On reconstruction in German ATB movement and the optimization of experimental designs

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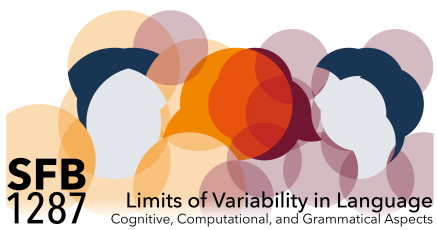

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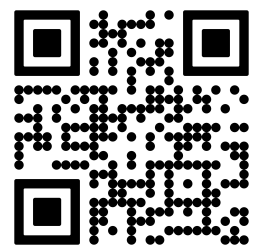

Outline

1 ATB movement and how it could be derived

2 Principle C reconstruction

3 Experiment, data and results

4 Closing thoughts

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ATB movement

- **A**cross-**T**he-**B**oard movement: one leftward extracted filler is shared among multiple gaps in a coordinate structure
- (sub-)extraction from all conjuncts 'across the board' (Coordinate Structure Constraint, Ross 1967)

(1) [Which book] did John buy ___ and Mary read ___?

- can be the result of $\bar{A}$-movement (relativization, topicalization, wh-movement), A-movement (raising) or head movement
- syntactically peculiar **1:many dependency** – standard movement does not allow argument sharing without further assumptions

Derivation of ATB movement

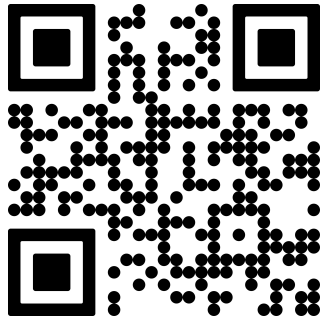
Symmetric approaches: extraction from all gap sites

- *why is only one filler pronounced?*

→ PF deletion (Wilder 1994; Biskup 2018)

→ fusion (Ross 1967; Williams 1978; Hein & Murphy 2020)

→ multidominance (Williams 1978; Citko 2005; Bachrach & Katzir 2009)



Asymmetric approaches: extraction from one of the gap sites

- *why are there multiple gaps?*

→ empty OP movement in non-initial conjuncts (Munn 1992, 1993; Franks 1993, 2005; Bošković & Franks 2000)

→ *pro* in non-initial conjuncts (Zhang 2010)

→ ellipsis in non-initial (Salzmann 2012) or initial conjunct (Ha 2008)

Sideward movement: successive movement from non-initial *through* initial conjunct (Nunes 2001; Hornstein & Nunes 2002)

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Binding Principle C

- regular expressions (*Poirot, Hanna, the gardener*) cannot be bound by pronouns, i.e. they cannot co-refer with pronouns that c-command them

An R-expression is free. Chomsky (1981, p. 188)

(2) a. *He$_i$ says that Poirot$_i$ is leaving.
b. *He$_i$ says [$_{CP}$ that Miss Marple thinks [$_{CP}$ that Jeeves claimed [$_{CP}$ that Poirot$_i$ is leaving]]]. Haegeman (1994, pp. 226–227)

- in an Ā-dependency, constituents need to obey Principle C in their base positions → final and intermediate landing sites do not matter (Nissenbaum 2000, p. 33; Sportiche 2017, p. 31)

(3) *[Which book about Hanna$_i$] did she$_i$ like <which book about Hanna$_i$>?

- (conflicting) study results suggest it is a violable constraint (Adger et al. 2017; Bruening & Al Khalaf 2019; Stockwell et al. 2021, 2022; Salzmann et al. 2022)

Using Principle C to diagnose movement

- Principle C violations can reveal the base position(s) of a constituent
  - → if an extracted R-expression cannot co-refer with a pronoun that linearly follows it, its structural base position must be c-commanded by the pronoun
- where is the filler of an ATB construction base generated?
  - → in all conjuncts (symmetric + ellipsis approaches)
  - → in the initial conjunct (asymmetric approaches)
  - → in the non-initial conjunct (sideward movement)
- Principle C seems to reconstruct asymmetrically to the first conjunct (Citko 2005; Salzmann 2012)

(4) a. *Which picture of John$_i$ did he$_i$ like and Mary dislike?
b. Which picture of John$_i$ did Mary like and he$_i$ dislike?

