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Not all children find *no* subjects hard: A cross-linguistic investigation of children's negative indefinite production

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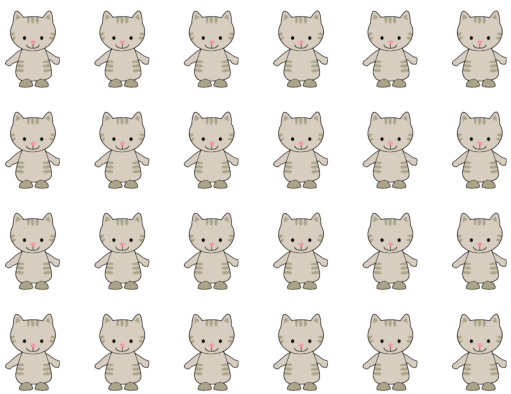
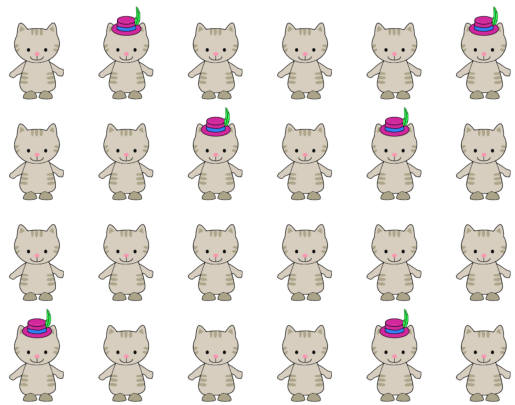
Bill, Yatsushiro, et al. (2019); Bill, Driemel et al. (2024)

Bill, Yatsushiro, et al. (2019)/Bill, Driemel, et al. (2024) conducted an experiment in which German-speaking adults[1] and children[2] described a series of pictures of cats wearing different amounts of hats:



"No cats have hats."



"Some cats have hats."

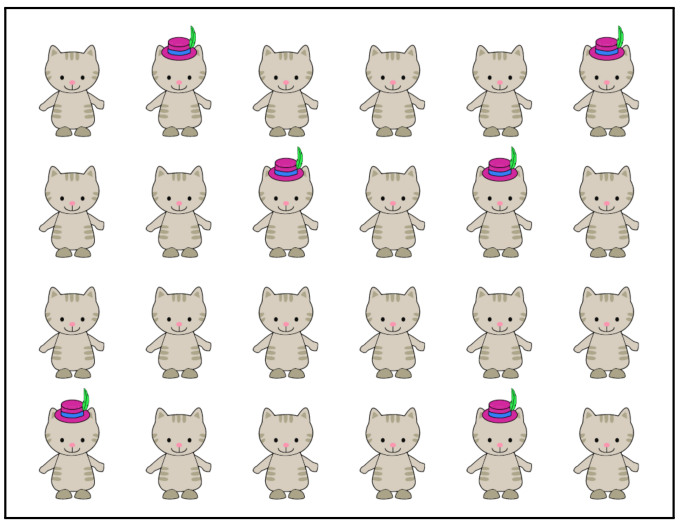
"All cats have hats."

[1] n = 15

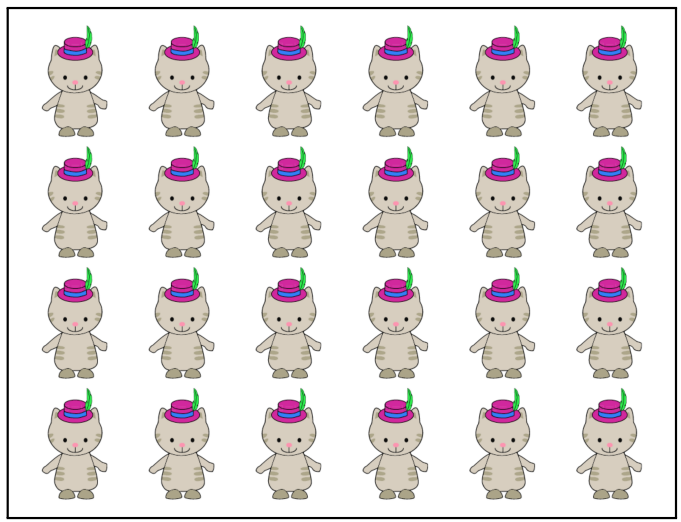
[2] n = 19, 3;1-6;2, M = 4;9

Bill et al. (2019, 2024)

Adults and children's production aligned for the SOME and ALL pictures: they produced sentences with the target determiner in the subject role.



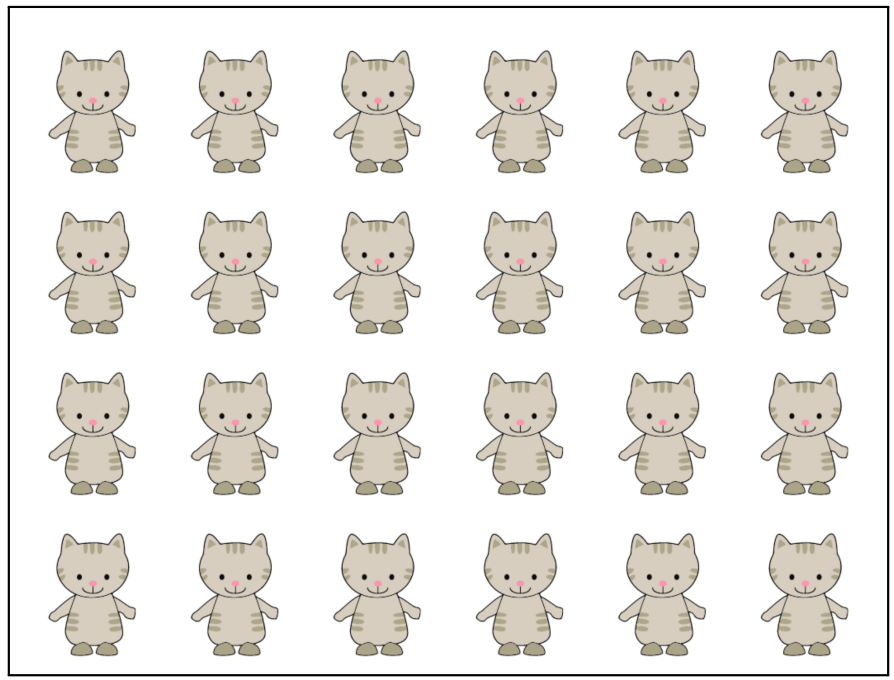
(1) Manche Katzen haben einen Hut.
Some cats have a hat
'Some cats have a hat.'



(2) Alle Katzen haben einen Hut.
All cats have a hat
'All cats have a hat.'

