Do Hungarian preschoolers always understand number words *exactly*?

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Hungary

- Research questions
- Background
- Experiments

  Experiment I.

  Experiment II.

  Experiment III.
- Discussion

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Research questions

- Can children differentiate between the 'at least' and 'exactly' readings of numerals?
- How does the manipulation of the pragmatic environment affect children's interpretation of numerals?
- How do the results obtained contribute to the semantic debate on the default meaning of numerals and on the analysis of Hungarian pre-verbal focus?

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Background

Different interpretations of the numerals:

(1) - *How many mistakes did you make?*

- I made five mistakes.

(2) *You need to make five mistakes to be allowed to take the test again.*

(3) *You can make five mistakes and still pass this test.*

What is the **default** meaning?

The neo-Gricean view

Horn 1972, Levinson 2000

Default meaning: „***at least n***”

Scalar implicature

Scalar implicature: „***exactly n***”

Maxim of Quantity

(4) John: *Are the cakes ready?*

Mary: *Some of them are.*

→ implicature: some but not all

(5) John: *Are the cakes ready?*

Mary: *Three of them are.*

→ implicature: no more than three

The Alternative Approach

Geurts 2006, Breheny 2008

Default meaning: „***exactly n***"

Existential Closure

Implicature: „***at least n***"

- ‘at least’ reading

  → an instance of Existential Closure

- EXISTS [a set of cardinality n]
- comptaible with both the lower-bound and upper-bound readings

- Breheny (2008): „pragmatically derived existential closure”

Hungarian data

- In Hungarian the distinction between the lower and upper bound meaning of numerals is claimed to be structure dependent.
- Numerals appearing in focus position obligatorily receive an ’exactly’ reading.
- Numerals in other positions are interpeted as ‘at least n’.

(É. Kiss 1998, 2010)

(8a) János 15 PALACSINTÁT evett meg.
John 15 pancake.ACC eat.Sg3.PRT
'John ate *exactly* fifteen pancakes.'

(8b) János meg.evett 15 palacsintát.
John PRT.eat.Sg3 15 pancake.ACC
'John ate *at least* fifteen pancakes.'

The standard analysis

(i) the default meaning of numerals is ‘at least n’ (Horn 1972)

(9) Aki fel-nevelt két gyereket, az 15% nyugdíj-emelésre jogosult.

‘Who brought up (at least) two children is entitled to a 15% pension raise.’

(ii) Hungarian preverbal focus expresses exhaustive identification which is responsible for imposing the upper-bound (É. Kiss 2006)

- alternatives to *n*: all the numbers higher than *n*
- as a result of identification numbers not being equal to $[n]_{\text{Foc}}$ are excluded
- in the case of numerals exhaustivity manifests itself as the upper bound reading

Experimental background
Scalar implicatures

Children, unlike adults, often fail to derive scalar implicatures.

might vs. *must* – Noveck, 2001.

some vs. *all* – Huang and Snedeker, 2009; Musolino, 2004; Noveck, 2001; Papafragou and Musolino, 2003.

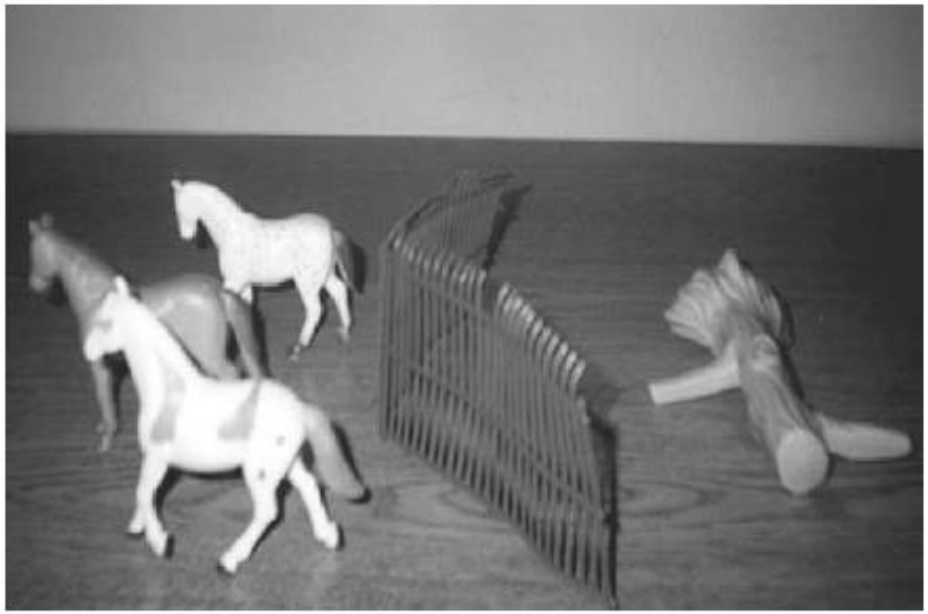
Papafragou and Musolino, 2003.

