Gradable Predicates and the Distribution of Approximators

Erin Zaroukian • zaroukian@cogsci.jhu.edu • Johns Hopkins University

Abstract

- Goal: Identify and explain asymmetries in the distribution of *approximately* and *about* – (3), (4)
  - Distribution of *approximately* – direct result of composition and argument types
  - Distribution of *about* – result of inability to coerce scalar readings

Puzzle

- Approximated numerals can appear in constructions like (1) and (2)

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

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

- But – coerced scalar NPs (here, *beef stroganoff*) are more restricted
- And – the synonyms *approximately* and *about* pattern differently

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

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

Q: Why do we find these asymmetries?
1. Why do coerced-scalar NPs pattern differently from numerals? – (1),(2) v. (3),(4)
   A: Following Hackl (2000), degree modifier + scalar can only be used attributively
2. Why do *approximately* and *about* pattern differently with coerced-scalar NPs but not with numerals? – (3) v. (4)
   A: *Approximately* and *about* have differing abilities to coerce scalars
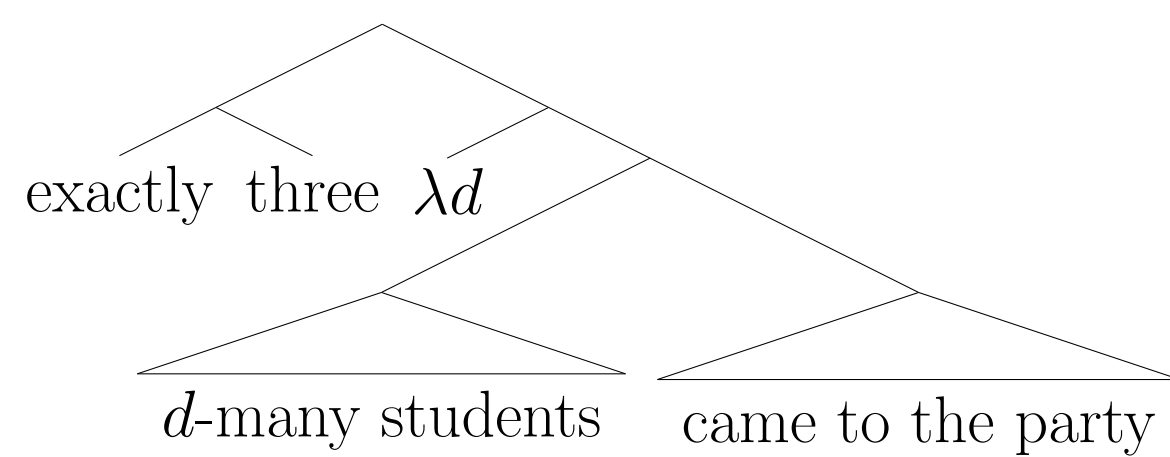
Modified numerals

Hackl (2000)
- Proposes that bare numerals combine with phonologically-null parameterized determiner *many*
- Numerals can also combine with degree modifiers (e.g. *-er than + n + many = more than n*)

(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) $[\![\textbf{-er than n}]\!] = \lambda D_{\langle dt\rangle}.max(\lambda d.D(d) = 1) > n$
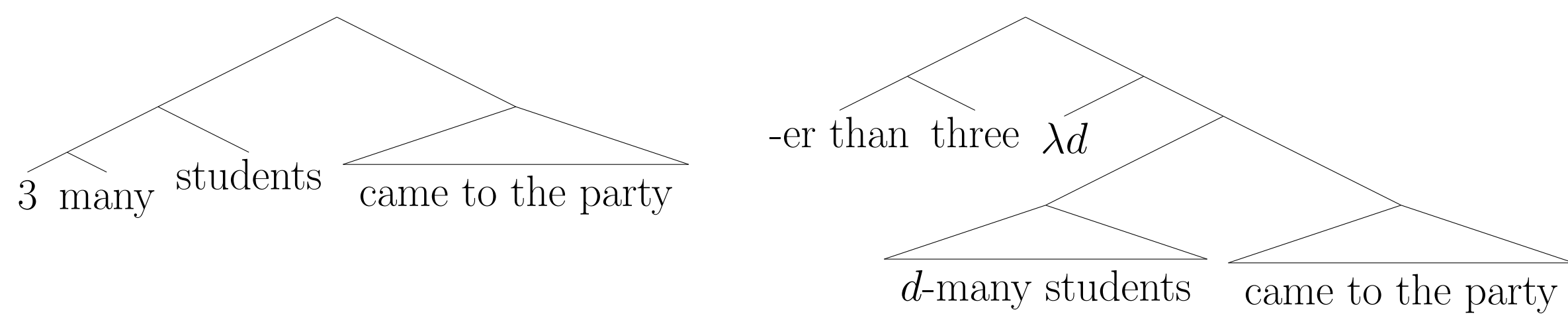
- Suggests treating *exactly* as a degree modifier:

