



FACULTY  
OF ARTS

Masaryk University

# Unlikely scalar particles: experimental evidence from Czech and Slovene

.....

Brno meets Vienna, 21-10-2018

Iveta Šafratová

# Overview

## The first goal

Interpret results of 2 experiments on Czech and Slovene SPs.

## The second goal

Explain the obligatory association of *i/ani* and *celo/niti* with weak/strong elements from their semantic properties.

## Data

- strong SPs: Czech *i*, Slovene *celo*
- correspond to English *even*

- (1) Petr přečetl **i** 10 knih od Hegela.  
Petr read even 10 books of Hegel  
'Petr read even 10 books of Hegel.'

- weak SPs: Czech *ani*, Slovene *niti*
- correspond to English *neg-even*
- morphologically *ani* contains *i*

- (2) Petr nepřečetl **ani** 1 knihu od Hegela.  
Petr neg-read even 1 book of Hegel  
'Petr didn't read even 1 book of Hegel.'

## Likelihood and Logical properties

- likelihood respects entailment

(3) John read even SEVEN<sub>F</sub> books of Hegel.

strong

(4) a. ...read 3 books  $\rightarrow$  read 2 books  $\rightarrow$  read 1 book

b. ...**read 3 books**  $<_{\text{likely}}$  read 2 books  $<_{\text{likely}}$  read 1 book

- negation reverses the direction of entailment; association with the least likely

(5) John didn't read even ONE<sub>F</sub> book of Hegel.

weak

(6) a. not read 1 book  $\rightarrow$  not read 2 b.  $\rightarrow$  not read 3 b.  $\rightarrow$  ...

b. **not read 1 b.**  $<_{\text{likely}}$  not read 2 b.  $<_{\text{likely}}$  not read 3 b.  $\rightarrow$  ...

# Hypothesis

## The hypothesis

- *i/ani* associate with focus alternatives
- the analysis: *i/ani* as overt *even*
- the focus associated expression (e.g., numeral noun, ...) generates alternatives over which *even*'s presupposition calculates
- the prejacent – the least likely among alternatives
- strong SPs: *i*, *celo* (PPIs)
- weak SPs: *ani*, *niti* (NPIs)

- corroborates Krifka's/Crnič's theory (Krifka 1995; Crnič 2011, 2014) of polarity items licensing, unlike classical approaches (Ladusaw, 1980b,a)
- Krifka's/Crnič's theory can explain the occurrence of polarity items in UE environments and not straightforwardly DE environments (like antecedent of implication: Strawson DE)
- alternative (most popular) theory: Chierchia (2013)
  - an empirical reason: Chierchia's style cannot be used to *i* without modification of the theory – *i* associates with strong PPI

## Experiments

- joint work with Mojmír Dočekal
- Czech particles *i*, *ani* and Slovene particles *celo*, *niti*
- Czech: 48 from 50 subjects successfully passed the fillers (distributed to subjects via HUME-Lab)
- Slovene: all 50 subjects successfully passed the fillers (some subjects via The Linguist List)
- online on IBEX farm, statistically interpreted in R using mixed model probit regression
- truth value judgment tasks (5-point Likert scale)
- contextual entailment (only mutually exclusive scales)
- 2 parts

## Part 1

- Czech and Slovene
- 9 exp. items + 9 fillers; 3 conditions:
  1. TOP: top of the scale
  2. MID: middle of the scale
  3. LOW: low of the scale



## Part 1: A sample item

- (7) Context: Brown rice can preserve essential vitamins but it has to be stored in the fridge, packed in hermetical dose and you have to consume it up to three days after cooking.
- a. Rýže v ledniče (nevydrží **ani** 3 dny)/(vydrží **i** 3 dny). TOP  
'The rice in the fridge (doesn't last even 3 days)/(lasts even 3 days).'
  - b. Rýže v ledniče (nevydrží **ani** 2 dny)/(vydrží **i** 2 dny). MID  
'The rice in the fridge (doesn't last even 2 days)/(lasts even 2 days).'
  - c. Rýže v ledniče (nevydrží **ani** 1 den)/(vydrží **i** 1 den). LOW  
'The rice in the fridge (doesn't last even 1 day)/(lasts even 1 day).'

