Approximative Inversion Revisited

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1 Introduction

- Approximative Inversion (AI) – a rather puzzling construction in Russian and other East Slavic languages.
- In this construction the noun and the numeral appear in an inverted order, yielding an approximative reading, as in (1b).

(1) 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.'

- It has received some attention, notably in Yadroff and Billings (1998) and Pereltsvaig (2006).
- These analyses have had some success.
  - e.g. they can account for PP-stranding and the impossibility of AI with adjectives.
- But they are limited in certain respects.
  - e.g. they have difficulty capturing the right semantics.

Goal of this talk: Suggest a different view on AI which may provide a more satisfactory analysis of this construction.

- The different view: the numeral is located in a post-nominal relative structure where it is associated with an epistemic modal operator.

2 Semantics of AI

Goals of this section: Explain when AI is felicitous and what AI means when felicitous.

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

- Past assumptions – AI ≈
  a. *approximately #*, i.e. number is imprecise, falls within some range
  (Billings 1995:162; Billings and Yadroff 1996:45, 46; Yadroff and Billings 1998:336)
  b. *maybe #*, i.e. hedge, speaker is uncertain about the number
  (Pereltsvaig 2006:284, following Mel'čuk 1985)
- I will argue for (b), but there are two problems to account for.
  i. On the surface, AI doesn't pattern like either (a) a true approximator or (b) an uncertainty marker.
  ii. It's not clear how uncertainty would lead to an approximative reading.

2.1 AI in context

i. On the surface, AI doesn't fit neatly into either (a) or (b).

(2) 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 [(2a)], 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'

- In (2), AI is felicitous in a speaker-uncertain context, unlike other approximators.
$\rightarrow b, \neg a$

(3) 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'

- If AI were merely an uncertainty marker, it should be fine in the uncertain context in (3), but it isn't.
  $\rightarrow \neg b$

Proposal:

- AI marks the speaker's public uncertainty with respect to the numeral.
- The numeral itself leads to an approximative reading and the contrast in felicity between (2) and (3).

2.2 Deriving approximation from uncertainty

ii. So if AI marks speaker uncertainty, how does it result in an approximative reading?

- Consider (4a), where B marks is uncertainty with respect to the numeral. A ultimately does not know how many books are in B's office, but he is likely to consider quantities close to 20 more likely, as if B had responded *Approximately twenty*.

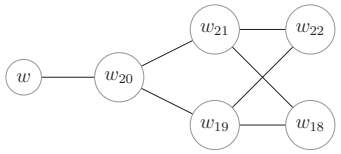
(4) a. A: How many books are in your office?
B: Maybe twenty.
b. {18, 19, 20, 21, 22}

- So, based on the behavior of *maybe*, uncertain numerals do seem to lead to approximative readings.
- But how does this happen?

Proposal: *Maybe* is a modal with a certain type of modal base and ordering source that can lead to an approximate interpretation of numerals.

- Possible world semantics (Kratzer 1981, 1991)
  - Modal base f determines which worlds are possible/accessible from a given world w - accessible worlds are the ones in which all the propositions in f are true
  - Ordering source g determines how close the possible/accessible worlds are - w_a is as least as close to w as w_b iff all the proposition in f that are true in w_b are also true in w_a
- We want the modal base and ordering source to be such that (4) results in (5), where only numbers close to 20 are possible, and where the numbers closer to 20 are more possible.

(5)



- In other words, we must know i) what the relevant information about probability is and ii) how to get it appropriately entered into the epistemic modal base and ordering source.

i. It has been suggested (e.g. in Krifka 2009) that numerals are associated with information about how close other values are to that numeral, as well as which values are 'close enough' to them.
  - This information shows up in round numbers.
    e.g. In the right context you can say *This book cost $20* even if it cost $19.50. You might be able to use it if the book cost $18 or maybe even $17, but not $10.
  - This information is psychologically real (see Dehaene 1997, among others), using numerals makes it salient such that it can enter computations.

ii. **Proposal:** Given that this information is associated with numerals, the modal base will contain information about what values are close enough to be plausible and the ordering source will contain information ranking values closer to the actual numeral higher.

