Putting plural definites into context

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Plural definites

1. **Homogeneity**
   - "Nathan opened his presents" \(\approx\) Nathan opened **all** of his presents
   - "Nathan didn't open his presents" \(\approx\) Nathan didn't open **any** of his presents

2. **Non-maximality**
   - "The doors are open" \(\rightarrow\) Enough doors are open maybe not all

(Haslinger 2022)
Non-maximality

Non-maximal readings are context-dependent

"Frank opened his presents."
- He's not supposed to open any of his presents before the guests arrive \(\rightarrow\) TRUE
- He's supposed to open all of his presents in front of the guests \(\rightarrow\) FALSE

If the sentence is judged to be true in an 'gappy situation' like this, it's due to a non-maximal reading
Two views on non-maximality

1. **Symmetric view**: Non-maximal readings are *ceteris paribus* available equally in positive and negative sentences (Križ 2016, Križ & Spector 2021)

2. **Asymmetric view**: Non-maximal readings are hard to obtain in negative sentences than in positive sentences (Magri 2014, Bar-Lev 2018, 2021)

- **Positive**: Frank opened his presents.
- **Negative**: Frank didn't open his presents.
Previous experimental research

• Križ & Chemla 2015
  ○ Intermediate judgments in gappy situations for positive, negative, non-monotonic
  ○ More non-maximal readings for positive than for negative

• Tieu, Križ & Chemla 2019
  ○ Adults accepted negative more often than positive in gappy situations
  ○ Children accepted positive more often than negative in gappy situations

⇒ Asymmetry between positive and negative but not exactly as predicted by the Asymmetric view
Context manipulation

But it's not fair to directly compare positive and negative sentences

- In the previous studies, positive and negative stimuli had different truth-conditions
- Positive and negative sentences are typically used in different contexts
  - "The dogs are inside"
  - "The dogs are not outside"

☞ **Context manipulation** to test how the non-maximal readings of positive and negative sentences are modulated by context
Experiment 1: Every vs. No
Design

Based upon Križ & Chemla's 2015 Experiment C1

Truth-value judgment task with a 5-point Likert scale (Completely false—Completely true)

(Appendix for binary judgments)

Sentences

Bound pronoun to make sure negation > plural definite

- **Every**: "Every boy opened his presents."
- **No**: "No boy opened his presents."
### Pictures

<table>
<thead>
<tr>
<th></th>
<th>Every</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every</td>
<td>Every boy opened his presents.</td>
<td>No boy opened his presents.</td>
</tr>
<tr>
<td></td>
<td>Frank</td>
<td>Mike</td>
</tr>
<tr>
<td>Every</td>
<td><img src="image1.png" alt="Gifts" /></td>
<td><img src="image2.png" alt="Gifts" /></td>
</tr>
<tr>
<td>No</td>
<td><img src="image9.png" alt="Gifts" /></td>
<td><img src="image10.png" alt="Gifts" /></td>
</tr>
</tbody>
</table>

### Control

<table>
<thead>
<tr>
<th></th>
<th>Every</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td></td>
<td>Frank</td>
<td>Mike</td>
</tr>
<tr>
<td>Every</td>
<td><img src="image17.png" alt="Gifts" /></td>
<td><img src="image18.png" alt="Gifts" /></td>
</tr>
<tr>
<td>No</td>
<td><img src="image25.png" alt="Gifts" /></td>
<td><img src="image26.png" alt="Gifts" /></td>
</tr>
</tbody>
</table>
## Context manipulation (b/w-subject)

Two families (four kids each) with different family rules about presents

<table>
<thead>
<tr>
<th>Existential Context</th>
<th>Universal Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opening the presents is prohibited before the guests arrive.</td>
<td>Opening the presents is required before the guests arrive.</td>
</tr>
<tr>
<td><strong>Every</strong> → TRUE</td>
<td><strong>Every</strong> → FALSE</td>
</tr>
<tr>
<td><strong>No</strong> → FALSE</td>
<td><strong>No</strong> → TRUE</td>
</tr>
</tbody>
</table>
### Predictions

<table>
<thead>
<tr>
<th>Symmetric View</th>
<th>Asymmetric View</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every</td>
<td>Every</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

![Symmetry Diagram](image)
Procedure

- For each quantifier, 4 targets, 8 true controls, 8 false controls, (4 false targets)
- Experiment hosted on SoSci Survey GmbH
- 192 participants on Prolific.ac, 7 excluded for low accuracy (<75%) for controls

Data analysis

- Mixed effects ordinal logistic model fitted to the target conditions
  - **CONTEXT** (more true vs. more false; sum-coded)
  - **QUANTIFIER** (Every vs. No; treatment-coded)
  - **CONTEXT×QUANTIFIER**
  - Mixed effects: by-subject intercept, slope for CONTEXT, correlation
Results

