

Reconstruction in German A'-movement

An experimental investigation

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- major contributions
 - The first experimental investigation of reconstruction in German A'-movement
 - We propose an enhanced method to elicit coreference judgments
 - Reconstruction in German behaves differently from both English and what has been reported for German in the literature:
 - * Condition C reconstruction is more robust than reported in recent experimental work on English
 - * No evidence for an argument-/adjunct-asymmetry
 - * Anaphor binding in both final and intermediate landing sites is possible
 - * Logophoric anaphor binding may be (residually) possible after all

1 Background: Reconstruction in A'-movement

1.1 Theoretical aspects

- evidence for movement (movement vs. base-generation, cf., e.g., Aoun et al. 2001)
- Principle A: can be satisfied in different locations during the derivation:
 - evidence for intermediate movement steps: Barss (1986: 25), Fox (1999): SpecCP/SpecvP
 - (1) [Which pictures of himself_{i/j}] did John_i think __ Fred_j liked __.
 - binding in the final landing site:
 - (2) John_i wonders [which picture of himself_{i/j}] Bill_j likes __.
- Principle C: reconstruction to the lowest position obligatory
 - (3) *[Which picture of John_i] do you think he_i likes __.
- argument-/adjunct-asymmetries: only R-expressions inside arguments trigger Principle C effects, R-expressions inside adjuncts don't (merged late), cf. van Riemsdijk and Williams (1981: 201–204), Freidin (1986: 179), Lebeaux (1988, 1990, 1991), Fox (1999), Safir (1999):
 - (4) a. *[Which claim that Mary had offended John_i]₁ did he_i repeat __₁?
 - b. [Which claim that offended John_i]₁ did he_i repeat __₁
 - (5) a. *[Which pictures of John_i] did he_i destroy __?
 - b. [Which pictures near John_i] did he_i destroy __?
- predicate-/argument-asymmetries: predicates obligatorily reconstruct (contain trace of local subject/are non-referential), arguments do not (always), cf. Huang (1993), Heycock (1995)
 - asymmetry w.r.t. Principle A: no intermediate binding with predicates (vs. ex. (1)):
 - (6) ... but [listen to each other_{*i/j}], they_i say the kids_j won't __.
 - distance effect: Principle C effects decrease with increasing distance between R-expression and pronoun (Huang 1993: 110, or even vanish, cf. Heycock 1995: 548ff.) under embedding with arguments but not with predicates:
 - (7) a. ?*How many pictures of John_i does he_i think that I like __?
 - b. ?How many pictures of John_i do you think that he_i will like __?

1.2 Empirical aspects

1.2.1 English

- data almost exclusively based on introspection
- Principle C in English: contested facts
 - Presence of Condition C effects under A'-movement questioned quite generally, cf. Heycock (1995), Fox (1999), Fischer (2002, 2004), Henderson (2007); cf. Safir (1999: 609)
 - (8) a. [Whose criticism of Lee_i]₁ did he_i choose to ignore __₁?
 - b. [Which picture of John_i]₁ does he_i like best __₁?
 - c. [Most articles about Mary_i]₁ I am sure she_i hates __₁.
 - d. [That John_i had seen the movie]₁ he_i never admitted __₁.
 - argument-/adjunct-asymmetry
 - * What qualifies as an argument/adjunct? Noun-complement clauses may not be complements after all (Stowell 1981); the status of PP-modifiers is contested; the clearest contrasts seem to involve event nominals, cf. Safir (1999: 589, note 1)
 - * asymmetry has been generally called into question, cf. Fischer (2004: 161f.) for ex. showing reconstruction with adjuncts and non-reconstruction with arguments
- confounds:
 - logophoricity: once non-local binding (across intervening definite, quantificational subjects, sometimes without c-command) is possible, Principle A reconstruction with picture NPs ceases to be a diagnostic for movement/intermediate landing sites, cf. Polard and Sag (1992: 267, 278), Reinhart and Reuland (1993: 681–685):
 - (9) a. Bill_i remembered that the Times had printed a picture of himself_i in the Sunday edition.
 - b. The picture of himself_i in Newsweek dominated John_i's thoughts.
 - implicit PRO (Principle A/C): Normally, both pronouns and reflexives are possible inside picture NPs, cf. (10-a); in some semi-idiomatic expressions, however, only the reflexive is possible, (10-b); possible explanation: these NPs contain an implicit PRO that binds the reflexive, cf. (10-c) → binding can obtain in the absence of reconstruction:
 - (10) a. Lucie_i saw a picture of her_i/herself_i.
 - b. Lucie_i told a story about *her_i/herself_i.
 - c. Lucie_i told [PRO_i a story about *her_i/herself_i].