Proposal: AI can be analyzed as involving a modal operator, just like *maybe*.

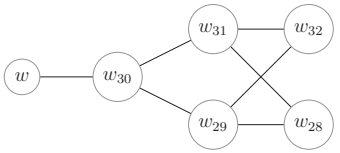
Applying this analysis:

- (2): Modal base contains worlds where the value is close enough to 30 to be plausible, say $[28 - 32]$, but it also contains the belief that it is this colleague's birthday, excluding intermediate ages.

  - *from the numeral*: information that only values close enough to 30 are plausible
  - *contextual information*: belief that it is this colleague's birthday, so the value must be an exact integer

  Note: True approximators like *priblizitel'no* and *approximately* are infelicitous in this kind of context, which can be explained if they are blind to this kind of contextual information (e.g. the belief that is it this colleague's birthday).

(6)



- (3): Modal base contains worlds where the value is close enough to 35 to be plausible, say $[32 - 38]$, but it also contains the belief that this person is 11 or 23 or 35 etc.

  - *from the numeral*: information that only values close enough to 35 are plausible
  - *contextual information*: belief that he is 11 or 23 or 35 etc.

  $\rightarrow$ This leaves only one possible value, which is inconsistent with uncertainty, leading to infelicity.

(7) 

- So, AI isn't normal approximation. Rather, it marks speaker uncertainty in a way that only allows close alternatives to the numeral expressed, which results from information contributed by the numeral (the same kind of information we see in number roundness).

  Note: This use of information contributed by the numeral is supported by the presence of a round-number effect in AI, such that using AI with 20 leads to a more approximative reading that with 17.

- AI can accommodate contextual information, though if this information conflicts with the information contributed by the numeral, it can lead to infelicity.

3 Syntax of AI

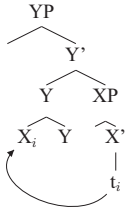
- Given its uniqueness as an approximation structure, what is its syntax?
- The semantic analysis above suggests that the numerals combines directly with a modal operator.

Goals of this section: Show some challenges facing a satisfactory account and argue for a new way to surmount them.

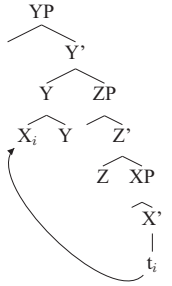
3.1 Head Movement analysis

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

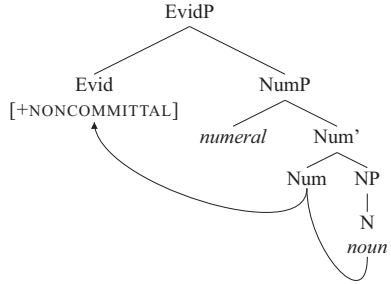
(8) Head movement:



(9) A HMC violation:



(10) Example head movement structure for AI (based on Pereltsvaig 2006)



- Some data supporting a head movement analysis of AI:
  - It looks like you can't move anything bigger than the noun – (11)
  - It looks like other heads can get in the way – (12)

(11) PP stranding (Pereltsvaig 2006:278)

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

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

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

(12) Adjectives (adapted from Pereltsvaig 2006:279)

a. desjat' dovol'nyx lingvistov
   ten satisfied linguists
   'ten satisfied linguists'

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

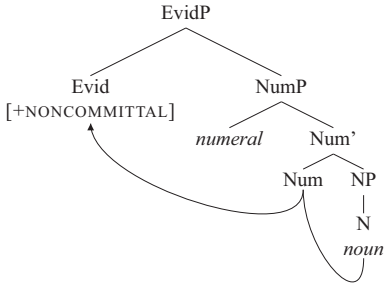
- Though note that (12) only supports a head movement account if a structure like [$_{AP}$A [$_{NP}$N]] is assumed, so that A intervenes.

Problem: The word order *noun P numeral* is often possible, where P should be an intervening head.