Citko (2005, p. 494)

→ *How robust is this observation within and across languages?*

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Experiment

Logic of the argument

- the ATB-dependency is embedded in a matrix clause containing an R-expression *(I asked* **Bill***...)*
- extracted filler contains an R-expression *(... which book by* **John***...)*
- gap is preceded by pronoun *(...* **he** *read ___ and Mary bought ___.)*
- all items come with a context preceding them
- 2x2 Latin Square, four conditions: filler is subject/object, pronoun precedes initial/non-initial gap

→ reconstruction of the filler to the gap preceded by the pronoun should yield a Principle C violation, i.e. disjoint reference

→ c-command relations are only reversed under reconstruction in object conditions

Experiment II

(5) Ich habe Marie$_i$ gefragt, [welche Geschichte über **Laura**$_j$]...
I have Marie asked which story about Laura

a. *object, initial*
sie$_{i/?j}$ ___ gehört und Michael ___ weitererzählt hat.
she heard and Michael passed.on has

b. *object, non-initial*
Michael ___ weitererzählt und **sie**$_{i/?j}$ ___ gehört hat.
Michael passed.on and she heard has

c. *subject, initial*
___ **sie**$_{i/?j}$ entzückt und ___ Michael überrascht hat.
her delighted and Michael surprised has

d. *subject, non-initial*
___ Michael überrascht und ___ **sie**$_{i/?j}$ entzückt hat.
Michael surprised and her delighted has.

Experiment III

Can the sentence be understood such that...

- Marie heard a story? — yes/no (matrix referent)
- Laura heard a story? — yes/no (embedded referent)

Salzmann et al. (2022)

- 300 German native speakers were tested, n = 277 after exclusions
- 12 experimental items in 4 conditions, 24 distractors
- questions presented in random order to avoid bias
- generalized linear mixed effects model using R
  - → fixed effects PHRASE, POSITION, PHRASE x POSITION
  - → random effects for PHRASE and POSITION for both participants and items

Predictions

Does the experiment measure what it should, i.e. c-command relations?

- significant effect of PHRASE (subject/object)

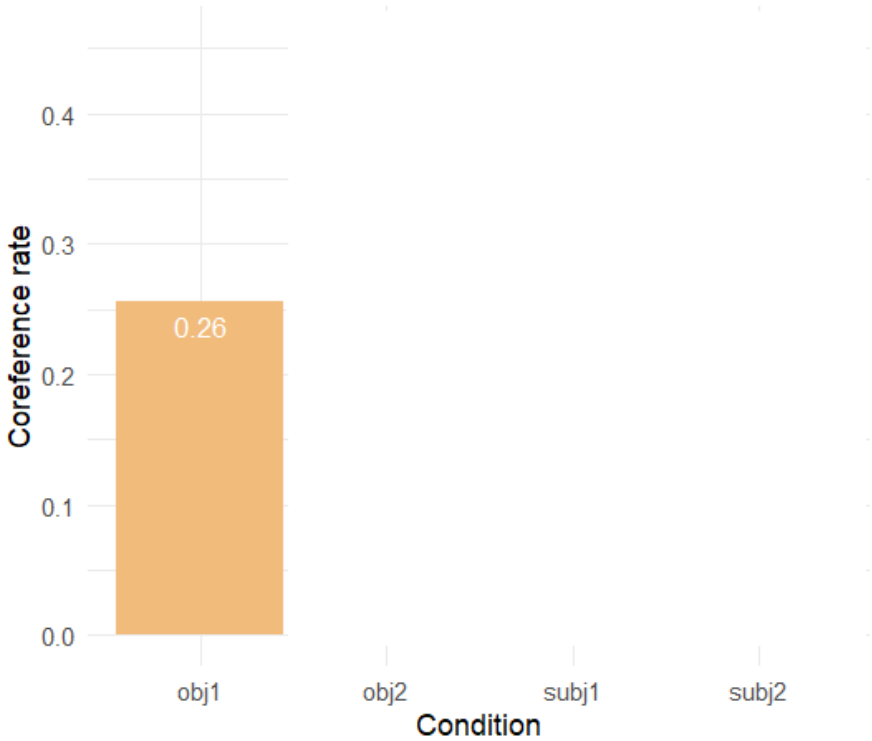
→ only object reconstruction should lead to a drop in co-reference rate (Principle C violation)