(11) *Some of the horses jumped over the fence.*

adults: false (92%)
children: **false (12%)**

(12) *Two of the horses jumped over the fence.*

adults: false (100%)
children: false (**65%**)



Musolino presumes that children do not rely on implicatures to derive the upper bound meanings of numerals, but they rely on their default meaning which must be '**exactly n**'.

(See also Huang, Snedeker and Spelke, 2004.)

Experimental background
Focus sensitivity

(13) A MACI ült fel a székre.
The bear sat.Sg3.PRT the chair
'It is the bear who is sitting on the chair.'

5-year-old children: **true (100%)**

(Pintér, 2011)

See also Lukács and Kas, 2013.

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Experiment I.

Predictions:

- If the default meaning of numerals is indeed ‘at least n’,
- and children are not sensitive to exhaustivity which is claimed to be responsible for producing the upper-bound reading,
- then it follows that the ’at least’ reading of numerals will be more accessible for them.

Experiment I. – Participants

- a group of **20 preschoolers** (mean age 5;6)
- a group of **17 adult native speakers of Hungarian**.

Kapjanak cukorkát azok a macik, …
Get.IMP candy.ACC those the bear.PL
'Those bears shall get a candy …'

(1.) … akik szedtek három málnát.
who.PL picked three raspberry.PL.ACC
(non-focussed numeral with action verb)

(2.) … akik HÁROM MÁLNÁT szedtek.
who.PL three raspberry.PL.ACC picked
(focussed numeral with action verb)

'Those bears shall get a candy who picked three raspberries.'


„exactly n”


„at least n”

Experiment I. – Results

- **Adults:** the position of the numeral had a significant effect on how the numeral got interpreted ($X^2 = 99.5$, df=3, p= .0001)
- **Children** interpreted the numeral as 'exactly n' in every single case.

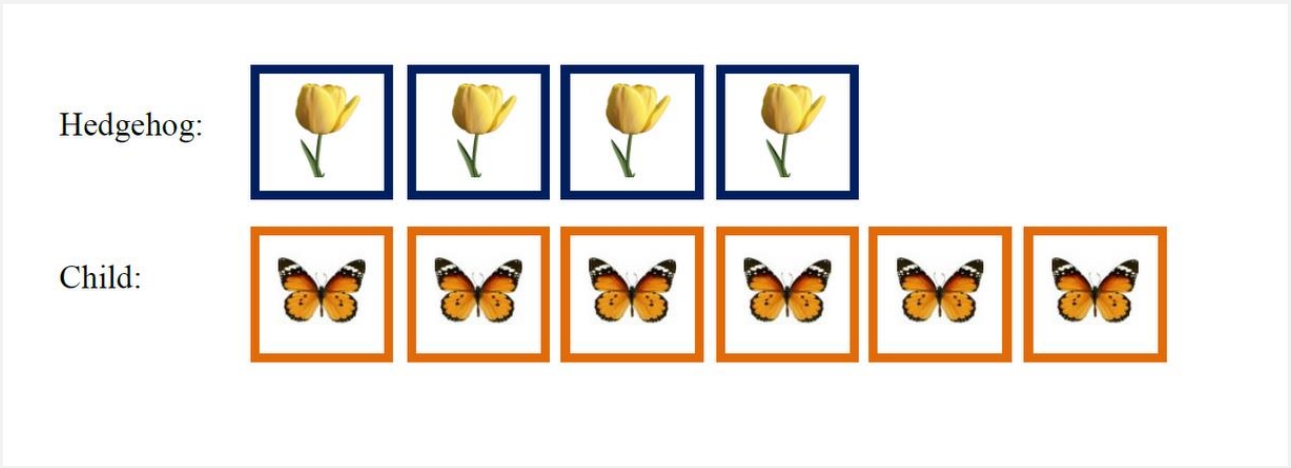
- Did children believe that they were tested on counting?