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

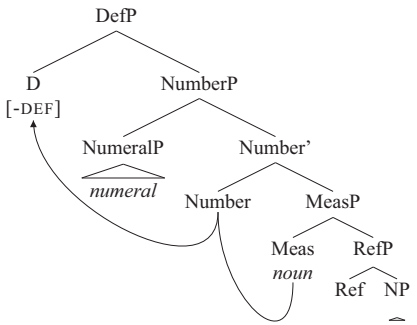
- (14)-(15) provide head-movement structures which may derive the right word order.

(14) (based on Pereltsvaig 2006)



[+NONCOMMITTAL] = speaker uncertainty marker

(15) (based on Yadroff and Billings 1998)



[-DEF] = formal indefiniteness marker

Problem: But consider the semantic effect of checking this kind of feature on the noun.

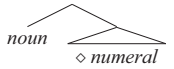
- if N-movement
  - ⟦**N [+NONCOMMITTAL]**⟧ = noncommittal(N) (i.e. Ivan read 20 [maybe books])
  - But under this analysis it's what Ivan read that you're not sure about, not how many books.

- if Meas-movement
  - ⟦**Meas [-DEF]**⟧ = indef(Meas) (i.e. Ivan read an indefinite measure of 20 books)
  - But would checking a formal [-DEF] feature on Meas lead to an indefinite quantity (i.e. approximative) reading? And is this even the desired reading?
  - To solve this, some other feature a la [+NONCOMMITTAL] could be added to D.
  - But if this feature combines with Meas and Meas combines with the noun, then this feature should have ramifications for the interpretation of the noun as well (i.e. Ivan read [maybe [20 units]] of books).
  - Also, it's not clear that having the noun null in N and pronounced in Meas is ideal.
- Head movement may be salvageable (e.g. drop compositionality, work some magic at LF), but a semantically satisfying head movement analysis is far from obvious.

3.2 A different kind of analysis

- Given these problems with a head movement account, we might consider a different approach, treating the numeral like a post-nominal modifier with a structure like (16).

(16)



◇ = epistemic modal possibility operator

- This way, it looks like we could get the semantics to work out just fine – epistemic modal combines with numeral as described above, with no uncertainty on the noun.
- But how could something like (16) match the success of the head movement analyses in dealing with the PP-stranding and adjective data in (11) and (12)?

Proposal: A raising analysis of relative clauses allows a structure like (16) to capture this data.

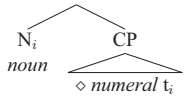
Raising analysis of relative clauses

- The head of a relative clause begins within the relative clause and raises to its surface position, raising is triggered by a strong selectional feature on the external D for a [+N] category (Kayne 1994, Bianchi 1999, Bianchi 2000).

  e.g. [$_{DP}$the [$_{CP}$[$_{NP}$picture][C^0[$_{XP}$[$_{DP}$which t_{NP}]$_i$[X^0[$_{IP}$Bill liked t_i]]]]]] (Bianchi 2000:130)
- So, what if the post-nominal modifier in AI was a relative clause that the noun moved out of? This could account for the PP-stranding and adjective data is two different ways.

i. Instead of moving a NP, only N moves.

(17)



- Works for PP stranding data in (11), only the N, not the whole NP, moves out of the relative clause, stranding PP.
- Works as well as previous analyses for the adjective data in (12), since A blocks head-movement of N.

ii. Or, perhaps its standard NP movement, but prosodic constraints a la Billings (1995) are at play.

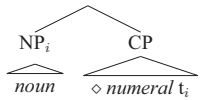
- Stipulate that the moved NP must be a single prosodic word (i.e. a constituent with single word stress, with certain exceptions, Billings 1995)
- Works for PP stranding data in (11), the NP moves leaving PP adjunct behind.

  Note: This analysis, unlike a head movement analysis, predicts that stranding of PP *arguments* should not be possible, since the NP would contain the PP and would therefore be more that one prosodic word. This prediction is born out – PP adjuncts cannot be stranded without contrastive stress (see also Franks 1995:168).

  (18) # učebnika tri po fizika
  textbook three in physics
  'approximately three textbooks'

- This accounts for the adjective data in (12) using an analysis of adjectives which places them within the NP[2], since they would make the NP more than one prosodic word.