Bill et al. (2019, 2024)

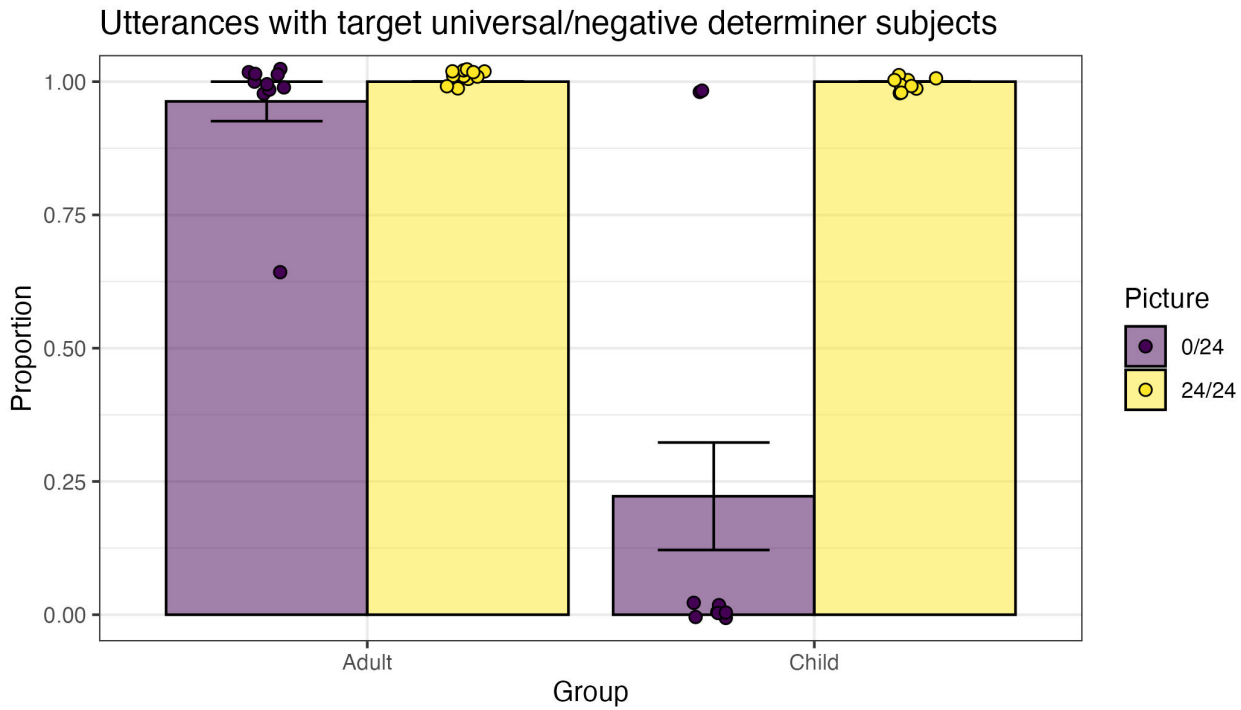
In contrast, for NONE pictures adults produced sentences with negative indefinite subjects, but children did not.



(3) Keine Katze hat einen Hut.
No cat has a hat
'No cat has a hat.'

Bill et al. (2019, 2024)

Children rather produced utterances with universal quantifier subjects and negative indefinite objects.

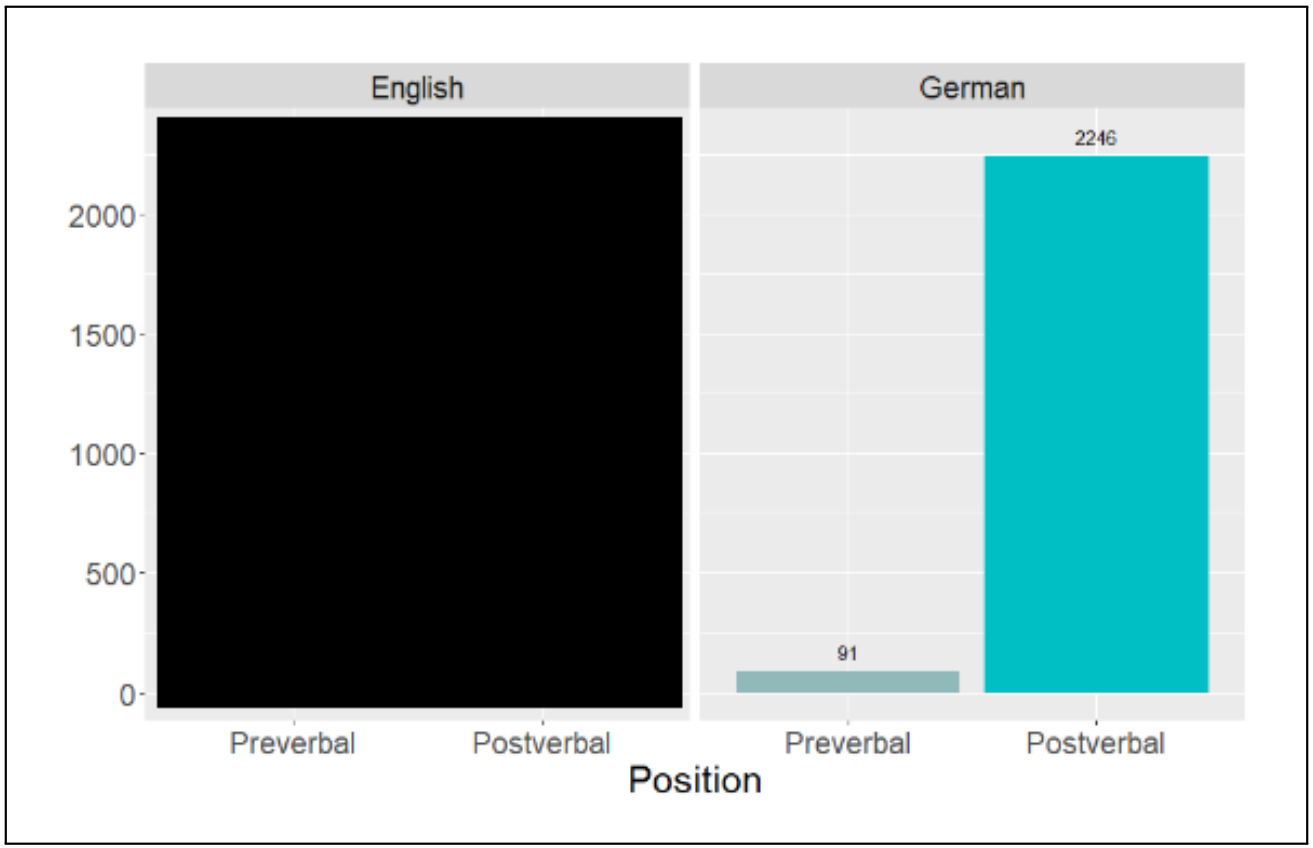


(4) Keine Katze hat einen Hut.
No cat has a hat
'No cat has a hat.'

(5) Alle Katzen haben keine Hüte.
All cats have no hats
'All cats have no hats.'