Does the filler reconstruct to either or both gaps?

- if reconstruction is asymmetric:
  - significant interaction between PHRASE and POSITION because the relationship between the co-reference rate respective to the position of the pronoun (initial/non-initial gap) should be different in object than in subject conditions
- if reconstruction is symmetric:
  - no significant effect of POSITION and no significant interaction between the two factors

Results

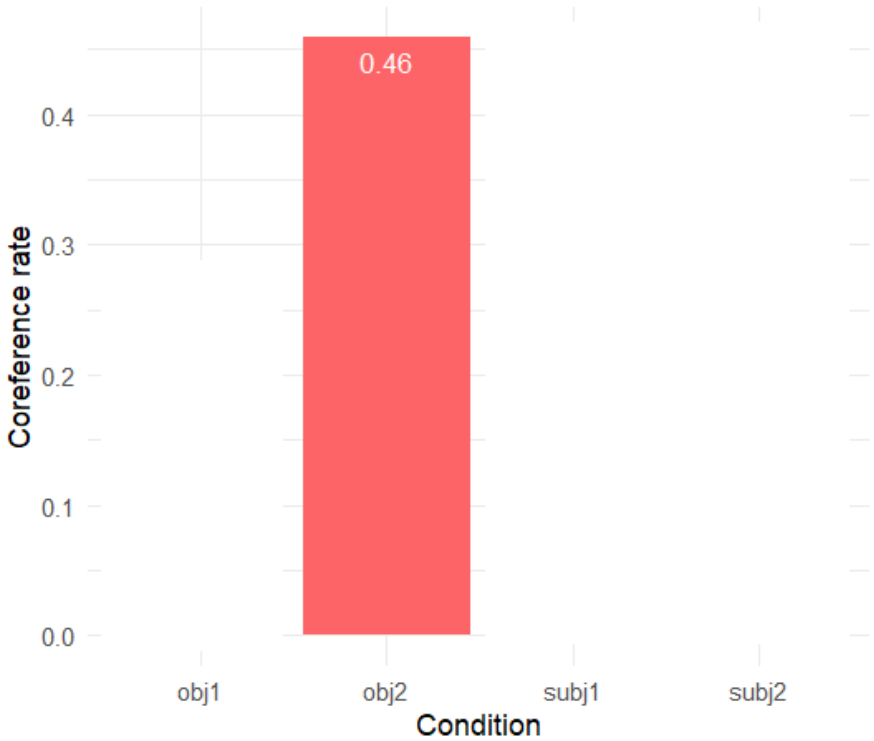
(6) Ich habe Marie$_i$ gefragt, [welche Geschichte über **Laura**$_j$] **sie**$_{i/?j}$ ___ gehört
I have Marie asked which story about Laura she heard
und Michael ___ weitererzählt hat.
and Michael passed.on has



- in 26% of the observations in the condition *object*, *initial*, the pronoun and the R-expression can co-refer

