Approximation and the coercion of gradable predicates

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1 Puzzle

Approximators can appear in with numerals in constructions like (1) and (2).

(1) John served {approximately/about} 50 sandwiches.

(2) What John served was {approximately/about} 50 sandwiches.

Approximators are more restricted, however, in their ability to appear with coerced-scalar NPs like *beef stroganoff* in (3) and (4).

(3) John served {??approximately/??about} beef stroganoff.

(4) What John served was {approximately/??about} beef stroganoff.

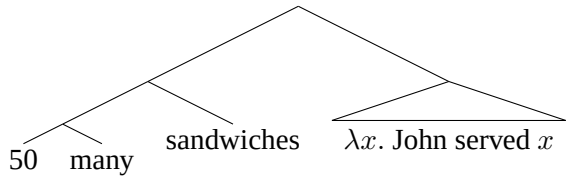
The goal of this paper is to explain the asymmetries in (1)-(4). First, I address the question of why numerals pattern differently from coerced-scalar NPs, as shown in (1) and (2) v. (3) and (4). This, I propose, is a matter of semantic argument structure. Second, I address the question of why *approximately* and *about* pattern identically with numerals but differently with coerced-scalar NPs. I propose that this is due to *about*'s inability to coerce scalars readings from NPs.

2 Modified numerals

I will assume an analysis of modified numerals along the lines of Hackl (2000). He proposes that bare numerals like 50 combine with the phonologically-null degree function *many*, given in (5), and compose as in (6).

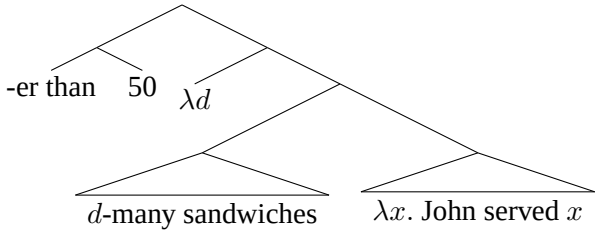
(5) $[\![\textbf{many}]\!] = \lambda d \in D_{Card}.\lambda\, {}^*f \in D_{\langle et\rangle}.\lambda\, {}^*g \in D_{\langle et\rangle}.\exists x\, {}^*f(x) = {}^*g(x) = 1$ & x has d-many atomic parts in f

(6) John served 50 sandwiches. →



Numerals can also combine with degree modifiers (e.g. *-er than* + n + *many* = *more than* n), which compose as in (7).

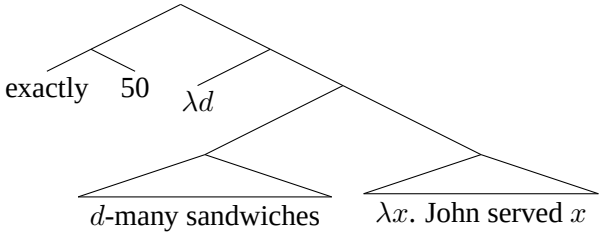
(7) John served more than 50 sandwiches. →



Hackl suggests treating *exactly* as a degree modifier, as shown in (8). In (9), *exactly* combines with the degree 50 and asserts that the quantity of atomic sandwiches that were served by John is 50, and there is no degree greater than 50 that is true of that set.

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

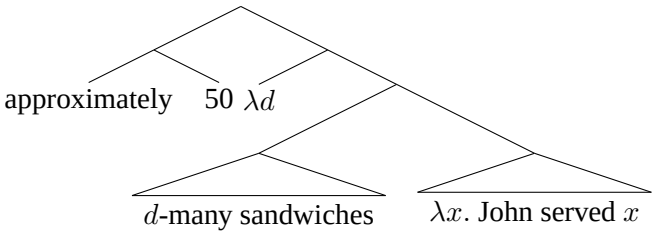
(9) John served exactly 50 sandwiches. →



This analysis can easily be extended to *approximately*, as shown in (10). Here I treat *approximately* as a degree modifier which feeds *many* a degree that falls within some contextually-determined distance σ of n.

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

(11) John served approximately 50 sandwiches. →



Now we can see how (1)-(2) fit into this framework, but more work is required to accommodate coerced scalars like *beef stroganoff* above.

I treat coerced scalars as denoting degrees; in (3)-(4), *beef stroganoff* will correspond to a degree on some scale representing beef-stroganoff-ness. We cannot use *many* with these constructions as it requires plural predicates and counting over atomic parts, so instead I will assume another phonologically-null degree function *much*.