Hein et al. (2023): Converging corpus data

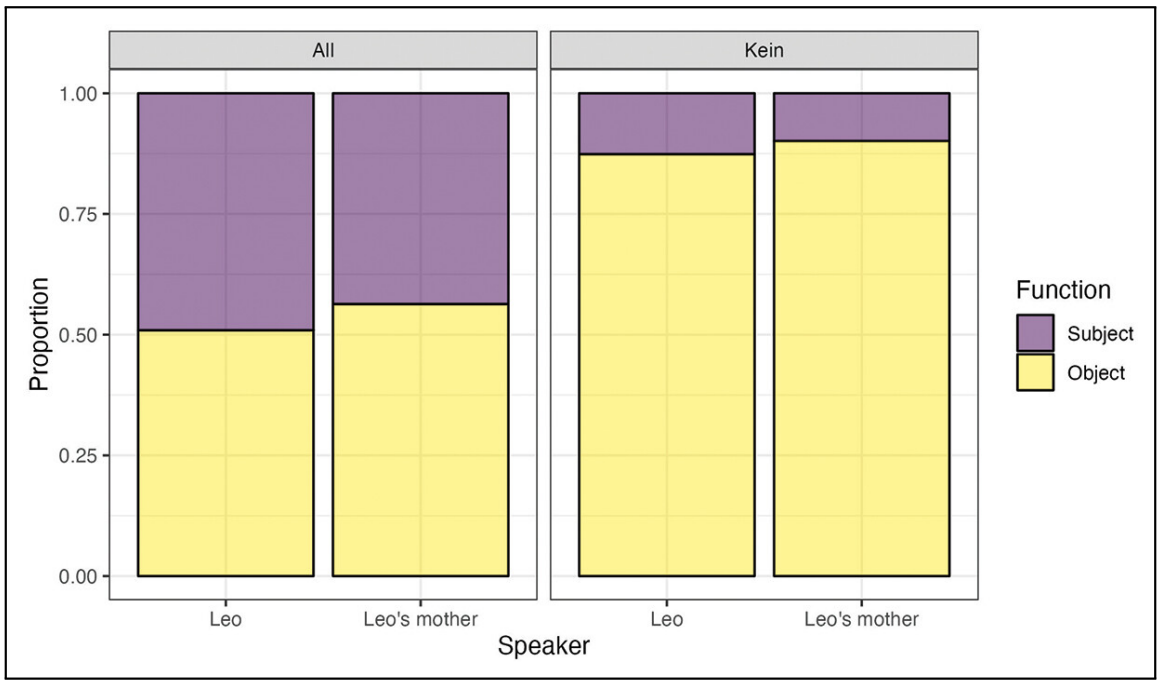
Converging data comes from a corpus study by Hein et al. (2023), which looked at the position of negative indefinites in German and English in a series of child-language (CHILDES) corpora.



While the contrast is clear, this search was looking at pre- vs. post-verbal, not subject vs. object.

Bill et al. (2024)

Bill et al. (2024) presents data from an independent corpus search showing that this asymmetry also holds when looking at subject versus object.



Bill et al. (2019, 2024)

Bill et al. (2019, 2024) account for this lack of subject indefinites in children's utterances by:

1. Adopting a decompositional analysis for negative indefinites (Penka and von Stechow 2001; Penka 2011, *pace* Zeijlstra 2011).

   (6) $[_{\text{TP}}\ \text{T}_{u\phi}\ [\ \text{NEG}\ [_{\text{vP}}\ \text{K-}\exists\ \text{Katze hat einen Hut}\ ]]]$

2. Assuming that children license subjects by moving them above negation to Spec,TP.

   (7) $[_{\text{TP}}\ [\text{K-}\exists\ \text{Katze}]_i\ \text{T}_{u\phi}\ [\ \text{NEG}\ [_{\text{vP}}\ \langle\text{K-}\exists\ \text{Katze}\rangle_i\ \text{hat einen Hut}\ ]]]$

3. Assuming that negative indefinite subjects need to be reconstructed under negation in order to be licensed.

4. Assuming that such reconstruction comes with a high processing cost (Anderson, 2004).

Children's behavior is then accounted for as being a function of their lower processing capabilities, relative to adults.

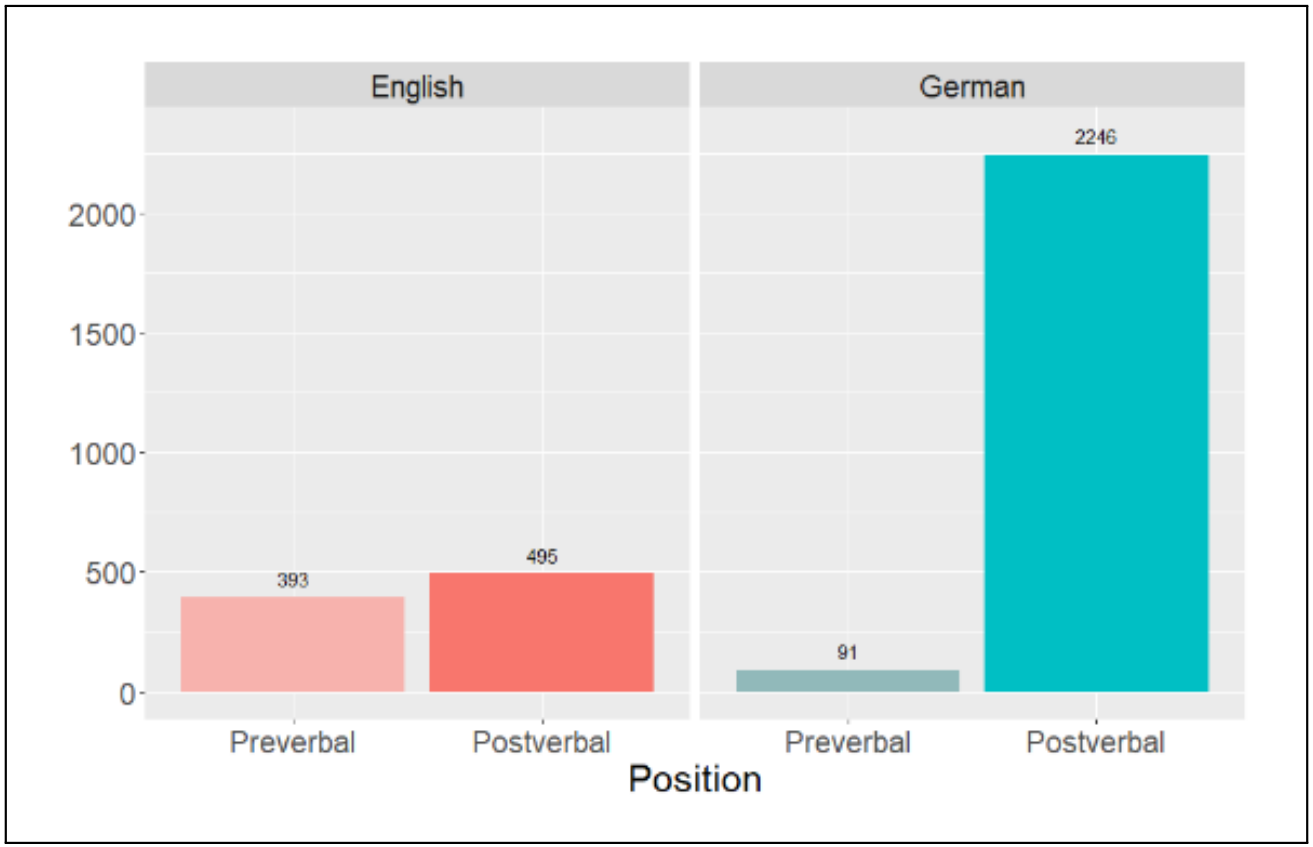
Bill et al. (2019, 2024)

Bill et al. (2019, 2024) predicts:

For any language where the subject is pronounced at a higher position than vP (i.e. NEG), children's production should display a similar lack of subject negative indefinites.

Hein et al. (2023): English data

We don't have a corresponding subject/object negative indefinite analysis for English, however, Hein et al. (2023) did compare pre- vs. post-verbal negative indefinites in English.