- Does pragmatic highlighting have any effect on interpretation?

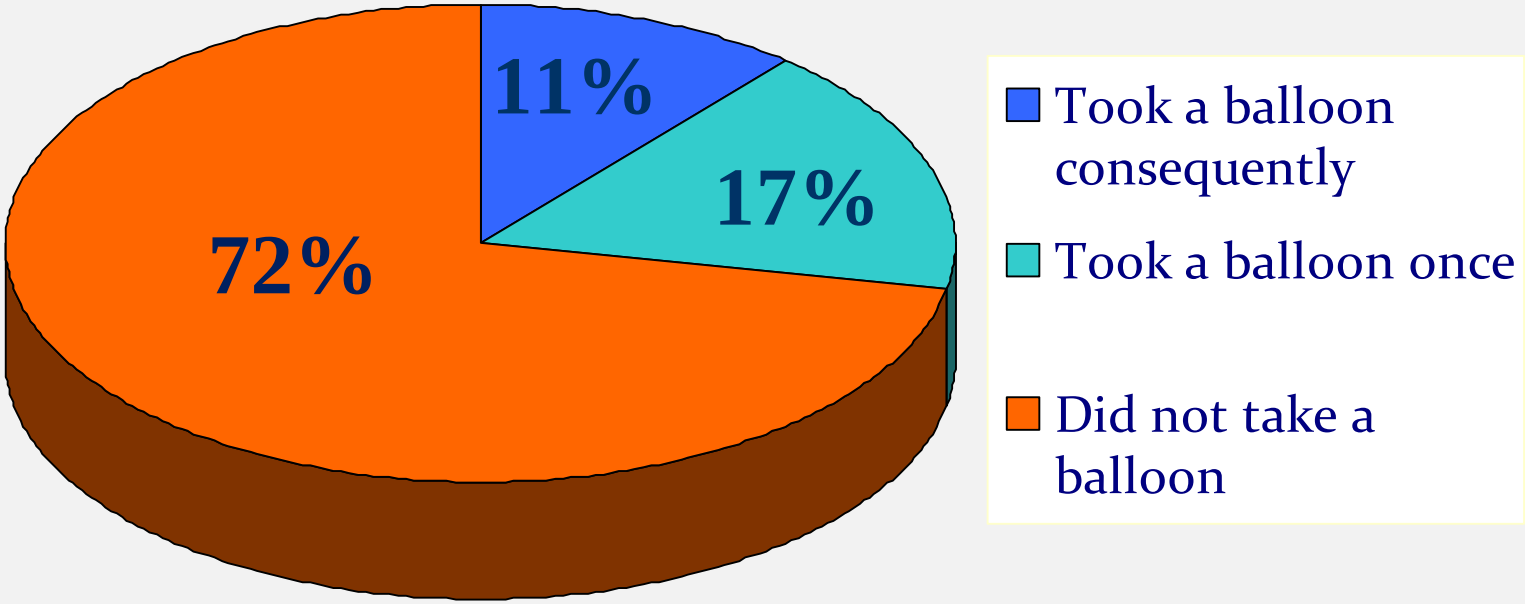
Experiment II.

Is the '***at least n***' meaning available at all?

(14) Elvehet egy lufit az, akinek van öt kártyája.
PRT.get a ballon.ACC that who has five card.POSS
'If anybody has five cards, he or she can take a balloon.'



Experiment II. – Results



Explanations:

„I don't have five."