Results II

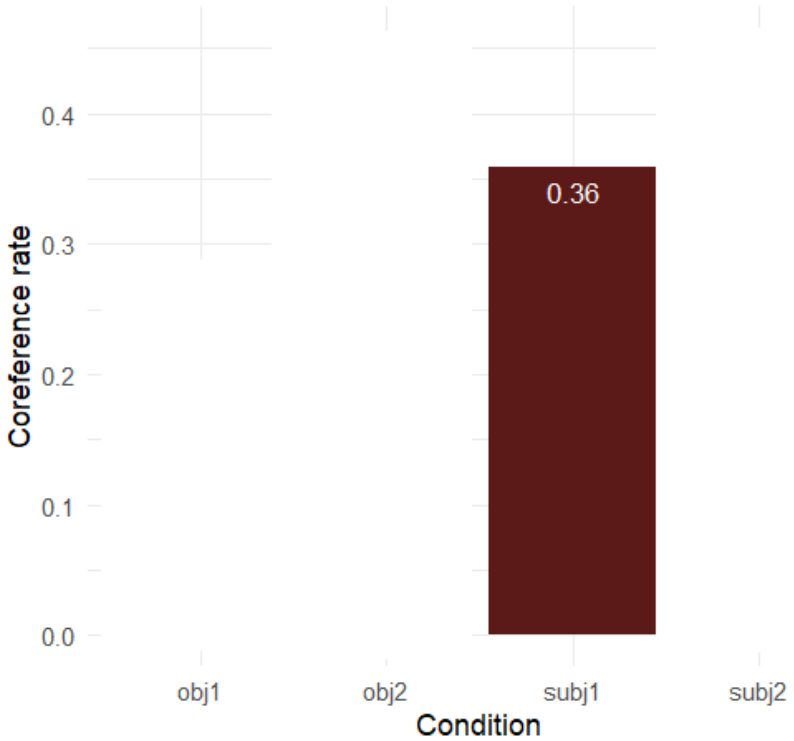
(7) Ich habe Marie$_i$ gefragt, [welche Geschichte über **Laura**$_j$] Michael ___
I have Marie asked which story about Laura Michael
weitererzählt und **sie**$_{i/?j}$ ___ gehört hat.
passed.on and she heard has



- in 46% of the observations in the condition *object*, *non-initial*, the pronoun and the R-expression can co-refer

Results III

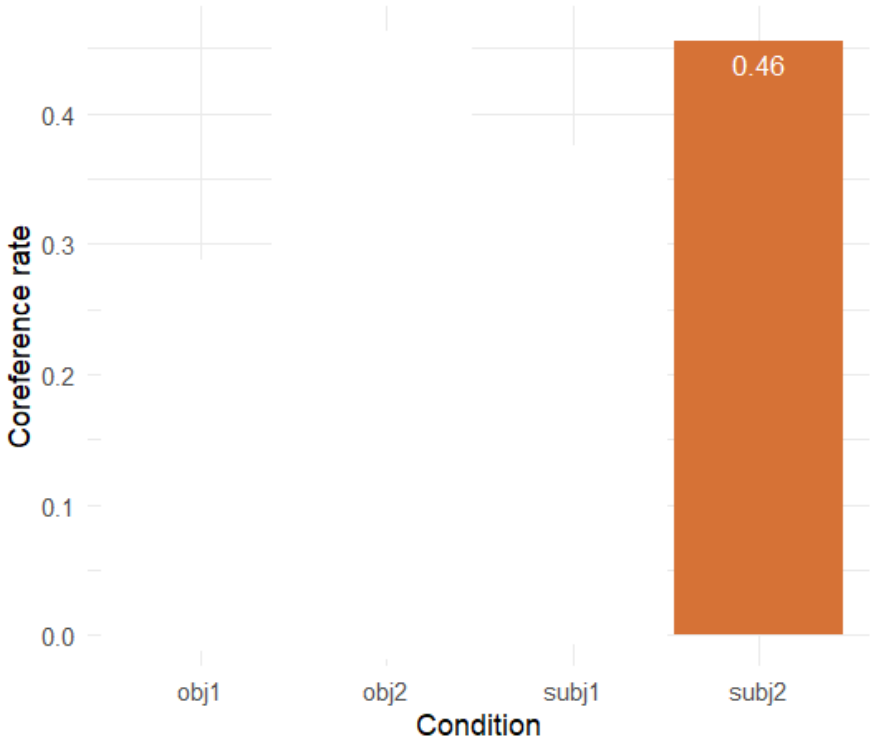
(8) Ich habe Marie$_i$ gefragt, [welche Geschichte über **Laura**$_j$] ___ **sie**$_{i/?j}$ entzückt
I have Marie asked which story about Laura her delighted
und ___ Michael überrascht hat.
and Michael surprised has