If the same correlation between pre-/post-verbal and subject/object can be assumed, then this data indicates that the contrast in German may not also be found in English.

Experiment

Our goal was to further test Bill et al. (2019, 2024)'s prediction by replicating their production experiment in two more languages: Italian and English.

Experiment

In both Italian and English, subjects move above the NEG operator at vP. This is not the case for objects.

(8) $[_{\text{TP}}$ [no-$\exists$ cat]$_i$ T$_{u\phi}$ [NEG $[_{\text{vP}}$ $\langle$no-$\exists$ cat$\rangle_i$ has a hat]]]

Therefore, Bill et al. (2019, 2024) predicts that **children should produce fewer negative indefinite subjects than adult speakers.**

Method

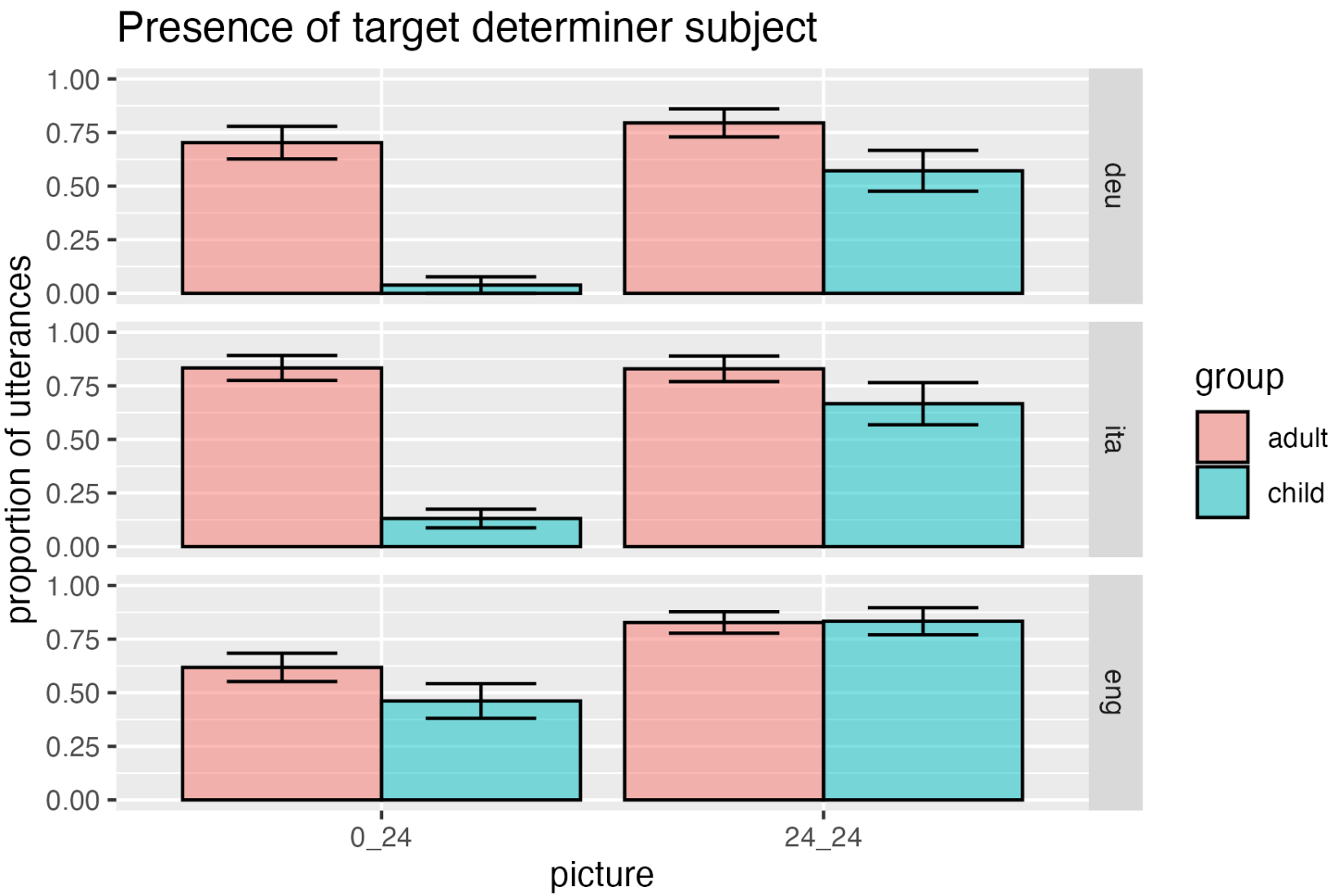
- **Paradigm**
  - Replication of Bill et al. (2019, 2024).
  - Participants played a game with a puppet, in which they needed to describe their picture to the puppet, without the use of numerals.
- **Languages:** Italian and English.[3]
- **Groups:**
  - ***Italian:*** 15 adults, 28 children (3;11-5;11, M = 4;12
  - ***English:*** 20 Adults, 14 children (4;04-5;11, M = 5;02)

[3]We also conducted the experiment in Russian and Ukrainian, however, the results from these languages ended up not being relevant for our research question, because the adult speakers did not produce any negative indefinites.