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

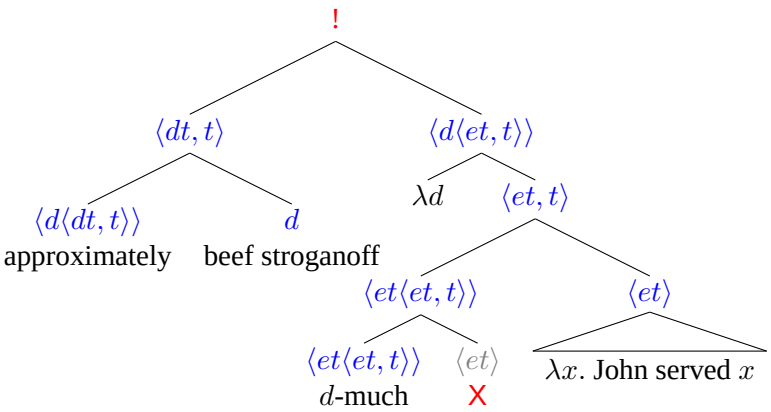
3 *Approximately*+NP

With our compositional machinery in place, we will first address the question of why coerced-scalar NPs pattern different from numerals, as shown in (1) and (2) v. (3) and (4).

In (3), *much* takes as arguments *beef stroganoff* (type d(egree)) and $[\lambda x.$ John served $x]$ (type $\langle et \rangle$), but is still missing an argument of type $\langle et \rangle$ and is therefore unacceptable. The sentence in (3) is is given again below, where the (missing) arguments of *much* are underlined. The composition is given in (13), with an X standing in place of *much*'s missing argument.

(3) ??<u>John served</u> approximately beef stroganoff *much* ____.

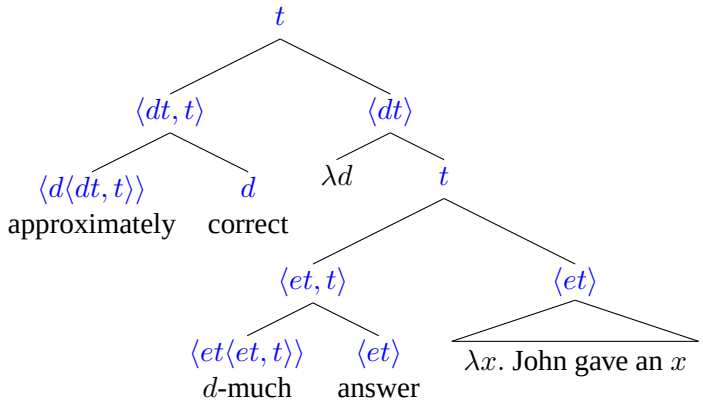
(13)



Additional support for missing $\langle et \rangle$ argument in (3) can be seen with coerced scalar adjectives. In (14) the sentence is acceptable when an additional NP argument ($\langle et \rangle$, e.g. *answer*) is present.

(14) John gave an approximately-correct-*much* answer.

(15)



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

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

Copular constructions appear to be a special case. Hackl suggests that they do they not require the item in post-copula position to be $\langle et \rangle$ (it appears to be $\langle et\langle et, t\rangle\rangle$ in (16)).

(16) The sandwiches were many.

However, it also appears that these post-copular items never become saturated. This may be circumvented by a copula-specific type shift a la Partee (2008) that would saturate one of *many*/*much*'s arguments. Thus, the copula-specific type can explain the felicity of (4).

In sum, I treat *approximately* is a Hackl-style degree modifier. It appears with *many*/*much*, which requires two arguments of type $\langle et \rangle$ unless it is in a copular construction. Since (1) does and (3) does not provide two $\langle et \rangle$ arguments, (1) is and (3) is not acceptable.

4 *Approximately* v. *about*

Now we have seen why *approximately* is good in (4) but not (3), and in this section I address the question of why is *about* acceptable in (1) and (2) but not (3) and (4). I propose that unlike *approximately*, *about* does not coerce scalar readings from nouns. Therefore, *about* cannot combine with non-inherently-scalar terms like *beef stroganoff* (similar behavior can be seen with other prepositions like *around* and *near*). This could be related to the availability of non-scalar meanings for *about*, as demonstrated in (17).

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

Restrictions on the distribution of *about* have been noted before. According to Sauerland and Stateva (2007), *about* can only combine with numerals and temporal expressions. Note, however, that *about* can occur with certain gradable adjectives.

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

Maximum-standard gradable adjectives (18a) seem more acceptable than minimum-standard gradable adjectives (18b), but not all maximum-standard gradable adjectives acceptable with *about*.

I propose that certain gradable adjectives can appear with a conventionalized null-*just* form of *just about*. One piece of evidence for this is shown in (19), where true bare *about* in patterns differently from (null-)*just about* (see Zaroukian (to appear) for further discussion).

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

5 Conclusions

To summarize, I have proposed that *approximately* patterns differently with numerals and coerced-scalar NPs because *approximately* (in conjunction with *many*/*much*) requires two arguments of type $\langle et \rangle$, and while the sentence in (1) provides both these arguments (*sandwiches* and $[\lambda x.$John served $x]$), the sentence in (3) only provides one ($[\lambda x.$John served $x]$). This two-argument requirement, however, is not present in copular sentences like (2) and (4), so both are acceptable. *Approximately* and *about* pattern the same with numerals but differently with coerced-scalar NPs because *approximately* can coerce scalar readings out of non scalars, but *about* cannot.

References

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