→ one should test nouns where a coreferential PRO is ruled out, either because the PRO would be disjoint, cf. (11), or because the noun is unaccusative and thus lacks an external argument (Bianchi 1999: 118–119, Cecchetto 2005: 16–18), cf. (12):

 - (11) Arbeitnehmer_i sollten Gerüchte über sich_i nicht einfach ignorieren
workers should.3PL rumors about self not simply ignore.INF
'Workers shouldn't simply ignore rumours about themselves.'
https://rp-online.de/leben/beruf/wie-man-auf-geruechte-richtig-reagiert_aid-22142659
 - (12) Il poeta describe il [riflesso di se stesso]_i [che Narciso_i vide __ nella fonte].
the poet describes the reflection of himself which Narcissus saw in.the fountain
'The poet describes the reflection of himself_i that Narcissus_i saw in the fountain.' *Italian*
- experimental work (Adger et al. 2017, Bruening and Al Khalaf to appear) provides evidence against Condition C reconstruction and argument-/adjunct- asymmetries, cf. appendix 3

1.2.2 German

• Principle A

– no logophoric binding, cf. Kiss (2001: 186):

- (13) a. *Gernot_i erinnerte sich daran, dass *die Zeit* ein Bild von Gernot remember.PST.3SG self there.on that the Z. a picture of sich_i veröffentlicht hatte. self publish.PTCP have.PST.3SG
'Gernot_i remembered that *the Zeit* published a picture of himself_i.'
- b. *Gernot_i dachte, dass niemand ein Bild von sich_i veröffentlichen Gernot think.PST.3SG that no.one a picture of self publish.INF wollte. want.PST.3SG
'Gernot_i thought that nobody would publish a picture of himself_i.'

- (14) a. *Das Foto von sich_i in *der Zeit* beherrschte Peters_i Gedanken. the picture of self in the Zeit dominate.PST.3SG Peter's thoughts
'The picture of himself_i in the *the Zeit* dominated Peter_i's thoughts.'
- b. *Ihr_i angenehmes Lächeln verleiht den meisten Fotos von sich_i einen her pleasant smile give.3SG the most pictures of self an Ausdruck von Zuversicht. air of confidence
'Her_i pleasant smile gives most pictures of herself_i an air of confidence.'

– No binding in final ((15)) and intermediate ((16)) A'-positions ((16-a) is from Kiss 2001: 186, cf. Frey 1993: 136 for a similar ex.; other ex. from Salzman 2017: 264f.; for Dutch, see van de Koot 2004: 187; for a case where intermediate binding is possible after all in German, cf. Frey 1993: 138):

- (15) a. Hans_i fragt sich, [CP [welches Foto von *sich_i/ihm_i]₁ ich am besten John ask.3SG self which picture of self/him I the best ___₁ mag]. like.1SG
'John_i wonders which picture of himself_i/him_i I like best.'
- b. Peter_i denkt, [CP [dieses Buch über *sich_i/ihn_i]₁ fände ich ___₁ Peter thinks this book about self/him find.SBJV.1SG I interessant]. interesting
'Peter_i thinks that this book about himself_i/him_i, I find interesting.'
- (16) a. [Das Buch über sich_{*i/j}]₁ glaubt der Urs_i mag der Ulrich_j ___₁. the book about self believe.3SG the Urs like.3SG the Ulrich
'This book about himself_i, Urs_i thinks that Ulrich likes.'
- b. *Sich_{i1} denkt Peter_i immer, dass du ___₁ magst. self think.3SG Peter always that you like.2SG
'Himself_i Peter_i always thinks that you like.'

→ difference between G./Engl. w.r.t. intermediate binding linked to logophoricity

- Principle C effects in *wh*-movement/topicalization: robust according to Salzman (2017)
- Experiment on binding in double objects: Featherston (2002): Dat binds Acc more readily than the other way around (falsifying the claims in the literature, cf. Grewendorf 1988)

2 Experiments: Reconstruction in German *wh*-movement

2.1 Method

- We did not directly ask for co-reference judgments as in Adger et al. (2017) as this may be unnatural for non-linguists and could lead subjects to engage in metalinguistic analysis
- We adapt the embedding method from Bruening and Al Khalaf (to appear):
 - indirect questions
 - Participants are presented with two potential antecedents for a pronoun: the R-expression inside the moved *wh*-phrase and an R-expression in the matrix clause
 - a question after the item then asks for the referent of the local subject
 - relatively natural task
- But we explicitly asked for each of the readings whether it is possible or not (two separate yes/no questions), as illustrated in the (translated) example below; cf. app. 1 for German ex.

Maria tells us how proud of Anna she is.		
<i>Can this sentence be interpreted such that...</i>		
<i>...Mary is proud?</i>	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<i>...Anna is proud?</i>	<input type="checkbox"/> Yes	<input type="checkbox"/> No

- explicit information about coreference possibilities
- optionality can be captured; especially relevant for Principle A: binding in the final landing site and in intermediate positions
- In the questions, we did not use pronouns in order to exclude potential Principle A or C effects there. For example, we avoided asking questions like “Is Mary proud of Mary?” (cf. Featherston 2002, who used sentences like “Martin saw Martin” to enforce the intended reading in their experiment on binding in double objects).
- the order of referents in the answers was randomized
- We used SoSci Survey (www.soscisurvey.de) to create online questionnaires.
- We ran four experiments (32/48/36/36 participants, respectively).
- We used a Latin Square Design, with a 1:1 proportion of items and fillers (for a description of the fillers, see the appendix 2).

2.2 Design

Factors

- Principle C vs. Principle A
- DPs (arguments) vs. APs (predicates)
- in situ vs. moved
- distance (short, coord, emb 1, emb 2)
- R-expression inside argument vs. R-expression inside adjunct (DP-arguments only)

→ For an example of a complete item set, see appendix 1.