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

- *Many* can only be used attributively, i.e. cannot be typeshifted to behave predicatively like other degree functions (e.g. *tall*)
- Therefore, *many* cannot appear as complement of *look, consider*, which require predicative $\langle et\rangle$ (Partee, 2008)

(8) a. *The guests look many. (Hackl, 2000, p. 97)
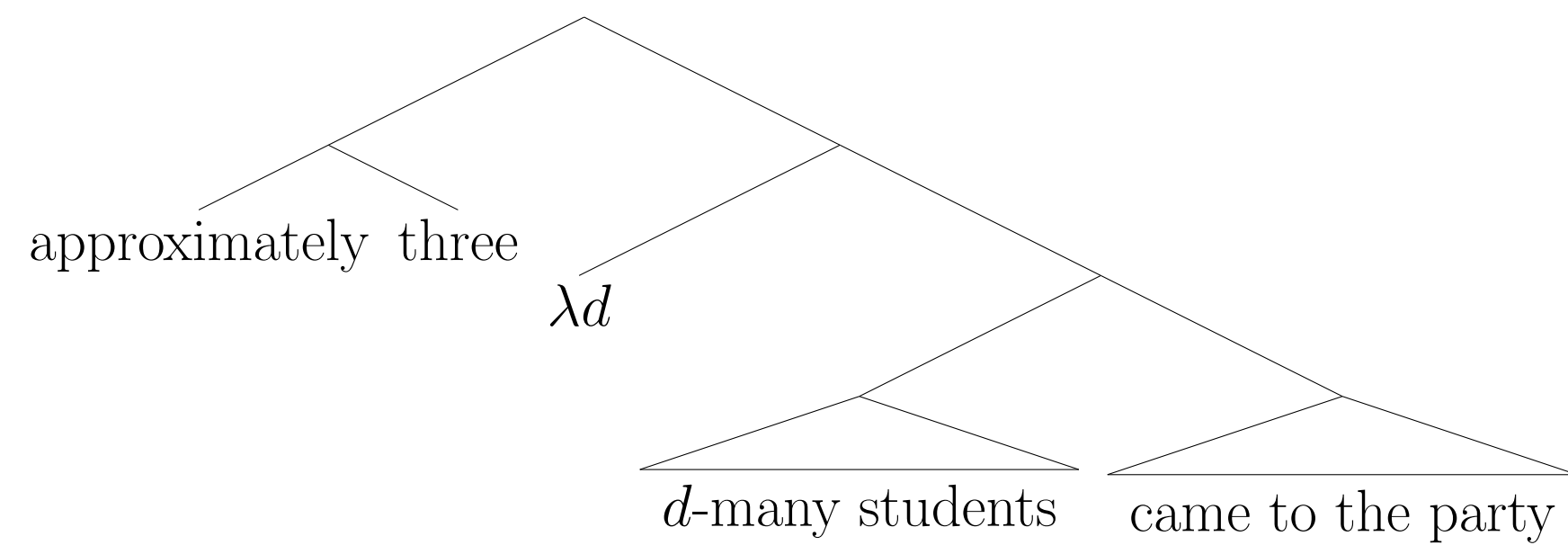   b. *Mary considers the guests many.