(19)



- So, analyzing AI as involving a post-nominal modifier as a relative clause with raising can account for the PP-stranding and adjective data, given the right restrictions.
- A raising account of relative clauses solves another problem associated with the type of structure in (16) – noun case.
- In (1), repeated below in (20), the quantified noun appears in genitive case regardless of inversion (cf. non-quantified noun in (20c), which appears in accusative case). With the structure in (16), it's not clear how genitive in AI can be accounted for.

[2]This can also be reformulated so that the DP moves, as in the English example above, and the numeral is left in specifier position within the relative clause. I'm considering it NP movement here for simplicity.

(20) a. Ivan pročital dvadcat' knig.
Ivan read twenty books$_{GEN}$
'Ivan read twenty books.'

b. Ivan pročital knig dvadcat'.
Ivan read books$_{GEN}$ twenty
'Ivan read approximately twenty books.'

c. Ivan pročital knigi.
Ivan read books$_{ACC}$
'Ivan read books.'

- A (vague) solution is suggested by inverse case attraction, where a relative clause head appears with internal case (Bianchi 1999).
  - In (21) you'd expect 'city' to be nominative ('The city ... is yours'), but it seems to be getting accusative from its relation to the relative clause.

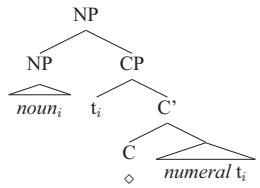
    (21) Urbem quam statuo vestra est. Latin
    city$_{ACC}$ which$_{ACC}$ found yours is
    'The city that I found is yours.' (Bianchi 1999:93)

  - Inverse case attraction has been taken as evidence for a raising analysis of relative clauses.
  - The head of a relative clause begins within the relative clause and retains case as it moves out to its surface position.
  - So, whatever mechanism causes the relative clause head to retain its internal case for inverse case attraction may also be operative in AI.

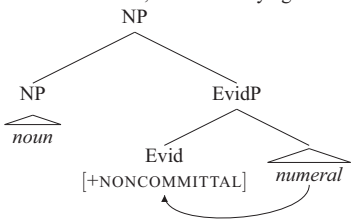
Additional support for a structure like (16)

- Others have analyzed post-nominal modifiers as relative clauses (see Cinque 2005 and references therein).
- Others have used covert-modal-containing relative clauses, notably Bhatt (1999), who analyzed non-finite modifiers as modal-containing relative clauses.

(22) (Based on Bhatt 1999)



Caveat: Unlike it Bhatt's analysis, the modal in AI would be epistemic (not bouletic) and reconstruction of the NP within the relative clause would be prohibited (not obligatory). Though, if a modal analysis turns out to be untenable, we could rely again on feature checking with a structure like

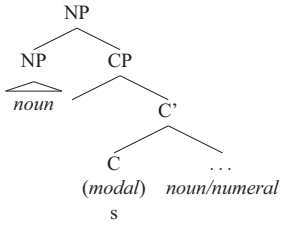


- Suggests parallels between AI and similar constructions.
  - In (23), *s* could be an overt realization of (a modal in) C.
  - Note how easily (23b) is paraphrased with a relative clause.

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

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

(24)



Some problems left unaddressed

- Case asymmetries
  - (arbitrary) restrictions on where this kind of relative clause can appear.
- Variability/restriction on P placement
  - Pied-piping, like in English relative clauses.

- Impossibility with 'head nouns' like 'one' and 'billion' (Franks 1995:166)
  - These could occupy positions which would make it impossible for a single-prosodic-work NP containing the noun to raise.
- Non-agreement and reciprocals (Franks 1995:166)
  - Perhaps they're maximally QPs, like Franks (1995) suggests.

4 Summary

- AI marks uncertainty on the numeral, which leads to an approximative interpretation of the numeral.
  - The numeral is associated with information about the closeness of different values and about which values are 'close enough'.
  - AI involves a modal such that the information contributed to the modal base and ordering source by the numeral only allows close values as alternatives to the numeral expressed.
- Head movement of the noun has difficulty explaining the semantics.
- Post-nominal relative structure, perhaps like (22), can provide a coherent semantic, as well as syntactic analysis.

Acknowledgments

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