„I have only six."

„If this one was not here, I could have one."

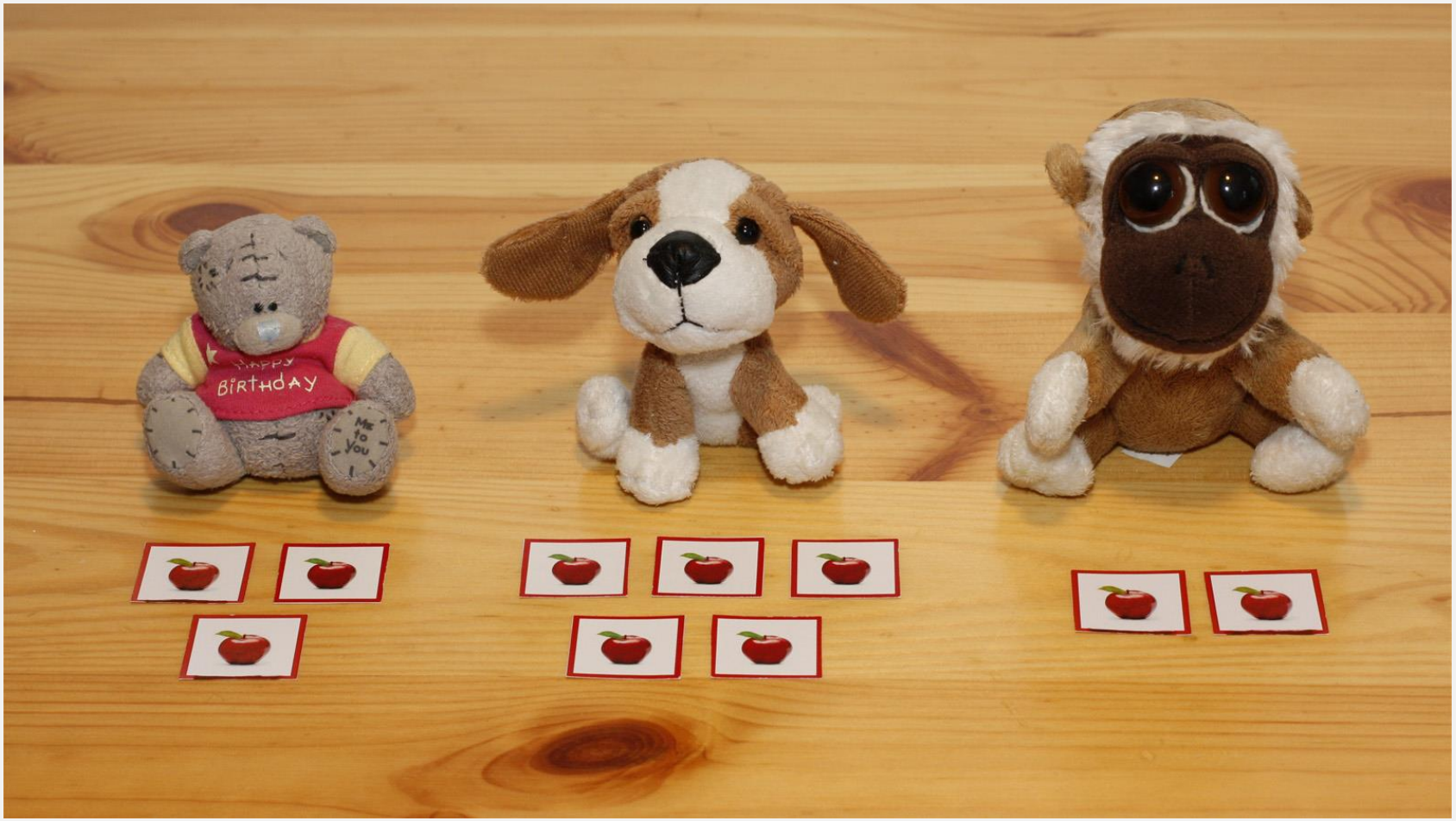
Experiment III. – Background

Musolino (2004)

Does Goofy have two cookies?