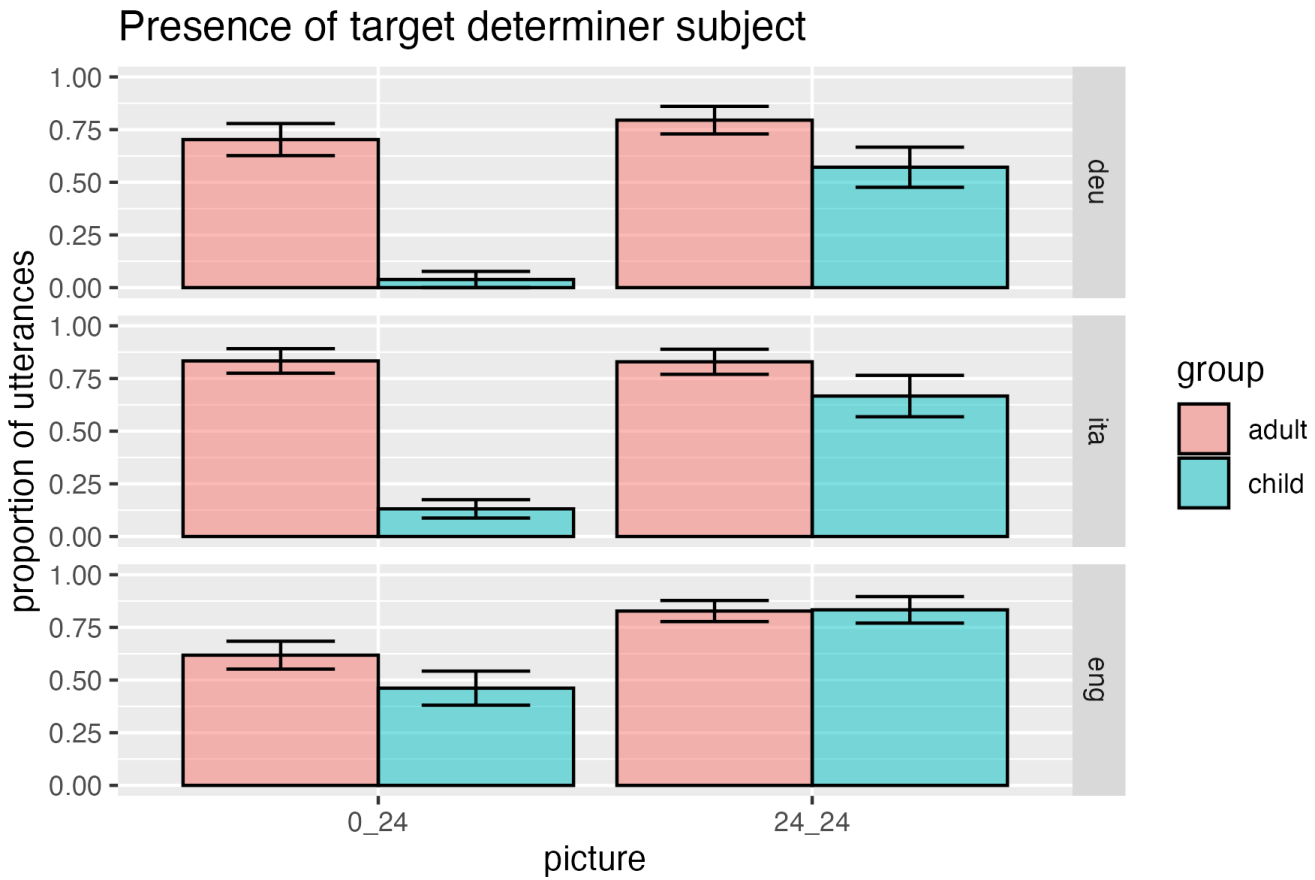
Method

The NONE and ALL pictures were presented 3 times each, while the other pictures were presented 2 times each, in a pseudo-randomized order.

Results


Presence of target determiner subject
proportion of utterances
1.00
0.75
0.50
0.25
0.00
deu
ita
eng
0_24
24_24
picture
group
adult
child

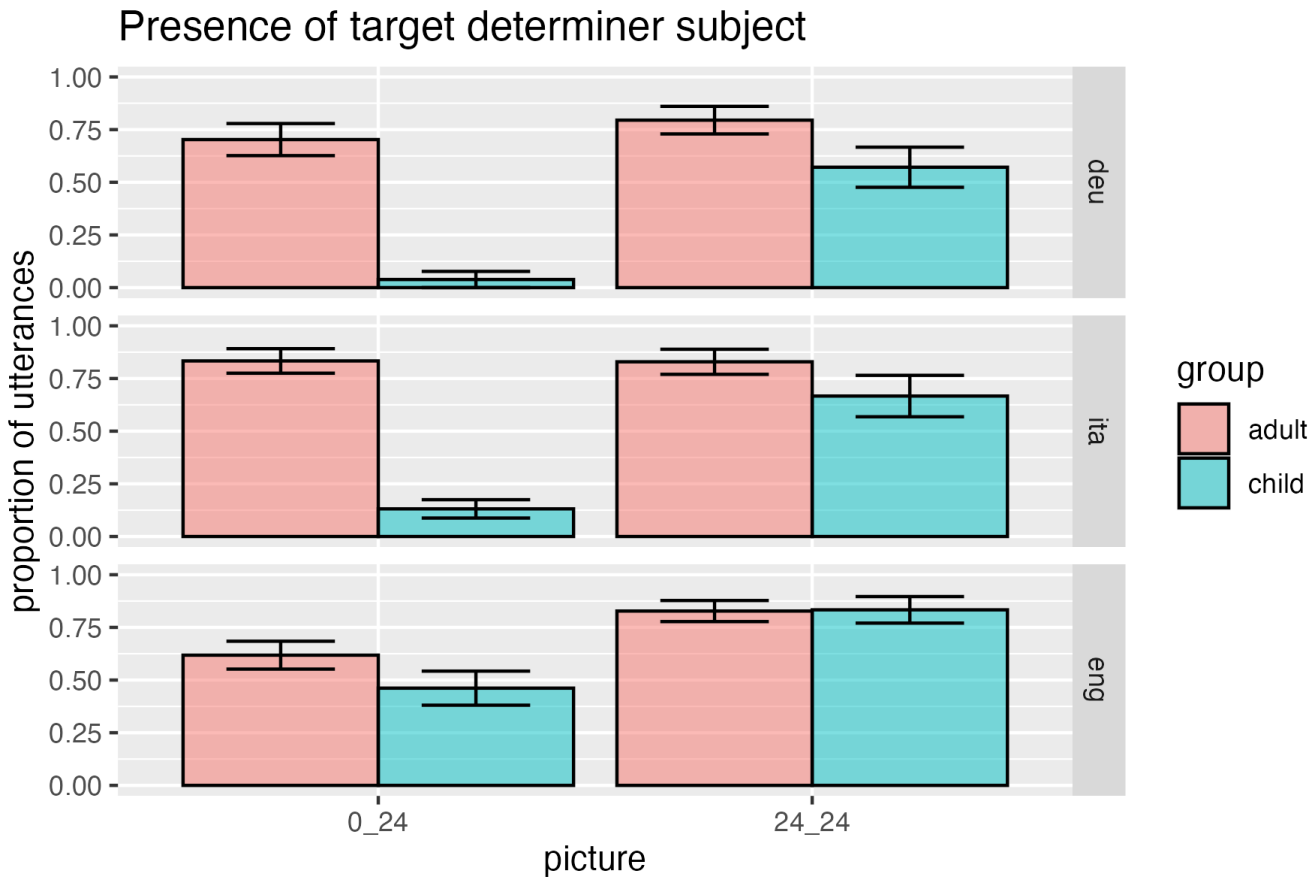
Results



German

- ***group*** $\chi(1) = 10.29$, $p < .01$
- ***picture*** $\chi(1) = 29.35$, $p < .001$
- ***group:picture*** $\chi(1) = 16.71$, $p < .001$