2.2.1 Principle C – Conditions

- (17) Principle C: APs (predicates)
- a. **Mary** tells (us) that **she** is very proud of **Anna**. *in situ*
- b. **Mary** tells (us) [how proud of **Anna**] **she** is _____. *moved*
- Principle C predicts: co-reference between *she* and *Anna* impossible.
- (18) Principle C: DPs – R-exp. inside argument
- a. **Mary** tells (us) that **she** saw a statue of **Anna**. *in situ*
- b. **Mary** tells (us) [which statue of **Anna**] **she** saw _____. *moved*
- Principle C predicts: co-reference between *she* and *Anna* impossible
- (19) Principle C: DPs – R-exp. inside adjunct
- a. **Mary** tells (us) that **she** saw a statue on the desk of **Anna**. *in situ*
- b. **Mary** tells (us) [which statue on the desk of **Anna**] **she** saw _____. *moved*
- Late Merger predicts: co-reference between *she* and *Anna* is *possible*
- argument vs. adjunct: R-expression contained in PP argument or PP adjunct to N
 - PP-arguments mostly involved selected prepositions: *an* ‘at/to’, *über* ‘about’, *für* ‘for’ etc.
 - ~50% of the nouns were event nominals (*ung*-derivations), ~50% were underived (e.g. statue, portrait, rumor) or verb-related (anger, hate, attack) → the former are more likely to take proper arguments (*ung*-derivations vs. other nouns did not end up behaving differently in the experiments)
 - a coreferential implicit PRO was ruled out (either unacc. noun or disjoint agent, cf. rumor)
 - linear distance (local extraction): by means of NP-coordination, the linear distance between the R-expression and the pronoun in the *moved* condition was increased.
- (20) a. **Mary** tells (us) [which statue of **Anna**] **she** saw _____. *short*
- b. **Mary** tells (us) [which statue of **Anna** and the siblings] **she** saw _____. *coord*
- structural distance (another level of embedding):
 - ‘embedding 1’: R-expression and pronoun are not clausemates underlyingly.
 - ‘embedding 2’: R-expression and pronoun are clausemates underlyingly.
- (21) a. **Mary** tells (us) [which statue of **Anna**] **she** thinks that you saw _____. *emb 1*
- b. **Mary** tells (us) [which statue of **Anna**] you think that **she** saw _____. *emb 2*
- These conditions were adopted from Adger et al. (2017) and served to test the predictions of approaches in terms of Vehicle Change:
 - Ellipsis: R-expression in antecedent can correspond to pronoun in ellipsis site:

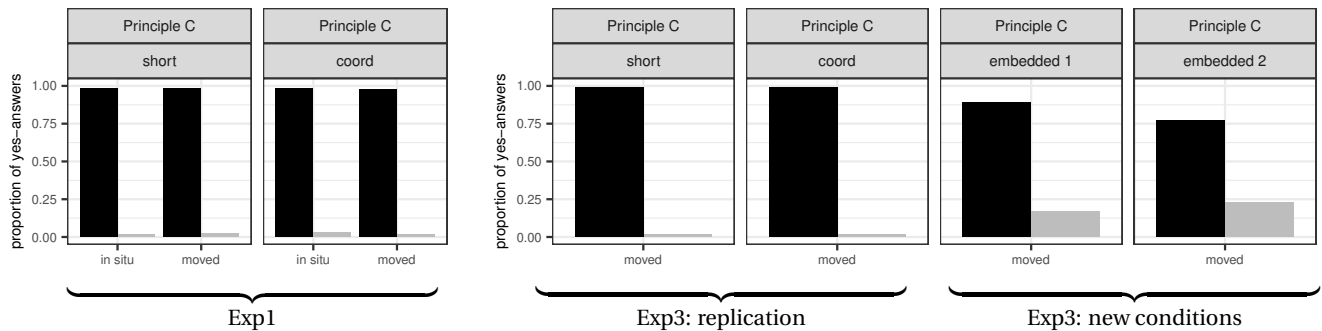
(22) John likes Mary and she thinks that I do, too < like **her** >.
 - Vehicle change extended to A'-movement chains (Safir 1999): R-expression in higher copy can correspond to pronoun in lower copy.
 - Under Vehicle Change, the Principle C effect should vanish with nouns and adjectives, but in the ‘embedding 2’ structure, a Principle B effect should arise with adjectives (not with nouns):

(23) a. How proud of Anna does she think that you are < how proud of her >. *emb 1*