- Hackl notes that post-copulas position does not require type $\langle et\rangle$

(9) The guests were many women. (Hackl, 2000, p. 97-8)

Analysis for *approximately*

- Treat *approximately* as a degree modifier (cf. *exactly*, (7)) which feeds *many* a degree that falls within some contextually-determined distance σ of n

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

- Treat coerced scalars as degrees – here *beef stroganoff* = degree on some (set of) scale(s) representing beef stroganoff
- We cannot use *many* with these constructions (requires plural predicates and counting over atomic part), instead assume what here is called *much*

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

- In (3), *much* takes arguments *beef stroganoff* (type d(egree)) and [λx. John served x] (type $\langle et\rangle$), but is still missing an argument of type $\langle et\rangle \rightarrow$ **unacceptable**

(3) ??<u>John served</u> approximately beef stroganoff *much* __.
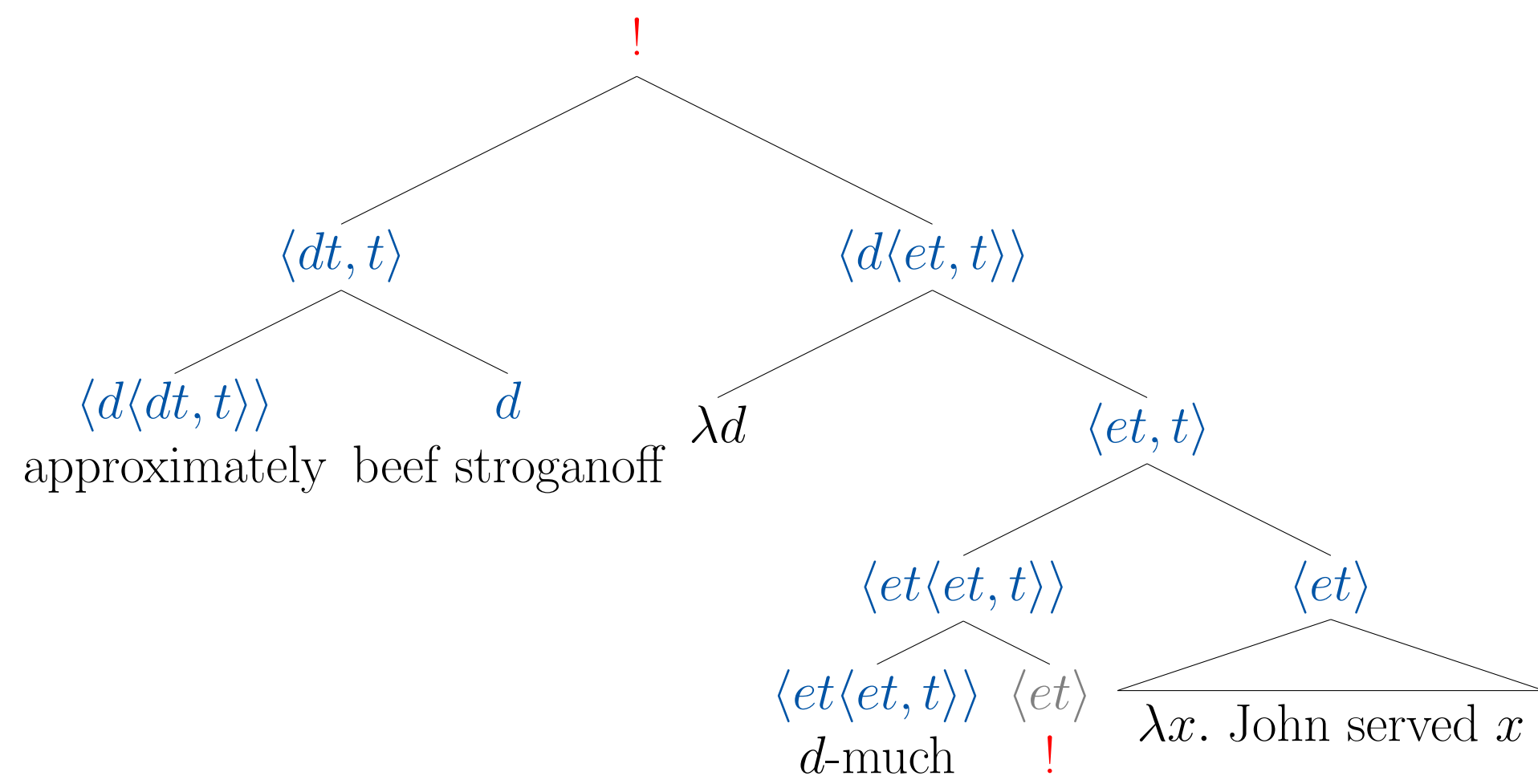
Additional support for missing $\langle et\rangle$ argument in (3): with coerced scalar AP, the sentence is acceptable when an additional NP argument ($\langle et\rangle$, e.g. *answer*) is present

(12) <u>John gave</u> an approximately-correct <u>answer</u>.

