Experimental evidence for neg-raising in Slavic

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Introduction

Goals of the talk & Intro

1. experimental data in support for the existence of neg-raising (NR) in Slavic languages;
2. comparison with the Boškovič & Gajewski's (2009) claim about the non-existence of NR in Slavic languages;
3. a scalar approach to NR (extending Romoli's 2012, 2013 work)

- neg-raising: interpretation of negation on the embedded predicate

(1) a. John doesn't think that it's raining. $\rightsquigarrow$
b. John thinks that it's not raining.

- the neg-raising interpretation isn't predicted by the standard semantics of propositinal attitudes (from Hintikka 1969) – *believe* universal quantifier over possible worlds, restricted to some modal base
- 5 classes of NR predicates: intention (*want, intend, ...*), obligation (*advise, should, ...*), perception (*seem, appear, ...*), opinion (*know, believe, ...*), probability (*probable, likely, ...*)

(2) $[\![believe]\!](p)(a)(w) = \forall w' \in M(w,a)[p(w')]$
a. $\neg[\forall w' \in M(w,a)[p(w')]]$
b. $\nrightarrow [\forall w' \in M(w,a)[\neg p(w')]]$

Experiment

Introduction to the debate

- NR generally received a lot of attention (Gajewski 2005, 2011; Homer 2008a, 2008b, 2011 a.o.) but in the area of Slavic languages it is relatively understudied phenomenon:
- there is only one article (Boškovič & Gajewski 2009), which claims the non-existence of neg-raising in SL
- Dočekal (2014): limited existence of NR in SL
- B&G base their arguments on the lack of strict NPI licensing in the embedded clauses of Slavic NR predicates.
- B&G used only one test and only for the class IV (opinion) of NR-predicates.

(3) *Ivan ne vjeruje [da ju je Marija posjetila najmanje dvije godine.]
'Ivan does not believe that Mary has visited her in at least two years.'

(4)
a. *Ivan ne veril, čto Marija uedet až do zavtrašnego dnja. Russian
b. *Jan nie wierzył, że Maria wyjedzie aż do jutra. Polish
c. *Ivan nije vjerovao da će Marija otići sve do sutra. SC
d. Az ne vjarvam/*kazah če Meri ja e poseštavala pone ot dve godini. Bulgarian
e. *Jan nevěří, že Marie ji navštívila nejméně dva roky. Czech
f. *Janez ne verjame, da jo je Marija obiskala že najmanj dve leti. Slovenian

Experiment

- The experiment consisted of two parts:
- an **acceptability** judgement task
- **inference** task
- acceptability task: participants had to judge the acceptability of sentences with strict NPIs, *ani* 'not even' and *až do* 'until', using the 5-point Likert scale (5=best, 1=worst)
- strict NPIs can be licensed

1. in negative clauses
2. in clauses embedded under negated NRs (Horn, 1989)

- 5 environments

1. a positive sentence (A)
2. a negative sentence (B)
3. a clause embedded under negated NR predicates of intention and judgement/obligation (e.g. *want, advise*) (C)
4. a clause embedded under negated NR predicates of opinion (*believe*) (D)
5. non-NR predicates (E)

(5) a. **Ztratila** se **ani** jedna ovce.
Lost SE not-even one sheep
'A single sheep is missing.'

b. **Neztratila** se **ani** jedna ovce.
neg-lost SE not-even one sheep
'Not a single sheep is missing.'

c. Nový bača v Tatrách **nechce**, aby se ztratila **ani** jedna ovce.
new shepherd in Tatras neg-wants C SE lost not-even one sheep.

d. Nový bača v Tatrách si **nemyslí**, že se ztratila **ani** jedna ovce.
new shepherd in Tatras SI neg-think C SE lost not-even one sheep

e. Nový bača v Tatrách **neříká**, že se ztratila **ani** jedna ovce.
new shepherd in Tatras neg-say C SE lost not-even one sheep

Items

- in all environments indicative/subjunctive complementizers were tested without any impact on grammaticality
- 20 items tested with *ani jeden* 'not-even one' strict NPIs, 20 items tested with *až do* 'until' strict NPIs
- intention/judgement/obligation verbs (C): *chtít* 'want', *hodlat dopustit* 'allow', *mít v úmyslu* 'have intention', *přát si* 'wish', *vyžadovat* 'require', *potřebovat* 'need', *usilovat* 'strive', *radit* 'advice', *doporučovat* 'recommend', *navrhovat* 'propose', ...
- opinion verbs (D): *myslet* 'think', *věřit* 'believe', *předpokládat* 'suppose', *představovat* 'imagine', *očekávat* 'expect', *uvažovat o* 'speculate', *domnívat se* 'assume', *soudit* 'judge', *spoléhat se* 'count on', ...

