Expressing numerical uncertainty

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LSA annual meeting, 7 January 2010

1 Introduction

- Expressing a number loosely

(1) a. John read approximately twenty books.
b. John read about twenty books.
c. John read twenty books, more or less.
d. John read twenty-ish books.
e. John read maybe twenty books.
f. John read something like twenty books.

- Approximative Inversion (AI) in Russian and other East Slavic languages

(2) a. Ivan pročital dvadcat' knig.
Ivan read twenty books
'Ivan read twenty books.'
b. Ivan pročital knig dvadcat'.
Ivan read books twenty
'Ivan read approximately[1] twenty books.'

- Overview
  - Look more carefully at the semantics of AI and provide a semantic analysis
    - Summary: AI marks the speaker's uncertainty with respect to the numeral, the numeral contributes information which can result in an approximate interpretation of the numeral
  - Revisit existing analyses of AI which see it as head movement, which will turn out to be inconsistent with the semantics of AI
  - Present a more semantically-compatible syntactic analysis of AI

2 Semantics of AI

- Semantic analysis should explain
  - when AI is felicitous
  - what AI means when felicitous
- Compare English "approximately twenty books" and "maybe twenty books"
  - "approximately" – imprecise, falls within some range
  - "maybe" – uncertainty
- AI doesn't pattern like either

[1] I will be using *approximately* in AI glosses, though, as will be seen later, this is not quite accurate.

  - It expresses speaker uncertainty and appears more epistemic than approximative (3)
  - It's not purely epistemic (4)

(3) Birthday example: (Pereltsvaig 2006:284)
Masha is going to a colleague's birthday party and is asked how old that colleague is. Since she doesn't know him very well, she is guessing his age from his looks, etc. In this situation, Masha's reply can use the approximative inversion in [(3a)], but not any other approximative strategy, such as using *priblizitel'no* 'approximately' or an interval:
a. let tridcat'
years thirty
b. # priblizitel'no tridcat' (let)
approximately thirty years
c. # 30-35 let
30-35 years
'approximately thirty years'

(4) Zodiac example:
You're talking to an acquaintance, and she tells you her brother was born in the year of the ox, which for present purposes means he's 11, 23, 35, 47, 59, 71, or 83 years old. This acquaintance is in her thirties, so your best guess would be that her brother is 35 (as opposed to 11, 23, etc.).
a. # let tridcat' pjat'
years thirty five
'approximately thirty-five years'

- So what is AI? I propose:
  - AI marks the speaker's uncertainty with respect to the numeral
  - The numeral itself leads to an approximative reading and the (3)/(4) contrast

2.1 Deriving approximation from uncertainty

- Numeral contributes closeness information and hearer uses this information (along with any other relevant information) to determine alternatives, so set of alternatives can look like approximation.
  - When a speaker marks X as uncertain, a hearer may entertain alternatives to X, using available relevant information to compute these alternatives. (cf. Neo-gricean alternatives, pragmatic halos (Lasersohn 1999))
    - e.g. "maybe X" → {X, X', X"}, or more concretely "maybe a newspaper" → {newspaper, a magazine, a book} (but if you know that John loves reading grocery receipts, {newspaper, receipt})
  - When X is a scalar numeral
    - X is defined with respect to a scale (vs. bus numbers and other labeling/non-scalar uses of numerals)
    - Scale also has information about what's like X (e.g. X+1, which is more like X than X+2)
    - If this information contributed by the numeral is used in computing alternatives, it could cause the set of alternatives to look like approximation (much like "maybe a newspaper" → {newspaper, a magazine, a book}, you get "maybe 20" → {18, 19, 20, 21, 22})
  - In AI
    - A numeral X is marked as uncertain
    - Since the speaker used a numeral (which is defined with respect to a scale), the hearer faces pragmatic pressure to use this information in computing alternatives
    - Numerals closer to X will be more like X and therefore more likely alternatives

∗ → *ceteris paribus*, AI will look like approximation, e.g. {X-2, X-1, X, X+1, X+2}

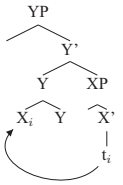
- This analysis accounts for (3)
  - Hearer entertains ages close to 30
  - Hearer also knows it's the colleague's birthday and therefore won't pick ages like 31;2
    - ∗ unlike true approximators, (3b) and (3c) bad because they're too continuous[2] (cf. English)
- This analysis also accounts for (4)
  - Hearer entertains ages close to 35
  - Hearer also knows that the brother is 11, 23, 35, 47, ..., but none of the alternatives are close enough to 35!
    - ∗ Numeral is also associate with closeness information, cf. round numbers (Krifka 2009) - In the right context you can use the numeral 35 to express the quantity 33, but you are unlikely to be in a context where you can use the numeral 35 to express the quantity 23. This is another piece of information associated with the numeral, namely, what is **close enough**. (cf. Sauerland and Stateva 2007)
- So, AI isn't true approximation. Rather, it marks speaker uncertainty in a way that only allows close alternatives to the numeral expressed as a result of information contributed by the numeral.