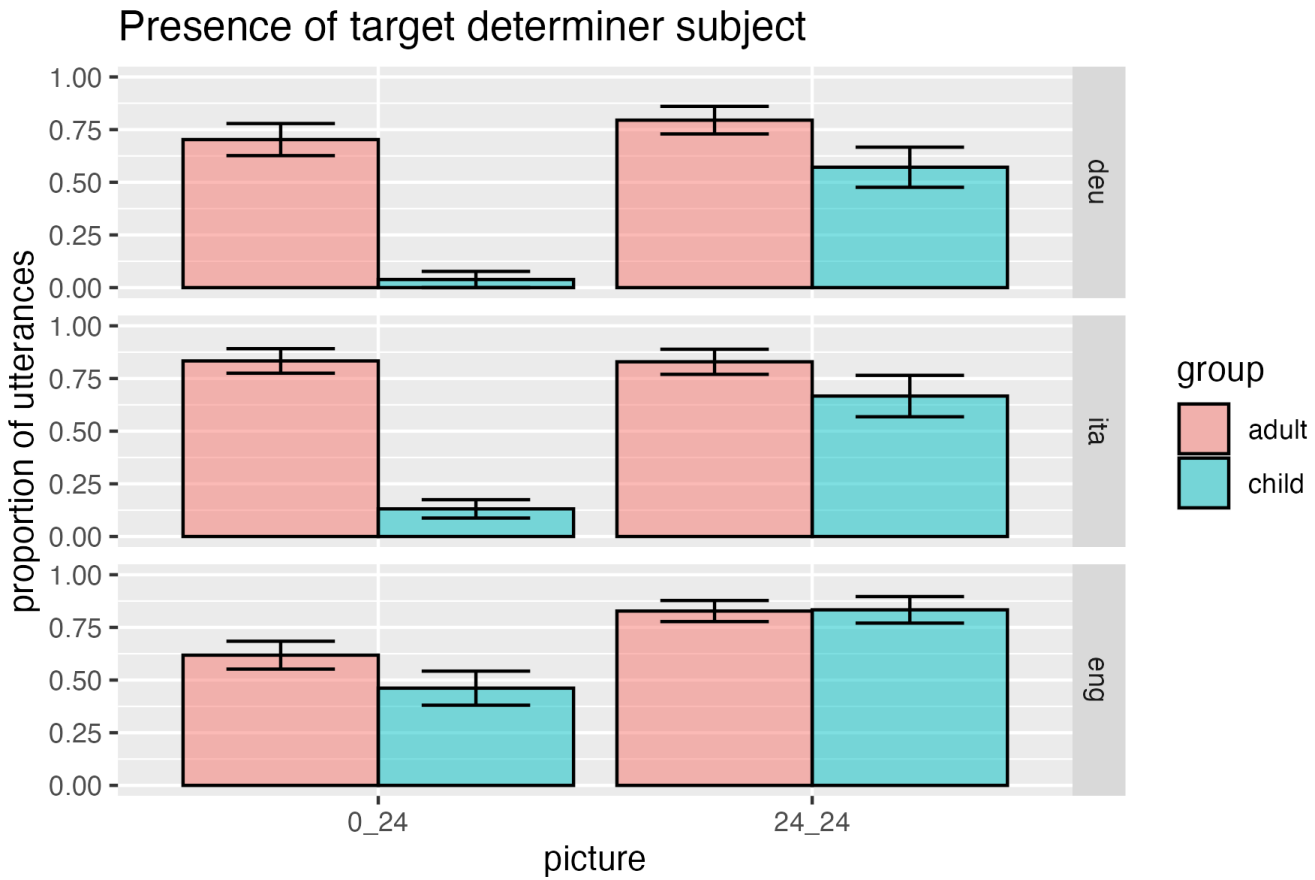
Results



Italian

- ***group*** $\chi(1) = 18.05$, $p < .01$
- ***picture*** $\chi(1) = 11.12$, $p < .001$
- ***group:picture*** $\chi(1) = 14.18$, $p < .001$

Results



English

- ***group*** $\chi(1) = 0.18$, p $= .673$
- ***picture*** $\chi(1) = 12.99$, p $< .001$
- ***group:picture*** $\chi(1) = 0.13$, p $= .723$

Results

- The results from Italian **support** Bill et al. (2019, 2024)'s prediction: Children produced fewer utterances with subject negative indefinites than adults.
- The results from English **challenge** Bill et al. (2019, 2024)'s prediction: Children produced the same proportion of utterances with subject negative indefinites as adults.
- The results from English align, however, with the corpus results from Hein et al. (2023).

Can Bill et al. (2019, 2024)'s analysis be saved?

Yes, if we take the results to indicate the distribution of the NEG operator not in the TP domain but in the CP domain.

New Analysis: German

- We retain both the decompositional analysis for negative indefinites across German/Italian/English and the assumption that NIs need to reconstruct for licensing.
- Recall that children acquiring German avoided producing (9a) and instead produced (9b). The syntax of (9a) is given in (10).

(9) a. Keine Katze hat einen Hut.
No cat has a hat
'No cat has a hat.'

b. Alle Katzen haben keinen Hut.
all cats have no hat
'All cats have no hat.'

- Observation: German is a V2 language (Thiersch, 1978; den Besten, 1983).
- Assumption: The silent NEG operator is visible to the V2-constraint.
- Consequence: The structure in (10) requires reconstruction. The V2 constraint blocks the non-reconstruction alternative (11).

(10) $[_{CP}$ [K-∃ Katze]$_i$ $[_C$ hat$_j$] $[_{TP}$ [NEG $[_{vP}$ ⟨K-∃ Katze⟩$_i$ ⟨hat⟩$_j$ einen Hut]]]]

✓ V2

(11) *$[_{CP}$ NEG [K-∃ Katze]$_i$ $[_C$ hat$_j$] $[_{TP}$ $[_{vP}$ ⟨K-∃ Katze⟩$_i$ ⟨hat⟩$_j$ einen Hut]]]

✗ V2

New Analysis: Italian

- Children acquiring Italian avoided producing (15a) and instead produced (15b).

(12) a. Nessun gatto ha il cappello.
No cat has the hat
'No cat has a hat.'

b. Tutti senza cappello.
All without hat
'All without hats.'

- Italian is not a V2 language. More than one constituent can precede the finite verb. Often they are either topics or foci.
- We adopt a split CP analysis for Italian (Rizzi, 1997):

(13) $[_{\text{ForceP}} \ldots [_{\text{TopP}} \ldots [_{\text{FocP}} \ldots [_{\text{TopP}} \ldots [_{\text{FinP}} \ldots]]]]]$

- In Italian, contrastively focused subjects seem to move to the left periphery (Rizzi, 1997; Belletti, 2004; Cardinaletti, 2018), ending up in preverbal position.

New Analysis: Italian

- In Italian, contrastively focused subjects seem to move to the left periphery (Rizzi, 1997; Belletti, 2004; Cardinaletti, 2018), ending up in preverbal position.

(14) A: Maria ha parlato al convegno.
Maria has spoken at-the conference
'Maria spoke at the conference.'

B: GIANNI, ha parlato, non Maria.
Gianni has spoken, not Maria
'Gianni spoke, not Maria.'

- Our experimental design created contexts for contrastively focused subjects, in the sense that the pictures could be described by *All/No/some cats have a hat.*

New Analysis: Italian

(15) a. Nessun gatto ha il cappello.
No cat has the hat
'No cat has a hat.'

b. Tutti senza cappello.
All without hat
'All without hats.'

- We assume that (15a) is produced by moving the negative subject into the preverbal focus position across the silent NEG operator.

(16) [ForceP … [FocP [ness-∃ gatto]$_i$ Foc [FinP [TP [NEG [vP ha ⟨ness-∃ gatto⟩$_i$ il capello]]]]]

✓ split CP

- In Italian, there is no independent evidence to assume that a high NEG operator is available and responsible for the licensing, e.g., via Foc$_{[+neg]}$.
- Therefore, as we claim for German, a subject negative indefinite would need to reconstruct in order to be licensed.

(17) * [ForceP … [FocP [ness-∃ gatto]$_i$ Foc$_{[+neg]}$ [FinP [TP [vP ha ⟨ness-∃ gatto⟩$_i$ il capello]]]

✗ split CP

New Analysis: English

- In English, however, there is independent evidence for the availability of high negation, i.e., negative inversion.

(18) Not a single paper did he finish on time.

- Haegeman (1995, 2000) takes the availability of negative inversion to indicate a high scope position for the NEG operator in English.

(19) ...[$_{\text{FocP}}$ [not a single paper]$_i$ [$_{\text{Foc}_{[+neg]}}$ did] [$_{\text{FinP}}$ [$_{\text{TP}}$ he ⟨not a single paper⟩$_i$ finish on time]]]]]

✓ split CP

- Given that the FocP can alternatively license negative phrases, we assume that English provides a high scope position for NEG, even if there is no visible inversion, as in our target sentences in English.