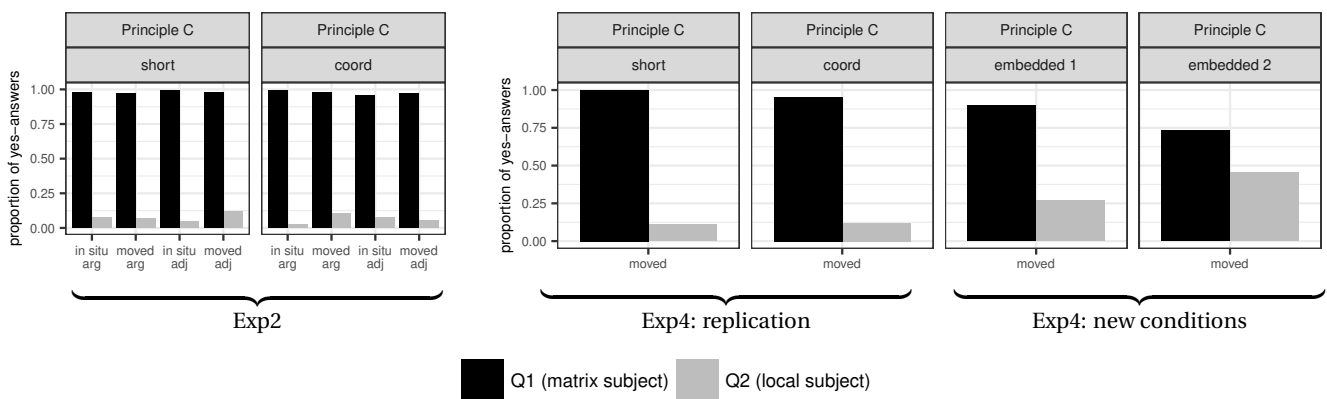
b. *How proud of Anna do you think that she is < how proud of her >. *emb 2*

2.2.2 Principle C – Results

PRINCIPLE C – APS



PRINCIPLE C – DPS



2.2.3 Principle C – Main findings¹

- Reconstruction is very robust across conditions, and with both arguments and predicates²
- No support for the predicted argument-/adjunct-asymmetry (argues against a late-merger approach)³
- Significant effect of embedding (but not of linear distance),⁴ but unlike in Adger et al. (2017), there remains a clear preference for non-coreference
- No evidence for vehicle change (reverse pattern: more acceptance of coreference with the lower R-expression for embedding 2 than embedding 1)

¹All statistical results reported in this section are based on univariate GLMMs with yes-answers to Q2 (main indicator of Principle A/C violations) as the dependent variable. They were fit following the recommendations for identifying parsimonious models by Bates, Kliegl, Vasishth and Baayen (2015) using the R packages lme4 and lmerTest (R Core Team 2016, Bates, Mächler, Bolker and Walker 2015, Kuznetsova et al. 2017).

²No significant effect of/interaction with movement in the Principle C conditions of exp 1 (linear distance: $z = 0.96$, $p = 0.33$; movement: $z = 0.52$, $p = 0.60$; dist:mov: $z = -1.04$, $p = 0.30$; all binary factors sum-coded). See next footnote for a qualification concerning exp 2.

³In exp 2, there is a numerically small but significant three-way interaction between distance, movement, and arg./adj. ($z = 2.83$, $p = 0.005$): there is less reconstruction with adjuncts in the short conditions; in the coord. conditions, the opposite holds. But it is not the case that there is generally less reconstruction with adjuncts.

⁴In comparison to the short, local baseline increasing linear distance via coordination does not make a significant difference in exps 3 + 4, but embedding does (exp3: coord: $z = -0.009$, $p = 0.99$; emb1: $z = 3.30$, $p < 0.001$; emb2: $z = 3.92$, $p < 0.001$; exp 4: coord: $z = 0.23$, $p = 0.81$; emb1: $z = 3.17$, $p = 0.002$; emb2: $z = 5.65$, $p < 0.001$).

2.2.4 Principle A – Conditions

(24) Principle A: APs (predicates)

- a. **Mary** tells (us) that **Anna** is very proud of herself. *in situ*
 b. **Mary** tells (us) [how proud of herself] **Anna** is _____. *moved*

Principle A predicts: co-reference between *herself* and *Anna* possible (obligatory if AP contains trace of subject).

(25) Principle A: DPs

- a. **Mary** tells (us) that **Anna** saw the statue of herself. *in situ*
 b. **Mary** tells (us) [which statue of herself] **Anna** saw _____. *moved*

Principle A predicts: co-reference between *herself* and *Anna* possible.

- linear distance between anaphor and R-expression: increased by means of NP-coordination

- (26) a. **Mary** tells (us) [which statue of herself] **Anna** saw _____. *short*
 b. **Mary** tells (us) [which statue of herself and the teams] **Anna** saw _____. *coord*

- structural distance: embedding

- ‘embedding 1’: R-expression and anaphor are not clausemates underlyingly.
- ‘embedding 2’: R-expression and anaphor are clausemates underlyingly.

- (27) a. **Mary** tells (us) [which statue of herself] **Anna** thinks that you saw _____. *emb 1*
 b. **Mary** tells (us) [which statue of herself] you think that **Anna** saw _____. *emb 2*