- **CONTEXT**: $\chi^2(1) = 49$, $p < 0.001$
- **QUANTIFIER**: $\chi^2(1) = 93$, $p < 0.001$
- **CONTEXT × QUANTIFIER**: $\chi^2(1) = 11$, $p < 0.001$
Exp 1 summary

Asymmetry

- Main effect of QUANTIFIER: Every $>$ No
- CONTEXT×QUANTIFIER interaction: Larger effect of CONTEXT for Every

Non-maximality with No

- No is also affected by context manipulation, suggesting No can have non-maximal readings
Experiment 2: *Every* vs. *Not every*
Design

Just like Exp 1, except no was replaced by *not every*

- **Every**: "Every boy opened his presents."
- **Not every**: "Not every boy opened his presents."

**Pictures**
# Predictions

<table>
<thead>
<tr>
<th></th>
<th>Symmetric View</th>
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</tbody>
</table>

![Diagram showing symmetrical and asymmetrical views with different symbols and colors representing true, target, and false trials.](image)
Procedure

• For each quantifier, 8 targets, 8 true controls, 8 false controls
• Experiment hosted on SoSci Survey GmbH
• 192 participants on Prolific.ac, 10 excluded for low accuracy (<75%) for controls

Data analysis

• Mixed effects ordinal logistic model fitted to the target conditions
  ○ CONTEXT (more true vs. more false; sum-coded)
  ○ QUANTIFIER (Every vs. Not every; treatment-coded)
  ○ CONTEXT×QUANTIFIER
  ○ by-subject random intercept, slope for CONTEXT, and their correlation
Results

**Context**: $\chi^2(1) = 89$, $p < 0.001$

**Quantifier**: $\chi^2(1) = 0.02$, $p = 0.90$

**Context x Quantifier**: $\chi^2(1) = 2.1$, $p = 0.15$
Exp 2 Summary

Symmetry

- Non-maximal readings for both Every and Not every
- Context manipulation had similar effect size
Discussion
Symmetric view

- Experiment 1 (*Every vs. No*): Asymmetric; but non-maximal reading available for *No*
- Experiment 2 (*Every vs. Not every*): Symmetric

The symmetric view could explain these results with ancillary assumptions about prior bias

- *No* is strongly biased towards context where a plural definite in its scope is read homogeneously; Our context manipulation had a mild effect due to the prior bias
- *Every* and *Not every* are more neutral, therefore more prone to contextual manipulation

But a theory of why this so is yet to be worked out
Next step: Exactly 2

Non-monotonic quantifiers will allow us to test the effect of polarity on non-maximality using the same sentence

"Exactly two boys opened their presents."

```
<table>
<thead>
<tr>
<th>Non-maximality in Pos</th>
<th>Non-maximality in Neg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nathan</td>
<td>Leo</td>
</tr>
<tr>
<td>Gifts</td>
<td>Gifts</td>
</tr>
<tr>
<td>Gifts</td>
<td>Gifts</td>
</tr>
<tr>
<td>Gifts</td>
<td>Gifts</td>
</tr>
</tbody>
</table>
```
Asymmetric view

The asymmetric view has to explain:

1. Symmetry between **Every** and **Not every**
2. Effect of context manipulation for **No**

**Implicature theory** (Bar-Lev 2018, 2021)

- Plural definites is semantically existential, can be strengthened by Exh
- Strengthening with a subset of alternatives = non-maximality
- Exh is anti-licensed in negative contexts

⇒ **No** receive 'no > ∃' reading, no non-maximal reading possible
1. Non-maximality under Not every

Robust non-maximality for Not every

- 'Not every' is semantically negative, but has a robust indirect SI, which renders the scope of 'not every' non-monotonic overall
- Exh is anti-licensed in negative contexts but not in non-monotonic contexts

Next step: SI version of Exp 2

- "Every boy opened some of his presents."
- "Not every boy opened some of his presents."
2. Non-maximality via covers

- Bar-Lev 2021 proposes a second mechanism for non-maximal readings
  - \( \begin{aligned} \text{open} \rightarrow \lambda x. \lambda y. x \text{ in } C \text{ and } y \text{ opened } x \end{aligned} \)
  - Due to distributivity, this won't matter in positive sentences
  - In negative sentences, coarse covers will result in non-maximal readings

- The effect of context on No can be explained with the assumption that the universal context made the singleton cover (for each boy) salient

- Potential issues
  - No was judged somewhat true in the Existential condition too
  - If covers could be accommodated, it would break the symmetry for Exp 2
Conclusion

- Plural definites have non-maximal readings in both positive and negative sentences
- **No** less affected by context than **Every** or **Not every**

These observations pose issues for both Asymmetric and Symmetric theories of non-maximality
Thanks!!
Appendix: Binary judgments
Every  
No

TrialType
True
Target
False

Context  
Every  
No

Context