(20) [$_{\text{ForceP}}$ [$_{\text{FocP}}$ [no cat]$_i$ Foc$_{[+neg]}$ [$_{\text{FinP}}$ [$_{\text{TP}}$ ⟨no cat⟩$_i$ has a hat]]]

✓ split CP

- This structure does not involve reconstruction.

In sum

- Preverbal negative subjects in German and Italian obligatorily undergo costly reconstruction, which leads children to avoid this structure.
- No such problems occur in English, as it contains a slot above the subject that can (exclusively) be filled with a NEG operator.

Predictions of new analysis

- For a given language, subject negative indefinites are expected to be associated with a processing cost, unless reconstruction is not required. That is, unless:
  - The language has a high negation (e.g., English).
  - The subject is articulated below low negation (at vP) (e.g., Matengo[4]).

[4] See Bárány and van der Wal (2022).

Further implications

- Italian results are a challenge for analyses of NCIs as negative quantifiers (Haegeman and Zanuttini, 1991; Watanabe, 2004; Espinal et al., 2023).
- Our analysis of the results argues for a certain perspective on the syntactic reality of silent operators, or at least a silent negation operator.
  - $\Rightarrow$ We expect to find cross-linguistic variation when it comes to the distribution/availability of the NEG operator.
  - $\Rightarrow$ High NEG in English but not in Italian.

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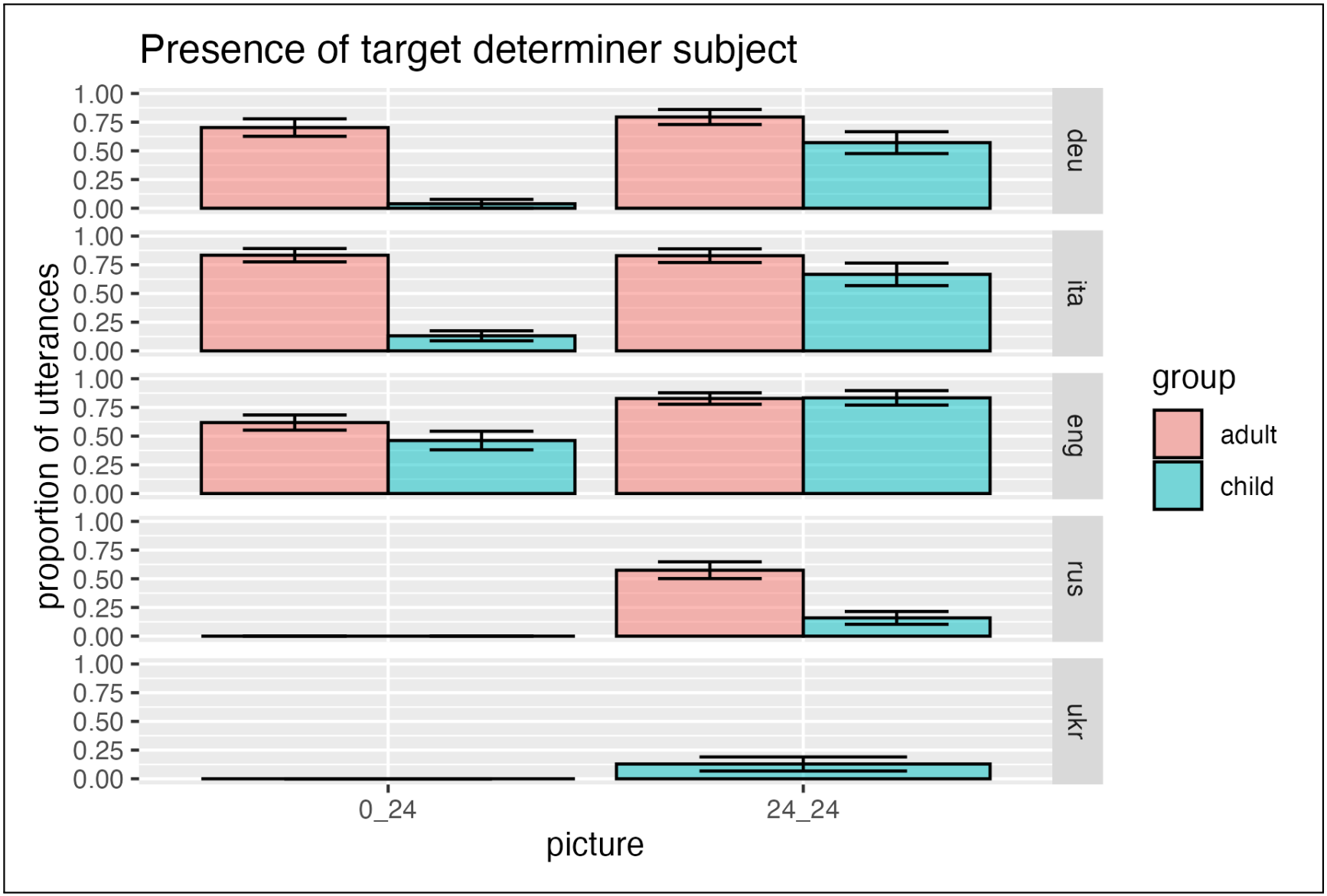
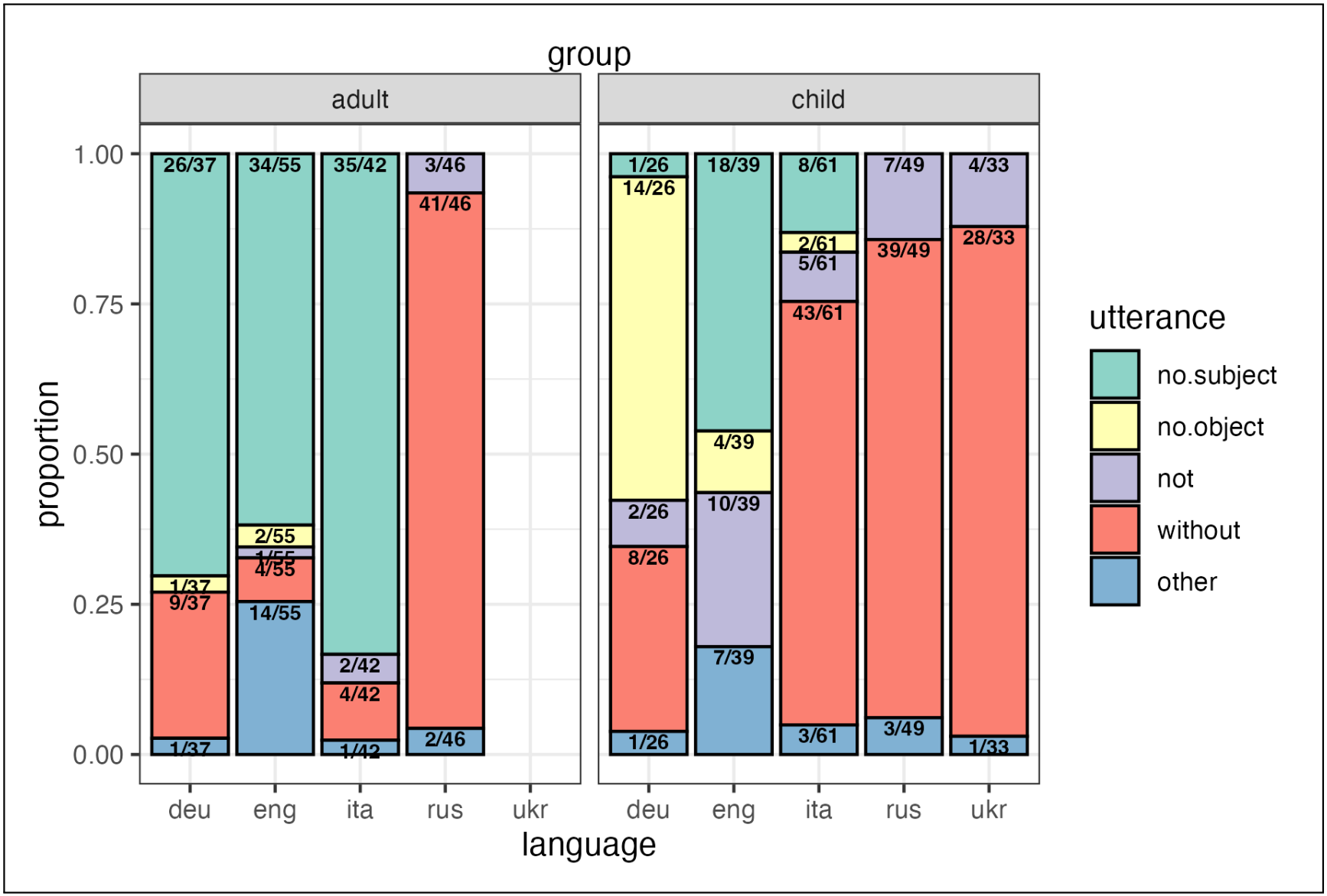
Russian and Ukrainian results