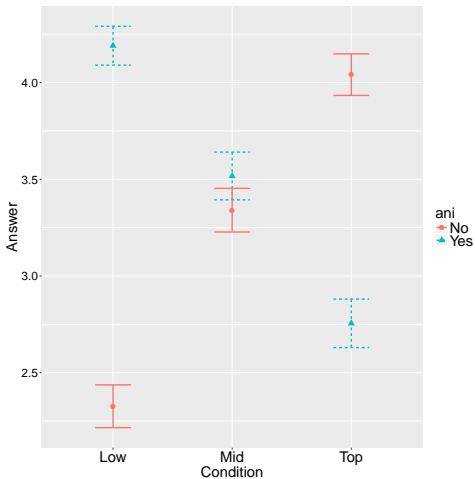
(8) the scale: <1 day, 2 days, 3 days>

- a. contextual entailment: *last 3 days* → *last 2 days* → *last 1 day*
- b. likelihood: *last 3 days* <*likely* *last 2 days* <*likely* *last 1 day*

(9) the scale: <1 day, 2 days, 3 days>

- a. contextual entailment: *don't last 1 day* → *don't last 2 days* → *don't last 3 days*
- b. likelihood: *don't last 1 days* <*likely* *don't last 2 days* <*likely* *don't last 3 days*

# Results



- both *i* and *celo* are strong particles; require the least likely alternative
- both *ani* and *niti* are weak particles; require the least likely alternative (implication as well as negation reverse the direction of likelihood/entailment)
- but: need intervening scale reversing operator  $\neg$
- *ani/niti* prefers wide scope w.r.t. DE operators:  
[EVEN [DE ... [...]<sub>F</sub> ...]]
- MID condition: in-between acceptability

- the middle of the scale in-between acceptability (MID conditions): **domain restriction:**
  - alternatives for  $i$  are {1 day, 2 days}
  - alternatives for  $ani$  {2 days, 3 days}

## Part 2

- same subjects (only Czech)
- 16 exp. items + 16 fillers; 5 conditions:
  1. NEG-ANI/I: *ani/i* with the least likely alternative in the negative sentence
  2. ANT-ANI/I: *ani/i* with the least likely alternative in DE environment
  3. NR-ANI/I: *ani/i* with the least likely alternative in a sentence with NR predicate
  4. NEG-ANI-HIGH: *ani* with the most likely alternative in the negative sentence
  5. ANT-I-BOT: *i* with the most likely alternative in DE environment

## Part 2: A sample item

- (10) Mother would be happy if her son would work for the police. The lowest rank is a sergeant, the highest is a general and somewhere in the middle is a colonel.

- a. Syn se nakonec nestal (**ani** rotným)/(**ani** generálem).

NEG-ANI/NEG-ANI-TOP

‘Son at the end didn’t become neg-even  
(sergeant)/(general).’

- b. Jestli se syn stane **ani** rotným, bude matka ráda.

ANT-ANI

‘If her son becomes neg-even sergeant, his mother  
would be happy.’

- c. Otec nechce, aby se syn stal (**ani** rotným)/(i generálem).

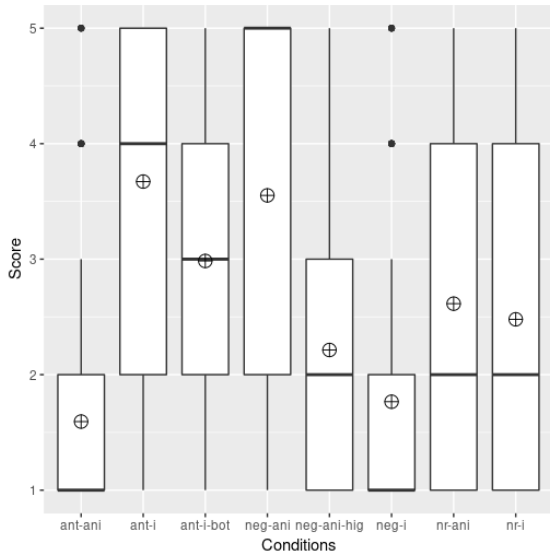
NR-ANI/NR-I

‘Father doesn’t want his son to become (neg-even  
sergeant)/(even general).’