- in 36% of the observations in the condition *subject*, *initial*, the pronoun and the R-expression can co-refer

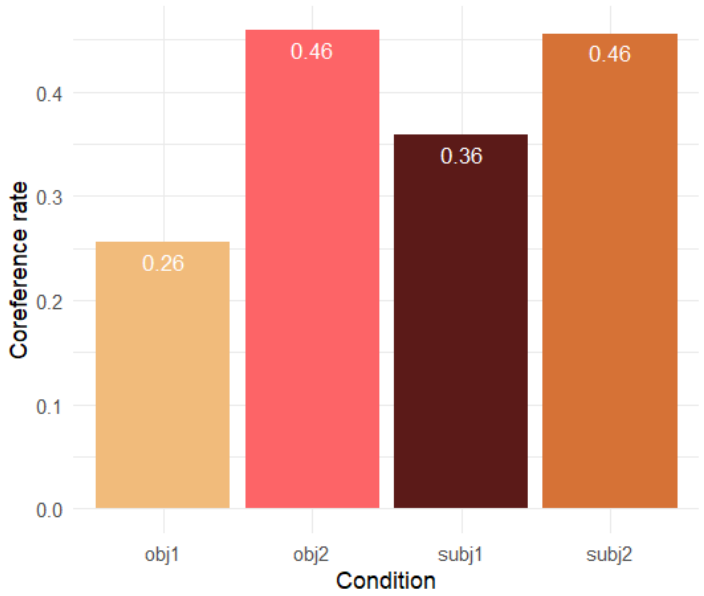
Results IV

(9) Ich habe Marie$_i$ gefragt, [welche Geschichte über **Laura**$_j$] ___ Michael überrascht und ___ **sie**$_{i/?j}$ entzückt hat.
I have Marie asked which story about Laura Michael surprised and her delighted has.



- in 46% of the observations in the condition *subject, non-initial*, the pronoun and the subject can co-refer

Results V



GLMM	
(Intercept)	0.94^{***} (0.15)
phrase	0.69^{***} (0.18)
position	-0.61^{***} (0.15)
phrase:position	-0.72^{***} (0.18)

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

- significant main effect of PHRASE

→ experiment is valid ✓

- significant interaction of PHRASE and POSITION

→ **support for asymmetric extraction from initial gap ✓**

- significant main effect of POSITION independent of PHRASE! ✗

→ unexpected under purely syntactic account

- contrast between subject vs. object conditions is present, but quite weak

Further ideas and possible improvements

How can the validity of the experiment be improved?