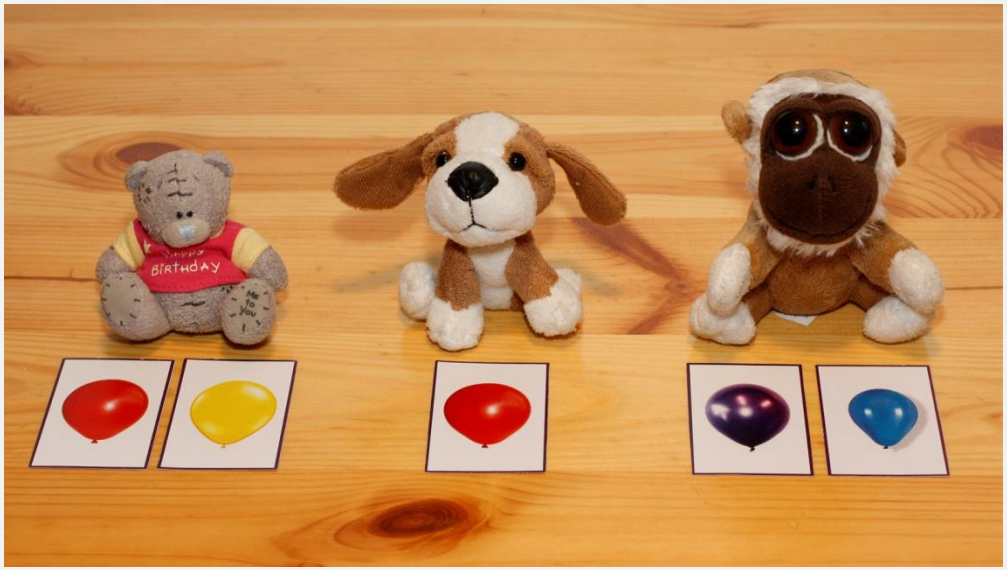
Children: **80%** – ‘yes’

Experiment III.

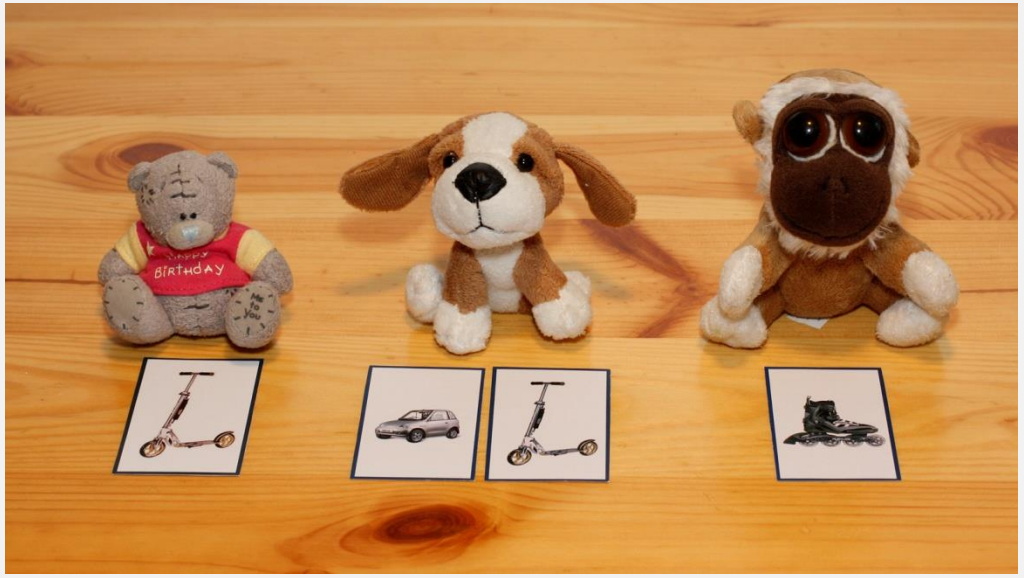


Experiment III.

(15) Van valaki, akinek van négy almája?
is someone who-DAT has four apple-POSS
'Is there anyone, who has four apples?'