- But then why is (4) fine? It too seems to be missing an argument of type $\langle et\rangle$

(4) <u>What John served</u> was approximately beef stroganoff *much* __.

- Recall – Hackl does not consider post-copula position to be strictly $\langle et\rangle$
- Possible explanation: a copula-specific type shift (Partee, 2008)
- But – this creates compositional problems - if *beef stroganoff many + what John served* ($\langle et,t\rangle$) is shifted to $\langle et\rangle$, it cannot combine with degree modifier, which requires argument of type $\langle dt\rangle$, not $\langle d\langle et,t\rangle\rangle$
- To retain this, we can change degree modifiers

(13) $[\![\textbf{approximately n}]\!] = \lambda D_{\langle d\langle et\langle et,t\rangle\rangle\rangle}.\lambda f.\lambda g.\exists x_d \in \{y|n + \sigma \geq y \geq n - \sigma\} : D(f, g, x)$

Approximately with a coerced scalar is also unacceptable as the complement of *look, consider*, cf. (8)

(14) *That dish looks approximately beef stroganoff.

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

Approximately is a Hackl-style degree modifier – for attributive use only
- Unacceptability of (3) due to missing argument of *many*
- Acceptability of (4) due to copula-specific type-shift such that *much* is no longer missing an argument

Approximately v. *about*

- Now we see why *approximately* is good in (4) but not (3). So why is *about* unacceptable in both examples?
- **Proposal:** unlike *approximately*, *about* does not coerce scalar readings, i.e. *about* cannot combine with non-inherently-scalar terms like *beef stroganoff* (see also prepositions *around, near*)

- According to Sauerland and Stateva (2007): *about* can only combine with numerals, temporal expressions
- But – *about* can occur with some gradable adjectives

(16) about <u>full</u>/<u>empty</u>/<u>straight</u>/?<u>dry</u>/?<u>certain</u>/?<u>closed</u>/#wet/#visible/#invisible/#pure

- Maximum-standard adjectives (underlined) seem better, minimum-standard adjectives presumably result in a trivial meaning (similar pattern holds for *approximately, exactly*)
- But why aren't all maximum-standard adjectives acceptable with *about*?
- Is there an aspectual or evidential contribution to *about* we can take advantage of?

- Why can't *about* coerce scalars? Perhaps related to the availability of non-scalar meanings:

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

About is unacceptable in (3) and (4) because it cannot coerce scalars

Conclusions

Summary

1. Coerced-scalar NPs pattern differently from numerals because *approximately* + (coerced) scalar can only appear attributively
2. *Approximately* and *about* pattern differently with coerced-scalar NPs but not with numerals because *approximately* can coerce scalar readings out of non scalars, but *about* cannot

This analysis
- provides new support for Hackl-style approach to quantification
  - Note that these contrasts would not be expected under a standard generalized quantifier theory
- extends Hackl's approach to other coerced scalars

Q: Are separate *many/much* operators necessary? They both relate degrees (of cardinality, beef-stroganoff-ness, etc.)
A: A difference: *many* is restricted to pluralities and atomic counts of items, not degrees (e.g. sandwiches, not cardinalities), *much* is restricted with respect to degrees (e.g. of beef-stroganoff-ness), not items (e.g. things John served)

- proposes copula-specific type shift that can apply to *many/much*

Q: Is there independent support for this?
Q: Is there independent support for degree modifiers of the form in (13)?

References

Hackl, Martin. 2000. Comparative quantifiers. Doctoral Dissertation, Massachusetts Institute of Technology.

Partee, Barbara H. 2008. Noun phrase interpretation and type-shifting principles. In *Formal Semantics: The Essential Readings*, ed. Paul Portner and Barbara H. Partee. Blackwell Publishers.

Sauerland, Uli, and Penka Stateva. 2007. Scalar vs. epistemic vagueness: Evidence from approximators. In *Proceedings of SALT 17*, 228–245. Ithaca, NY: CLC Publications, Cornell University.