- matrix referent (or question about it) could be distracting
- complexity of task
- entirely different verbs in subject vs. object conditions

Solution: pilot studies addressing these methodological issues

- pilot 1: matrix referent is present, but not assessed for co-reference
- pilot 2: no matrix referent, no embedding, no context, forced choice between referent in filler or 'someone else' (similar to Stockwell et al. 2021, 2022)
- *X surprised Y* (subject) vs. *Y found X surprising* (object) (Salzmann et al. 2022)

There may be inter-individual variability

- some participants may show reconstruction effects more reliably than others
- maybe it is not the robustness of the effect overall, but a matter of different speaker profiles

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Closing thoughts

- experiment supports an **asymmetric extraction** approach
- syntax is seen as absolute – a c-command relation holds or not, a configuration either violates a principle or not

→ in reality, things are much more nuanced and subject to **non-syntactic influences** (Gordon & Hendrick 1998; Järvikivi et al. 2005; Cowles et al. 2007; Kaiser 2011; Cunnings et al. 2014, 2015; Kush et al. 2015)

- further topic: effect of POSITION due to proximity effect

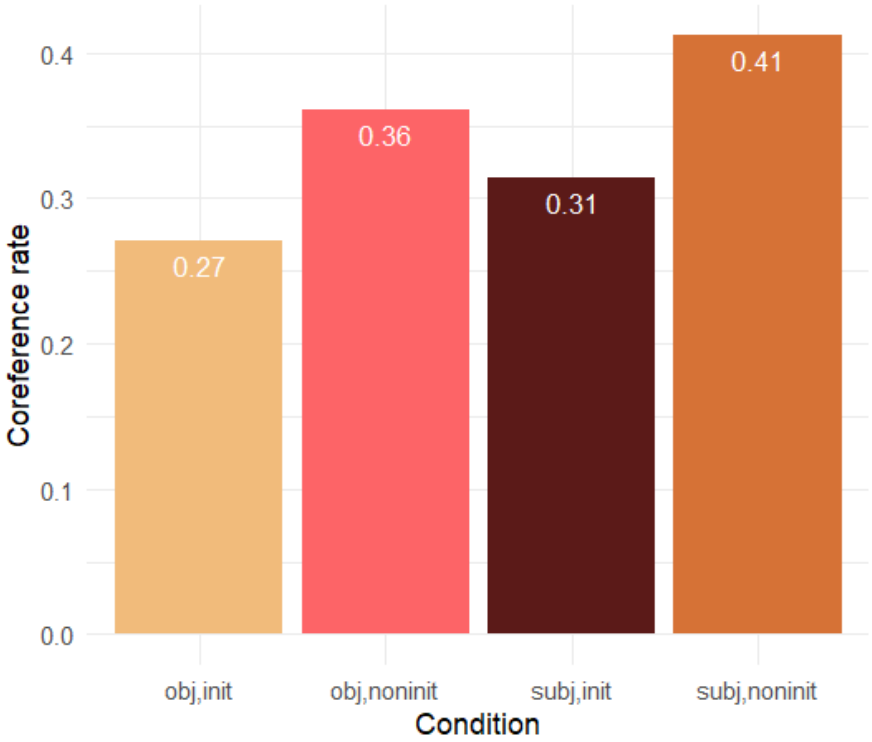
→ in ATB constructions, linear and structural distance overlap

→ distinguish linear vs. structural distance in parasitic gap constructions by manipulating position of the adjunct clause

(10) a. Which paper by John$_i$ did Mary file __ without showing him$_{?i}$ *pg*?
b. Which paper by John$_i$, without showing him$_{?i}$ *pg*, did Mary file __?