- non-NR verbs (E): *říkat* 'say', *slyšet* 'hear', *tvrdit* 'assert', *rozhlašovat* 'rumour', *naznačit* 'indicate', *prozradit* 'reveal', *sdělit* 'tell', *zavolat* 'call', *napsat* 'write', *způsobit* 'cause', *vyrozumět* 'inform', *nutit* 'force', *číst* 'read', *chápat* 'understand'
- in most cases the sentences were conceived as 'small scenarios' to help subjects construct plausible context, pseudo-Czech:

(6)
a. New librarian neg-want/believe/say that-IND/that-SUBJ strict-NPI book get lost.
b. The writer of detective novels neg-need/think/reveal that he is praised by strict-NPI journalist.
c. Karel's doctor neg-recommend/believe/say that Karel miss strict-NPI cure.

(7)

a. Mother neg-wants/imagine/hear that-IND/that-SUBJ father arrives until Christmas.

b. Strict teacher neg-intend/guess/indicate that he will release students until twilight.

c. Klara's parents neg-allow/think/tell that he will marry her until summer.

- the second part:

1. neg-raising is intuitively valid ($\neg NR[P] \rightsquigarrow NR[\neg P]$)

(8) a. John doesn't think that it's raining. $\neg NR[P] \rightsquigarrow$
b. John thinks that it's not raining. $NR[\neg P]$

2. cyclic neg-raising is valid ($\neg NR_1[NR_2[P]] \rightsquigarrow NR_1[NR_2[\neg P]]$)

(9) a. I don't believe Bill wanted Harry to die.
$\neg NR_1[NR_2[P]] \rightsquigarrow$
b. I believe Bill wanted Harry not to die. $NR_1[NR_2[\neg P]]$

3. existential wide scope is valid ($\neg\forall x NR_1[NR_2[P]] \rightsquigarrow \exists x NR_1[NR_2[\neg P]]$)

(10) a. Not every student thinks that Mary passed. $\neg\forall x NR_1[NR_2[P]] \rightsquigarrow$

b. There are some students who think that Mary didn't pass. $\exists x NR_1[NR_2[\neg P]]$

- only NRs of intention were used in this part of the experiment
- examples items (pseudo-Czech):

(11) a. Old duke would neg-be glad if the best wine would get lost from the cellar. $\rightsquigarrow$

b. Old duke would be glad if the best wine would neg-get lost from the cellar.

(12) a. Servants neg-believe that old duke would be glad if the best wine would get lost from the cellar. $\rightsquigarrow$

b. Servants believe that old duke would be glad if the best wine would neg-get lost from the cellar.

(13) a. Not all servants believe that old duke would be glad if the best wine would get lost from the cellar. $\rightsquigarrow$

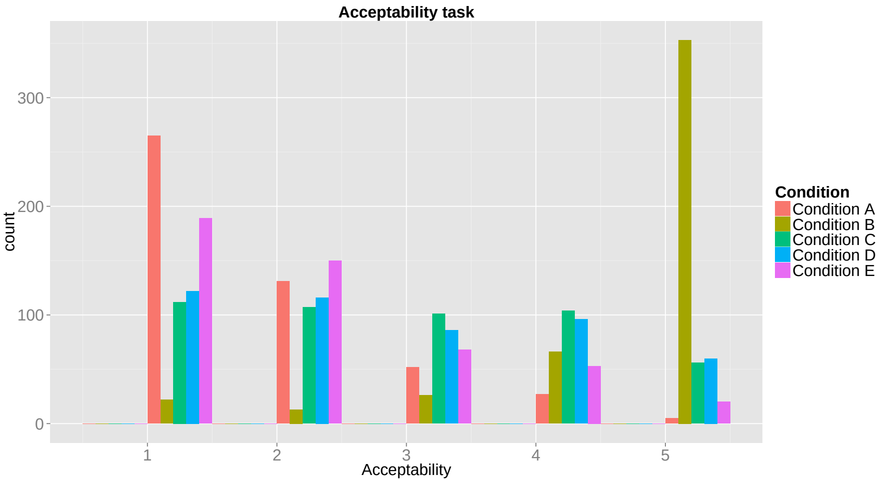
b. Some servants believe that old duke would be glad if the best wine would neg-get lost from the cellar.