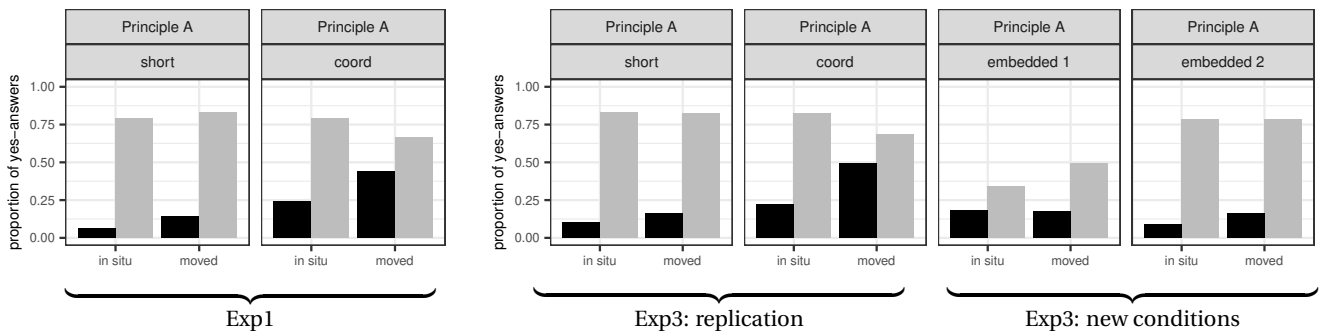
- if full reconstruction is obligatory, *Anna* and *herself* can be co-referential only in emb 2
- if binding in intermediate position is possible, *Anna* and *herself* can be co-referential in emb 1 as well (at least with DPs)
- if Vehicle Change is possible (*herself* → *her*), *Anna* can be antecedent for *herself* in emb 1 without binding in intermediate position

- Further predictions of Vehicle Change for Principle A

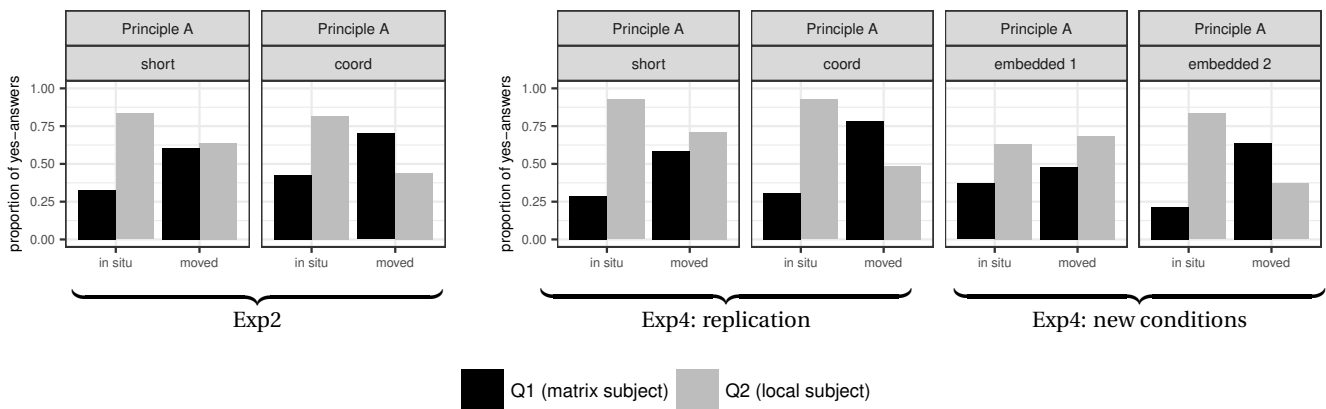
- binding by matrix subject *Mary* possible (even if interpretation in final landing site impossible)
- matrix binding should then only be possible in the moved condition but not in-situ (Vehicle Change only applies to movement chains)
- Vehicle Change should have the same effect with APs and DPs (w.r.t. matrix and intermediate binding)

2.2.5 Principle A – Results

PRINCIPLE A – APs



PRINCIPLE A – DPs



■ Q1 (matrix subject) ■ Q2 (local subject)

2.2.6 Principle A – Main findings

- Reconstruction for Principle A is less systematic than for Principle C⁵
- Reconstruction for Principle A is more likely with predicates than with arguments
- APs (predicates): reconstruction all the way down preferred, but
 - intermediate binding accepted by 50% (argues against obligatory trace of subject within AP)
 - matrix binding much less acceptable: less than 20% [except with coord] (argues against vehicle change)
- DPs:
 - Intermediate binding accepted by 70% (against claims in the literature); fillers testing intermediate binding also showed a high acceptance rate: 65–87%
 - Matrix binding accepted by 50–60% (against claims in the literature)
 - Both argue against the presence of a silent PRO within DP

⁵Significant interaction between movement and linear distance in exp 1 ($z = -2.44$, $p = 0.01$) and exp 2 ($z = -2.29$, $p = 0.02$).

3 Further issues

Methodological insights:

- The findings from experiments 1 + 2 were replicated in experiments 3 + 4, supporting the reliability of our method.
- The responses to the fillers were consistent and mostly in line with the expectations (see appendix), confirming that subjects understood the task as intended and were paying attention.
- In experiment 3 + 4, we additionally collected acceptability ratings for the sentences (on a 1–7 scale), because the acceptability of long-distance movement varies between speakers. The ratings will allow us to potentially exclude speakers that do not accept this kind of structure, and to explore correlations between acceptability and coreference judgments: → A first inspection suggests that the patterns are robust even for items that received a low acceptability rating

Open issues

- With nominal arguments (exps 2/4), there is a surprisingly high proportion of matrix binding (around 30%) even in the short in situ condition. Can this be considered evidence for logophoric anaphor binding in German?
- For Principle A, the presence of coordination has a strong effect on the availability of matrix binding with adjectival predicates⁶. This could mean that a larger linear distance between the anaphor and the potential local binder makes this binding relation less likely. But then, the same effect would be expected for the 'embedding 2' structure; there, a similar increase of matrix binding is observed only for nominals, but not for adjectives.
- To do: more detailed analysis of the availability of matrix binding and its relation to the availability of local binding (multivariate statistical analysis including both Q1 and Q2 as dependent variables).