Ages of child groups

language	mean.age	min.age	max.age
deu	4;09	3;01	5;11
eng	5;02	4;04	5;11
ita	4;12	3;11	5;11
rus	4;10	3;07	5;10

Utterances for NONE pictures



German

Children

Object negative indefinite (14/26; 54%):

(21) Alle haben keine Hüte.
All have no hats
"All have no hats."

Prepositional negation (8/26; 31%):

(22) Alle Katzen ohne Hut.
All cats without hat
"All cats without hats."

Adults

Subject negative indefinite (26/37; 70%):

(23) Keine Katze trägt einen Hut.
No cat wear a hat
"No cat is wearing a hat."

Prepositional negation (9/37; 24%):

(24) Nur Katzen ohne Hut.
Only cats without hat
"Only cats without hats."

English

Children

Subject negative indefinite (18/39; 46%):

(25) None of them are wearing hats.

Sentential negation (10/39; 26%):

(26) All of them don't have hats.

Adults

Subject negative indefinite (34/55; 62%):

(27) None of the cats have hats.

Negative indefinite w/ unclear role (14/55; 25%):

(28) No hats.

Italian

Children

Prepositional negation (44/61; 72%):

(29) Tutti senza cappello.
All without hat
"All without hats."

Subject negative indefinite (8/61; 13%):

(30) Nessuno ha il cappello.
Noone have the hat
"Noone has a hat."

Adults

Subject negative indefinite (35/42; 83%):

(31) Nessun gatto ha il cappello.
No cat has the hat
"No cat has a hat."

Prepositional negation (4/42; 9.5%):

(32) Qua ci sono gatti solo senza
Here there are cats only without
cappello.
hat
"Here there are only cats without hats."

Russian

Children

Prepositional negation (39/49; 80%):

(33) Tol'ko kotiki bez šljapok.
Only cats without hats
"Only cats without hats."

Sentential negation (7/49; 14%):

(34) Tam net v
There be.NEG.PRS.3SG in
šljape kotjat.
hat.F.SG.PREP kitten.M.PL.GEN
"There are no kittens in a hat."

Adults

Prepositional negation (32/46; 70%):

(35) Vse kotiki bez šljap.
All cats without hats
"All the cats without hats."

Prepositional negation (7/46; 15%):

(36) Tol'ko koty bez šljapy
Only cats without hat
"Only cats without a hat."

Ukrainian

Children

Prepositional negation (17/33; 51%):

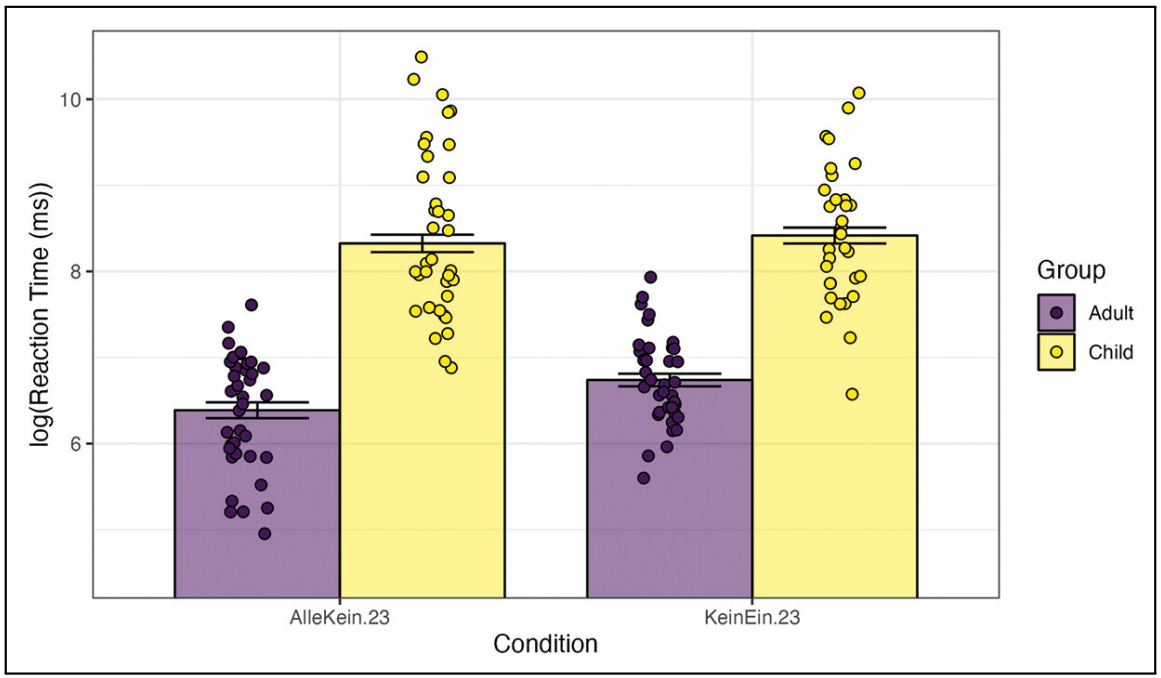
(37) Vse bez šljap.
All without hats
"All without hats."

Prepositional negation (5/33; 15%):

(38) Bez šljapok kotyky til ky
Without hats cats only
"Only cats without hats."

Bill et al. (2024)

Bill et al. (2024) found evidence of a processing cost, in terms of a response time delay, for German-speaking adults and children, when it came to interpreting utterances with subject negative indefinites, relative to those with object negative indefinites.



The expectation is that this reaction-time effect would not be found in languages like English, where the negative indefinite subject can alternatively be licensed by a high NEG operator.