- 40 exp. items in part 1 and 20 exp. items in part 2: 260 tested sentences
- each part 30 fillers, 60 Czech native speakers, $\approx$ 1 hour
- the experiment online in Ibex: link

Results of acceptability task

- all participants passed control fillers (uncontroversially grammatical/ungrammatical)
- **acceptability** task: modeled by mixed-effects ordered probit regression
- Condition C as the reference level
- negated sentences, Condition B, were judged as better than NRs ($\beta = 1.84, z = 23, p < .001$)
- positive sentences, Condition A, were judged as worse than NRs ($\beta = -1.1, z = -15, p < .001$)
- sentences with negated non-NR (E) predicates worse than any NR ($\beta = -0.65, z = -9, p < .001$)
- evidence for:

1. treating *ani* 'not even' and *až do* 'until' as a strict NPIs (otherwise, Condition E should be acceptable, contrary to the facts)
2. Czech has a class of NR verbs.


Acceptability task
count
300
200
100
0
1
2
3
4
5
Acceptability
Condition
Condition A
Condition B
Condition C
Condition D
Condition E

Results of inference task

- the analysis of the **inference task**: using mixed-effects logistic regression (with 1=inference follows, 0=inference does not follow)
- one fixed factor: Condition I as the reference level
- condition I was significantly higher than a chance, prob=0.5, “inference follows” was preferred
- Condition II and III had a significantly smaller preference for 1, in fact, they did not significantly differ from prob=0.5
- unexpected in previous accounts of NRs (all three inference tasks should be possible) but
- the difference is likely a consequence of the higher complexity of Condition II and III (i.e., more clauses, more complex sentences): Condition II & III 2-3 times longer reaction time than Condition I

Analysis

Scalar approach to NR

Roadmap:

- explain the acceptability and the inference tasks
- especially w.r.t. strict NPI licensing:

0. against syntactic (reconstruction) treatment – see (14) (type E) were tested both with indicative/subjunct. embedded CP and in both environments the strict NPIs were ungrammatical
1. why are NR (C and D) better than non-NR (E)
2. but worse than simple negated sentences (B)

(14) Petr neřekl, *že/*aby ani jeden student prošel.
Petr didn't-say *that_IND/*C_SUBJ not-even one student passed.

- the scalar approach to NR (originally Horn, today esp. Romoli 2012,2013)
- NR predicates (beside the assertion – (15-b)) contribute the excluded middle (EM) to the semantic composition ((15-a)):
- alternatives grow through the semantic composition of the sentence until they hit the proposition taking EXH – (16-a)
- it applies to the proposition and negates the excludable – (16-b) – alternatives

(15) a. $Alt(NR) = \{\lambda p \lambda x.\Box_x[p], \lambda p \lambda x.[\Box_x[p] \vee \Box_x[\neg p]]\}$
b. $[\![P]\!] = \lambda p \lambda x.\Box_x[p]$

(16) a. $EXH(Alt(p))(p)(w) = p(w) \wedge \forall q \in Excl(p, Alt(p))[\neg q(w)]$
b. $Excl(p, Alt(p)) = \{q \in Alt(p) : \lambda w[\neg q(w)] \cap p \neq \emptyset\}$

- application to the Czech NR (C) predicate *chtít* 'want' in (17)– assertion
- (18-a) the alternatives, (18-b) the exhaustification
- such exhaustification proceeds only if it is an answer (to and implicit or explicit) QUD like *What does the new shepherd want his sheep to do?*

(17) 'New shepherd in Tatra mountains doesn't want even one sheep to be missing.' $\neg want_s[p]$.

(18) a.
$$Alt(\neg want_s[p]) = \{\neg want_s[p], \neg(want_s[p] \vee want_s[\neg p])\}$$
b. $[\![EXH]\!](\neg want_s[p]) =$
$$\neg want_s[p] \wedge \neg\neg(want_s[p] \vee want_s[\neg p]) \models want_s[\neg p]$$

- explanation of the **inference** task: neg-raisers (C,D) do have the excluded middle alternative unlike non-NR (E)
- and it explains the **acceptability** distinction between neg-raisers (C,D) and non-NR (E)
- the scope of negation of neg-raisers is low $\rightarrow$ strict NPIs are licensed in the embedded clause
- with non-NR predicates like *be certain*, the alternative is existential (or missing – *say, ...*) $\rightarrow$ explanation of the acceptability difference between NR (C,D) and non-NR (E)
- the existential alternative blocks the DE environment (parallel to *every*: **I doubt that every student ever solved that problem*)

(19) a. John isn't certain that Mary will arrive.
b. $\rightsquigarrow$ It's possible for John that Mary will arrive.
c. $\neg\Box_j[p] \wedge \Diamond_j[p]$

NR suspension – NR vs. simple negated sentences

- the limited NR inferences ability of SL as a result of NR inferences suspension (for English observed by Gajewski 2007: *John DOESN'T think that Fred left. He isn't sure*)
- for the suspension in SL: the verbal negation is interpreted (systematically ambiguous between the propositional and constituent scope) with constituent scope
- the interpretation marks the sentence: an answer to a different QUD $\rightarrow$ the EM alternative becomes irrelevant

(20) Petr nepřečetl tři Kunderovy romány, on je zhltl s vášní.
'Petr didn't READ three Kundera's novels, he devoured them with passion.'