Appendix

Pilot 1: Principle C reconstruction in ATB

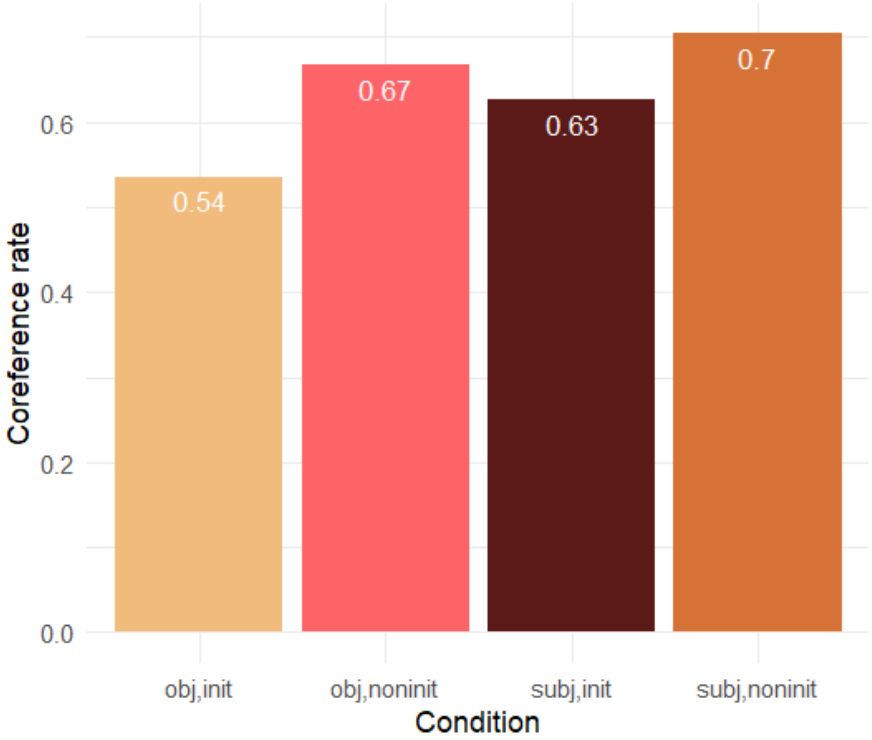


- n = 61, 12 original items + 12 more
- verbs adjusted to match across conditions
- one task per item: can the R-expression in the filler and the pronoun co-refer? yes/no
- significant effect of POSITION, no significant effect of PHRASE, no significant interaction

- original results: obj1 0.26, obj2 0.46, subj1 0.36, subj2 0.46

Appendix II

Pilot 2: Principle C reconstruction in ATB

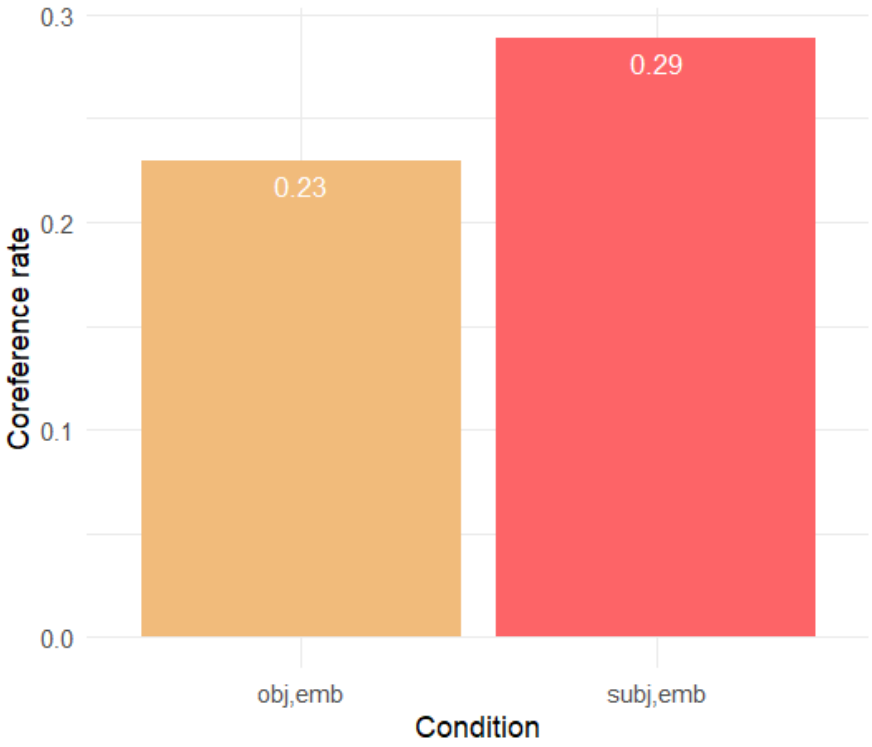


- n = 60, 12 original items + 12 more
- verbs adjusted to match across conditions
- one task per item: who does the pronoun refer to? R-expression in filler/someone else (no embedding, no context)
- significant effect of PHRASE and POSITION, no significant interaction