- (11) a. Syn nakonec vystudoval biochemii a nestal se i generálem. NEG-I  
 'Son at the end studied biochemistry and didn't become even general.'
- b. Jestli se syn stane (i generálem)/(i rotným), matka bude ráda. ANT-I/ANT-I-BOT  
 'If son will become (even general)/(even sergeant), his mother will be happy.'
- (12) a. the contextual scale: <Sergeant, Colonel, General>  
 b. contextual entailment: *become general* → *become colonel* → *become sergeant*  
 c. likelihood: *become general* <<sub>likely</sub> *become colonel* <<sub>likely</sub> *become sergeant*



# Results



## Analysis & Discussion

- *i* associates with strong elements
- *ani* associates with weak elements
- *i* is ungrammatical in negative sentences

1. *i* → narrow scope: [DE [EVEN ... [STRONG]<sub>F</sub> ... ]]

ANT-I

2. *ani* → wide scope: [EVEN [DE ... [WEAK]<sub>F</sub> ... ]]

NEG-ANI

- in-between acceptability (conditions: ANT-I-BOT): the association with even scoping reversely to the default pattern:

1. *i* → wide scope: [EVEN [DE ... [STRONG]<sub>F</sub> ... ]]

ANT-I-BOT

- both *i/celo* and *ani/niti* bear strong unlikelihood presupposition (formalized after Crnič (2011; 2014) as obligatory association with **covert even**:

(13)  $\llbracket \text{even} \rrbracket^{g,c}(C, p, w)$  is defined only if  $\forall q \in C [p \triangleleft_c q]$

- *ani* is a super strong NPI (restricted to **A(nti)-M(orphic)** environments (Zwarts, 1998):

(14)  $\llbracket AM \rrbracket = O(\neg X) = \neg O(X)$

- *i* ... [EVEN]
- *ani* ... [EVEN, AM]
- both lexemes compete for insertion via the Maximize Presupposition (MP) mechanism (Heim, 1991)

## Summary

- Czech and Slovene particles behave similarly → both need the least likely alternative
  - *i/celo*: strong elements
  - *ani/niti*: weak elements
- particles may associate with *even* scoping reversely to the default pattern → in-between acceptability
- both SPs and NPIs are licensed by likelihood

## Future research/Open questions

- the distinction between weak and strong NPIs in Czech
  - *byť jediný* ‘even single one’ – a candidate for a weak NPI → the most likely in positive sentences
- *i*: many properties of strong PPIs (in Krifka’s approach to PPI) but in the antecedent of implication the PPI reading (ANT-I-BOT) is dis-preferred: antecedent of implication tolerates PPIs
- exhaustifying operator (Chierchia 2006, 2011)
  - EXH(O): negates all stronger alternatives
  - EXH(E): a prejacent has to entail all alternatives

Iveta Šafratová  
Masaryk University in Brno  
safratova@mail.muni.cz

Thanks!

## Selected references

- Chierchia, Fox, and Spector (2012). *Scalar implicature as a grammatical phenomenon* (Maienborn, von Stechow & Portner ed.), Volume 3, pp. 2297–2331. Mouton de Gruyter.
- Chierchia, G. (2013). *Logic in grammar: Polarity, free choice, and intervention*. OUP Oxford.
- Crnič, L. (2011). *Getting even*. Ph. D. thesis, MIT.
- Crnič, L. (2014). Non-monotonicity in npI licensing. *NLS* 22(2), 169–217.
- Fauconnier, G. (1975). Pragmatic scales and logical structure. *Linguistic inquiry* 6(3), 353–375.
- Gajewski, J. R. (2005). *Neg-raising: Polarity and presupposition*. Ph. D. thesis, MIT.
- Heim, I. (1991). Articles and definiteness. *Semantics: An international handbook of contemporary research*, 487–535.
- Horn, L. (1969). A presuppositional analysis of only and even. *CLS* 5, 98–107.
- Karttunen, F. and L. Karttunen (1977). Even questions. In *Proc. of NELS*, Volume 7, 115–134.
- Krifka, M. (1995). The semantics and pragmatics of polarity items. *LA* 25(3-4), 209–257.
- Ladusaw, W. A. (1980a). On the notion affective in the analysis of negative-polarity items. *Formal Semantics: The Essential Readings*, 457–470.
- Ladusaw, W. A. (1980b). Polarity sensitivity as inherent scope relations.
- Rooth, M. (1985). *Association with focus*. Ph. D. thesis, MIT.
- Rooth, M. (1992). A theory of focus interpretation. *Natural language semantics* 1(1), 75–116.
- Zwarts, F. (1998). Three types of polarity. In *Plurality and quantification*, pp. 177–238. Springer.