4 Conclusion

- Principle C
 - reconstruction is very robust across conditions, with both nouns and adjectival predicates
 - no argument-/adjunct asymmetry (against Late-Merger)
 - small effect of embedding, but (unlike in experiments on English) there remains a strong preference for non-coreference
- Principle A
 - reconstruction is less systematic than for Principle C
 - reconstruction is more likely with adjectival predicates than with nouns
 - nouns: binding in final and intermediate landing sites accepted to a high degree (against claims in the literature)

⁶According to a univariate GLMM with yes-answers to Q1 as the dependent variable, there was a significant effect of linear distance in exp 1: $z = 3.25$, $p = 0.001$.

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5 Appendix 1: Items: original German version

Experiment 1: adjectival predicates (local movement)

- (28) Principle A
- a. **Maria** erzählt, dass **Anna** sehr stolz auf **sich** (und die Mannschaften) ist. *in situ*
- b. **Maria** erzählt, [wie stolz auf **sich** (und die Mannschaften)] **Anna** ___ ist. *moved*
- Q1: Kann man den Satz so verstehen, dass jmd stolz auf **Maria** (und die Mannsch.) ist?
- Q2: Kann man den Satz so verstehen, dass jmd stolz auf **Anna** (und die Mannsch.) ist?
- (29) Principle C
- a. **Maria** erzählt, dass **sie** sehr stolz auf **Anna** (und die Mannschaften) ist. *in situ*
- b. **Maria** erzählt, [wie stolz auf **Anna** (und die Mannschaften)] **sie** ___ ist. *moved*
- Q1: Kann man den Satz so verstehen, dass **Maria** stolz ist?
- Q2: Kann man den Satz so verstehen, dass **Anna** stolz ist?

Experiment 2: nominal arguments (local movement)

- (30) Principle A
- a. **Maria** erzählt, dass **Anna** die Statue von **sich** (und den Geschwistern) gesehen hat. *in situ*
- b. **Maria** erzählt, [welche Statue von **sich** (und den Geschw.)] **Anna** ___ gesehen hat. *moved*
- Q1: ...so verstehen, dass jmd eine Statue von **Maria** (und den Geschw.) gesehen hat?
- Q2: ...so verstehen, dass jmd eine Statue von **Anna** (und den Geschw.) gesehen hat?
- (31) Principle C (argument)
- a. **Maria** erzählt, dass **sie** die Statue von **Anna** (und den Geschwistern) gesehen hat. *in situ*
- b. **Maria** erzählt, [welche Statue von **Anna** (und den Geschw.)] **sie** ___ gesehen hat. *moved*
- Q1: Kann man den Satz so verstehen, dass **Maria** eine Statue gesehen hat?
- Q2: Kann man den Satz so verstehen, dass **Anna** eine Statue gesehen hat?
- (32) Principle C (adjunct)
- a. **Maria** erzählt, dass **sie** die Statue auf dem Tisch von **Anna** (und...) gesehen hat. *in situ*
- b. **Maria** erzählt, [welche Statue auf dem Tisch von **Anna** (und...)] **sie** ___ gesehen hat. *moved*
- Q1: Kann man den Satz so verstehen, dass **Maria** eine Statue gesehen hat?
- Q2: Kann man den Satz so verstehen, dass **Anna** eine Statue gesehen hat?

Experiment 3: adjectival predicates (local and long-distance movement)

- (33) Principle A (only additional conditions):
- a. **Maria** erzählt, dass **Anna** denkt, dass du sehr stolz auf sich bist. *in situ, emb 1*
 - b. **Maria** erzählt, [wie stolz auf sich] **Anna** denkt, dass du ___ bist. *moved, emb 1*
 → Q1: Kann man den Satz so verstehen, dass du stolz auf **Maria** bist?
 → Q2: Kann man den Satz so verstehen, dass du stolz auf **Anna** bist?
 - c. **Maria** erzählt, dass du denkst, dass **Anna** sehr stolz auf sich ist. *in situ, emb 2*
 - d. **Maria** erzählt, [wie stolz auf sich] du denkst, dass **Anna** ___ ist. *moved, emb 2*
 → Q1: Kann man den Satz so verstehen, dass du denkst, dass jemand stolz auf **Maria** ist?
 → Q2: Kann man den Satz so verstehen, dass du denkst, dass jemand stolz auf **Anna** ist?
- (34) Principle C (only additional conditions):
- a. **Maria** erzählt, [wie stolz auf **Anna**] sie denkt, dass du ___ bist. *moved, emb 1*
 → Q1: Kann man den Satz so verstehen, dass **Maria** denkt, dass du stolz bist?
 → Q2: Kann man den Satz so verstehen, dass **Anna** denkt, dass du stolz bist?
 - b. **Maria** erzählt, [wie stolz auf **Anna**] du denkst, dass sie ___ ist. *moved, emb 2*
 → Q1: Kann man den Satz so verstehen, dass du denkst, dass **Maria** stolz ist?
 → Q2: Kann man den Satz so verstehen, dass du denkst, dass **Anna** stolz ist?