- scalar implicatures are context dependent – only relevant alternatives produce scalar implicatures and the relevance of the alternatives depends on QUDs
- e.g. *exact* scalar implicature for numerals is valid only for QUD like (21-a) but not for (21-c)
- So an answer to QUD like (22-a) creates a partition like (22-b)
- the excluded middle (c_3) is relevant, yielding the NR inference

(21)
a. How many beers did John drink?
b. John drank 3 beers. $\approx \#x = 3$
c. Who did drink 3 beers?
d. John drank 3 beers. $\approx \#x \geq 3$

(22)
a. What does the new shepherd want his sheep to do?
b. $Q = \{c_1 = want_s[p], c_2 = want_s[\neg p], c_3 = \neg(want_s[p] \vee want_s[\neg p])\}$

- but different stress e.g. on *think* in (23) leads to a QUD like (24-a)
- it's a predicate verum focus negation
- which create partitions like (24-b)
- The excluded middle proposition is not relevant in such partitioning because it doesn't distinguish beween the partitions but only within c_2.
- Therefore the NR inference is suspended.
- simple negated sentences (B) don't need implicature calculation for strict NPI licensing $\rightarrow$ the difference between B and C,D

(23) Nový bača si NEMYSLÍ, že se ztratila *ani jedna ovce.
New shepherd DOESN'T think that even-one one sheep dissapeared.

(24) a. Does the new shepherd think that one sheep dissapeared?
b. $Q = \{c_1 = think_s[p], c_2 = \neg think_s[p]\}$

Quick comparison with Gajewski's approach

- basic ingredients of Gajewski's theory:

1. excluded middle is a presupposition:

(25) $[\![P]\!] = \lambda p \lambda x : [P(p)(x) \vee P(\neg p)(x)].P(p)(x)$

2. NR are soft presupposition triggers $\leftrightarrow$ context dependent: suspension by ignorance:

(26) I don't know whether Peter enrolled in the race, but if he won, he is in the bar now.

- but soft presupposition triggers need contextual information to be suspended

- if excluded middle was a presupposition, it should project; but it does not

(27)
a. Peter thinks that the sheep is missing.
b. Peter has an opinion as to whether the sheep is missing.
c. Peter doesn't think that the sheep is missing. ($\rightsquigarrow$ projects (27-b))
d. Does Peter think that the sheep is missing? ($\not\rightsquigarrow$ projects (27-b))
e. If Peter thinks that the sheep is missing, we should call police. ($\not\rightsquigarrow$ projects (27-b))
f. Perhaps Peter thinks that the sheep is missing. ($\not\rightsquigarrow$ projects (27-b))

- in the same environments the exhaustification of scalar implicatures follows similar pattern:

(28) a. Peter didn't find every sheep. ($\rightsquigarrow$ found some)
b. Did Petr find every sheep? ($\not\rightsquigarrow$ found some)
c. If Peter found every sheep, we'll celebrate. ($\not\rightsquigarrow$ found some)
d. Perhaps Peter found every sheep. ($\not\rightsquigarrow$ found some)

- maybe the presuppositions are cancelled by indicative like Homer's example: the indicative triggers the presupposition that the speaker holds true the complement clause $\rightarrow$ NPIs *mai* 'ever' are un-licensed:

(29) Context: Maria has visited Paris several times.

a. *Gianni non pensa che Maria e mai andata a Parigi
Gianni NEG thinks that Maria be.IND ever gone to Paris
'Gianni doesn't think that Maria has ever been to Paris.'

(30) Gianni non pensa che Maria sia mai andata a Parigi
Gianni NEG thinks that Maria be.SUBJ ever gone to Paris
'Gianni doesn't think that Maria has ever been to Paris.'

- highly improbable for Czech data: the same items with NR C in subjunctive and NR D in indicative were judged similarly, e.g.

(31) a. Nový vedoucí katedry nehodlá dopustit, aby studenti vynechali ani jednu přednášku.
'New chief of the department doesn't want C-SUBJ students miss even one lecture.' (SUBJ)

b. Nový vedoucí katedry nevěří, že studenti vynechali ani jednu výběrovou přednášku.
'New chief of the department doesn't believe that students missed even one class.' (IND)'

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