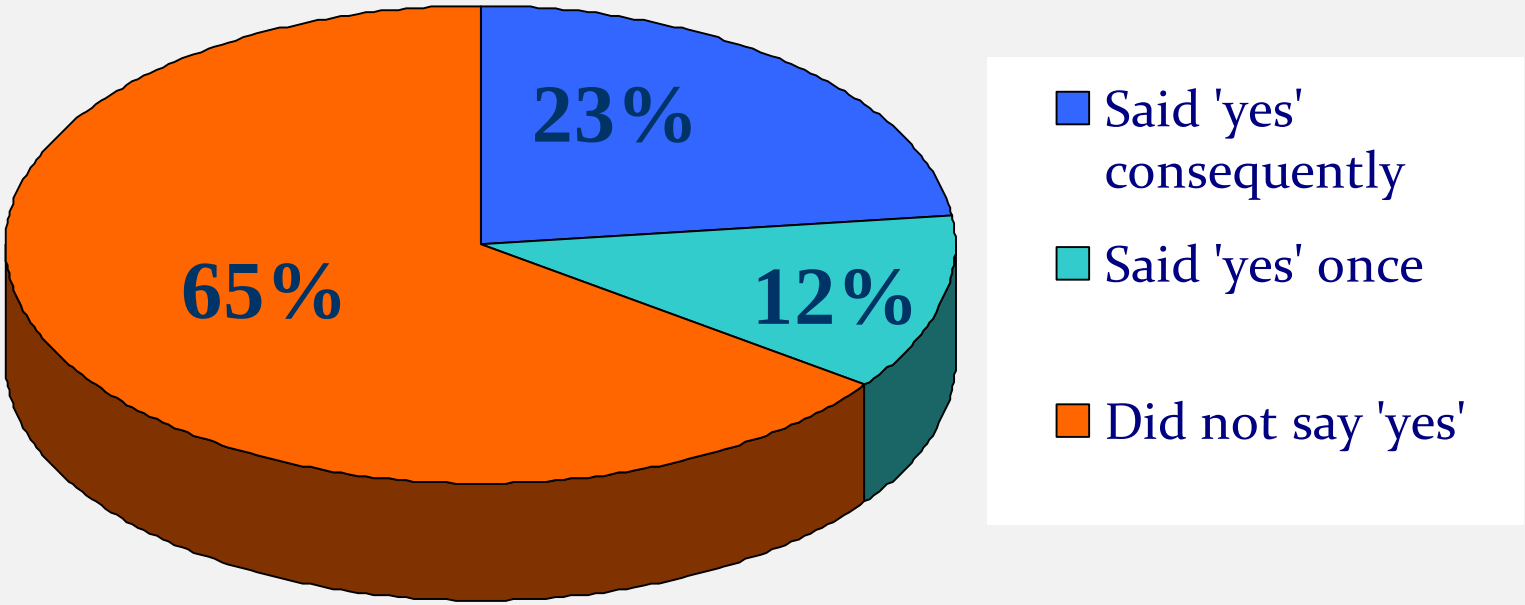


Is there anyone, who has a blue balloon?



Is there anyone, who has a bicycle?

Experiment III. – Results



Explanations:

„I can see only three and five, not four."

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Findings:

- Children's interpretation of numerals is unaffected by the information structure of the sentence.
- Strong preference for the upper-bound ('exactly') reading.
- The influence of the context is limited.

Discussion

Conclusions:

- The results disconfirm the claims of the standard analysis.
- The 'exactly' interpretation is not a consequence of exhaustivity.
- The results are in line with the Alternative Approach:
  - the default meaning of numerals is in fact 'exactly *n*'
  - the 'at least' reading is an implicature arising through pragmatic inferences
- Children seem to have no or limited access to the lower-bound reading.

Discussion

Why is the 'at least' reading blocked if the numeral is focussed?

- Focus: answers to the Question Under Discussion (QUD, Roberts 1998)
- congruency criterion
- at issue → cardinality of the set
- presupposed → existance of the set
- in order to be congruent with the QUD focus must specify the cardinality of the set

Thank you for your attention!

References

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