Experiment 4: nominal arguments (local and long-distance movement)

- (35) Principle A (only additional conditions):
- a. **Maria** erzählt, dass **Anna** denkt, dass du die Statue von sich gesehen hast. *in situ, emb 1*
 - b. **Maria** erzählt, [welche Statue von sich] **Anna** denkt, dass du ___ gesehen hast. *mvd, emb 1*
 → Q1: Kann man den Satz so verstehen, dass du eine Statue von **Maria** gesehen hast?
 → Q2: Kann man den Satz so verstehen, dass du eine Statue von **Anna** gesehen hast?
 - c. **Maria** erzählt, dass du denkst, dass **Anna** eine Statue von sich gesehen hat. *in situ, emb 2*
 - d. **Maria** erzählt, [welche Statue von sich] du denkst, dass **Anna** ___ gesehen hat. *mvd, emb 2*
 → Q1: ...so verstehen, dass du denkst, dass jmd eine Statue von **Maria** gesehen hat?
 → Q2: ...so verstehen, dass du denkst, dass jmd eine Statue von **Anna** gesehen hat?
- (36) Principle C (only additional conditions):
- a. **Maria** erzählt, [welche Statue von **Anna**] sie denkt, dass du ___ gesehen hast. *mvd, emb 1*
 → Q1: Kann man den Satz so verstehen, dass **Maria** denkt, dass du eine Statue gesehen hast?
 → Q2: Kann man den Satz so verstehen, dass **Anna** denkt, dass du eine Statue gesehen hast?
 - b. **Maria** erzählt, [welche Statue von **Anna**] du denkst, dass sie ___ gesehen hat. *mvd, emb 2*
 → Q1: Kann man den Satz so verstehen, dass du denkst, dass **Maria** eine Statue gesehen hat?
 → Q2: Kann man den Satz so verstehen, dass du denkst, dass **Anna** eine Statue gesehen hat?

6 Appendix 2: Fillers

- (Almost) the same filler materials were included in all four experiments.
- They were all constructed in such a way that two yes/no questions could be asked about their interpretation, to keep the task constant.
- Description of the filler groups:
 1. Subject/object control

Anja hat Markus versprochen, in der WG die Möbel umzustellen.
 ‘Anja promised Markus to rearrange the furniture in the shared apartment.’
 → Will Anja/Markus rearrange the furniture?
 2. VP coordination (1/3: SVO, 2/4: OVS)

Die Chefin rief den Assistenten an und machte sich Notizen. SVO
 ‘The boss[NOM] called the assistant[ACC] and took some notes.’
 → Did the boss/assistant take notes?

Den Kollegen kritisierte die Ingenieurin und ging nach draußen. OVS
 ‘The colleague[ACC] criticized the engineer[NOM] and left.’
 → Did the colleague/engineer leave?
 3. Relative clauses (1/3: non-ambiguous, 2/4: ambiguous)

Peter hat erzählt, dass der Schüler, den er geärgert hat, eine Strafarbeit bekommen hat. *non-amb*
 ‘Peter told us that the student who he teased got a punishment.’
 → Did Peter/the student tease someone?

Leyla hat erzählt, dass die Verwandte, die sie besucht hat, in Budapest wohnt. *amb*
 ‘Leyla told us that the relative {who she visited | who visited her} lives in Budapest.’
 → Did Leyla/the relative visit someone?
 4. Case ambiguity

Die Königin hat die Herzogin eingeladen.
 ‘The queen[ACC/NOM] invited the duchess[ACC/NOM].’
 → Did the queen invite someone?
 5. PP attachment ambiguity

Linus hat erzählt, dass er den Nachbarn mit dem Teleskop beobachtet.
 ‘Linus told us that he observes the neighbor with a telescope.’
 → Does the neighbor/Linus have/use a telescope?
 6. Long movement

Welches Bild von sich denkt Paula, dass Isabell hochgeladen hat?
 ‘Which picture of herself does Paula think that Isabell uploaded?’
 → Is the sentence about a picture of Paula/Isabell?
 7. ECM

Gustav hat erzählt, dass Karl und Jonas ihn Bücher einscannen ließen.
 ‘Gustav told us that Karl and Jonas had him scan books.’
 → Did Karl/Jonas scan books?
 8. Coordinated dative

Gabriel hat Egon und Lars erzählt, dass er nach München ziehen will.
 ‘Gabriel told Egon and Lars that he wants to move to Munich.’
 → Did Egon/Lars move to Munich?