3 Syntax of AI

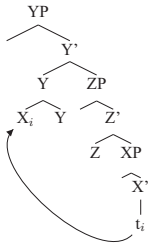
3.1 Head Movement analysis

- Analyses have claimed that AI is head movement of the noun to check some approximation-related feature

(5) What head movement looks like:



(6) A HMC violation:



- There are several reasons to believe it's head movement
  - It looks like you can't move anything bigger than the noun (7)
  - It looks like other heads can get in the way (8)

(7) PP stranding (Pereltsvaig 2006:278)

a. desjat' [pobed [$_{PP}$ nad vragom]] (non-inverted)
ten victories over enemy$_{INST}$
'ten victories over the enemy'

[2] It appears that approximators as in (3b) and (3c) are less receptive to outside information such that the fact that it is the this colleague's birthday doesn't rule out intermediate ages, leading to infelicity. This may be because approximators do not encourage the hearer to entertain alternatives like uncertainty markers do and therefore lack this opportunity to make use of relevant information in the computation of alternatives. Rather, approximators express that X falls within some range.

b. pobed desjat' [[$_{PP}$ nad vragom]] (inverted)
victories ten over enemy$_{INST}$
'approximately ten victories over the enemy'

c. * [pobed [$_{PP}$ nad vragom]] desjat' (*inverted)
victories over enemy$_{INST}$ ten

(8) Light[3] and heavy adjectives (adapted from Pereltsvaig 2006:279)

a. (*dovol'nyx) lingvistov (*dovol'nyx) desjat' (*dovol'nyx)
(satisfied) linguists (satisfied) ten (satisfied)
'approximately ten satisfied linguists'

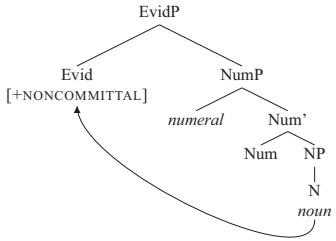
b. lingvistov desjat' [$_{AP}$ dovol'nyx svoimi vystuplenijami]
linguists ten satisfied self's$_{INST}$ talks$_{INST}$
'approximately ten linguists satisfied with their own talks'

- But the availability of and word order in AI is quite complex, e.g. the word order *noun P numeral* is often possible, where P should be an intervening head

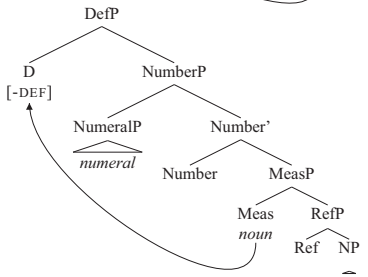
(9) knig za pjat' (Billings and Yadroff 1996:46)
books$_{GEN.PL}$ for five
'for approximately five books'

- A couple structures that might potentially derive the right word order (10)-(11)

(10) (based on Pereltsvaig 2006)



(11) (based on Yadroff and Billings 1998)



- But what good does it do to check a feature on a noun?

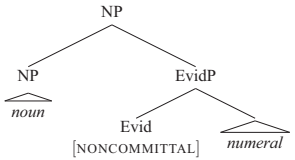
[3] Note that this depends on a structure like [$_{AP}$ A [$_{NP}$ N]] so that A intervenes

– if N-movement
  * ⟦**N [+NONCOMMITTAL]**⟧ = noncommittal(N) (i.e. Ivan read 20 [maybe books])
  * But under this analysis it's what Ivan read that you're not sure about, not how many books
– if Meas-movement
  * ⟦**Meas [-DEF]**⟧ = indef(Meas) (i.e. Ivan read an indefinite measure of books)
  * But this misses the epistemic part
  * ⟦**Meas [+NONCOMMITTAL]**⟧ = noncommittal(Meas) (i.e. Ivan read 20 [maybe units] of books)
  * But under this analysis it's the units of what Ivan read that you're unsure about, not how many units
– You might be able to salvage head movement (e.g. drop compositionality, work some magic at LF), but a satisfying head movement analysis is far from obvious.

3.2 A new analysis

- Perhaps inversion isn't a result of noun movement. Instead, the numeral in AI could be base-generated in a post-nominal position.

(12)

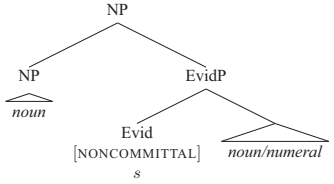


- Amenable to a head movement analysis while getting the right semantics (i.e. may account for word order data at least as well as head movement analysis)
- Resembles post-nominal modification a la Cinque, which involves a post-nominal (reduced) relative clause (Cinque 2005)
- Makes AI parallel to similar constructions

(13) a. osetrof s sorok (Billings 1995:12)
sturgeons-GEN.PL S forty-ACC
'about forty sturgeons (archaic)'

b. mal'čik s pal'čik
boy S thumb-ACC
'boy (about) the size of a thumb, Tom Thumb'

(14)



4 Summary

- AI marks uncertainty on the numeral, leads to an approximative interpretation of the numeral
- Head movement of the noun does not explain the semantics
- Post-nominal relative structure can provide a coherent semantic analysis

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