- original results: obj1 0.26, obj2 0.46, subj1 0.36, subj2 0.46

Appendix III

Replication of experiment 2 from Salzmann et al. (2022)

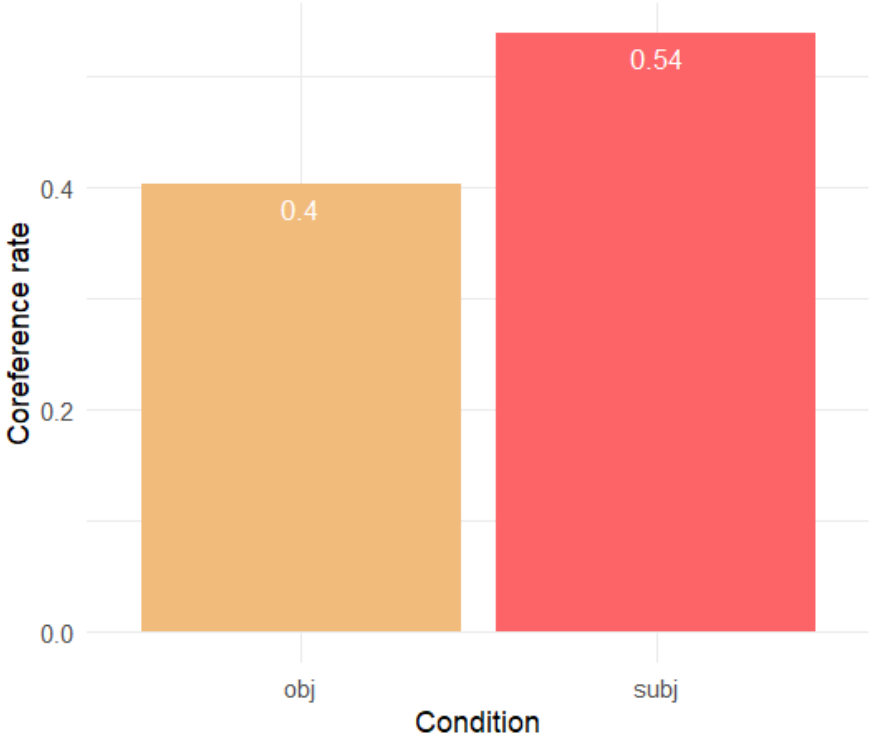


- original results: obj 0.36, subj 0.5

- n = 61, 32 items
- one task per item: can the R-expression in the filler and the pronoun co-refer? yes/no
- no significant effect of PHRASE

Appendix IV

Replication of experiment 2 from Salzmann et al. (2022)



- original results: obj 0.36, subj 0.5

- n = 60, 32 items
- one task per item: who does the pronoun refer to? R-expression in filler/someone else (no embedding, no context)
- significant effect of PHRASE

Appendix V

Is there Principle C reconstruction?

→ depends on the design of the study

- omission of matrix referent increases co-reference rate with embedded referent regardless of syntactic configuration

→ bias to resolve pronominal reference (Gordon & Hendrick 1998)

- forced choice tasks between two referents are bound to be inconclusive

→ they depict preferences, not possibilities (cf. Adger et al. 2017; Bruening & Al Khalaf 2019)

- difference between designs has greater impact in more complex structures, i.e. ATB movement

→ could it be that once the syntactic structure is (too) complex, pragmatic cues are weighted even higher? (weighted retrieval cues, for an overview see Yadav et al. 2022)

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