannot.

This analysis provides new support for a Hackl-style approach to quantification, as these contrasts would not be expected under a standard generalized quantifier theory. It also extends Hackl's approach to numerals, which (among other things) treats them as degrees modified by a possibly-null degree function, by extending it to coerced scalars like *beef stroganoff*. This analysis, however, raises a number of questions.

For instance, one might wonder whether separate *many*/*much* operators necessary. On some level, they both relate degrees (of cardinality, beef-stroganoff-ness, etc.), so perhaps one unifying operator could be posited. Note, however, that *many* is restricted to pluralities and atomic counts of items, not degrees (e.g. sandwiches, not cardinalities), while *much* is restricted to degrees (e.g. of beef-stroganoff-ness), not items (e.g. things John served).

## Acknowledgments

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## Notes

[1] Additional support for this can be found with coerced scalar adjectives. In (36), the sentence is acceptable when an additional NP argument ($\langle et \rangle$, e.g. *answer*) is present.

(36) John gave an approximately-correct answer.

[2]Partee's shift concerns moving between generalized quantifiers and predicates, not parameterized determiners and generalized quantifiers, which is what we need here.

[3]Thanks to Ed Cormany for reminding me of this option.

[4]Note that I have not shown how exactly a Hackl-style analysis could account for verb modification.

[5]To be clear, I do not assume that all uses of *about* involve the same lexical item. Instead, I suggest that the presence of non-scalar lexical entries with the same phonological form as scalar *about* causes us to resist forcing a scalar reading out of a non-scalar modified by *about*.

[6]Thanks to Gregory Ward for bringing these to my attention, as well as fact that scale matters for felicity (cf. *I'm about* {*at the boarder/# in New York*}).

[7]Note also that maximum-standard adjectives are more punctuated, like numerals and (acceptable, see previous footnote) temporal expressions.

[8]Thanks to Adele Goldberg for prompting me to take this step.

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