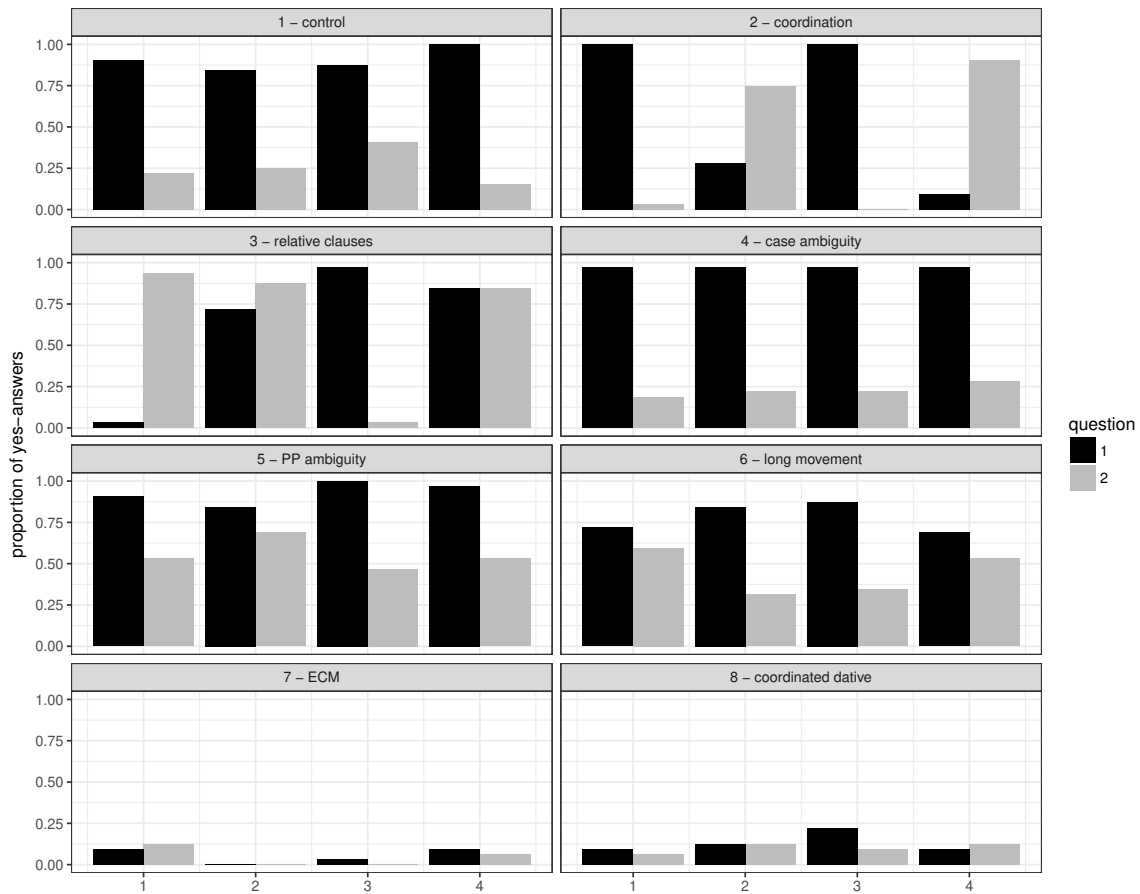


Figure 1: Results for the fillers (in experiment 1)

7 Appendix 3: Experimental work on Principle C in English

7.1 Adger et al. (2017)

7.1.1 Method

- Participants were explicitly asked for coreference judgments (forced-choice task):

“To assess the availability of coreference, participants were presented with a sentence containing a pronoun and proper name. The pronoun and proper name were then highlighted. Participants were asked whether they could use the sentence when the two highlighted expressions referred to the same individual. They were given the option of answering Yes or No.”

How proud of **Elizabeth** is **she**?

Could you use this sentence when the two highlighted expressions refer to the same individual?

Yes

No

7.1.2 Results

- predicates vs. arguments (R-expression inside PP-complements):
 - predicates: robust reconstruction; coreference becomes slightly more acceptable under increasing distance between R-expression and pronoun (*pace* Huang 1993, who only observes this effect for arguments), but non-coreference remains preferred
 - arguments: weak Principle C effect under local extraction; coreference becomes even preferred once a clause-boundary is crossed (unlike with predicates), disconfirming the claims in the literature
- argument-/adjunct-asymmetries (R-expression inside complement clause vs. relative clause):
 - DP-arguments: Coreference is preferred with both arguments and adjuncts (contrary to claims in the literature); weak Condition C effect with complement clauses (more non-coreference answers than with adjuncts)
 - predicates: coreference preferred with both arguments and adjuncts; weak Condition C effect with complement clauses (more non-coreference answers than with adjuncts)
- distance effect: Condition C effect is weakest when the coreferential pronoun is in the embedded clause; scale: local mvt > pronoun in matrix clause > pronoun in embedded clause (evidence for linear distance: adding material in local extraction between R-expression and pronoun leads to same results as (37-b)):

- (37)
- Which picture of John does **he** like?
 - Which picture of John does **he** think that Sue likes?
 - Which picture of John does Sue think that **he** likes?

7.2 Bruening and Al Khalaf (to appear)

7.2.1 Method

- Participants were not asked directly for coreference judgments but had to choose between two potential referents for a pronoun.

A female staffer told everyone which of the announcements that Hillary Clinton was running for president she had actually authorized.

Who authorized the announcement?

the staffer

Hillary Clinton

7.2.2 Results

- distance not investigated/not controlled for
- arguments vs. adjuncts (complement clauses/relative clauses to N): no significant contrast:
 - arguments: 42.7% accept coreference (only 57% Condition C)
 - adjuncts: 56% accept coreference (only 44% Condition C)
- arguments vs. adjuncts (PP-complements/PP-adjuncts to N): no significant contrast
 - arguments: 22% accept coreference (78% Condition C)
 - adjuncts: 30.7% accept coreference (69.3% Condition C)

7.3 Possible shortcomings of previous experiments

- Adger et al. (2017):
 - The task may be unnatural (for non-linguists) and may lead subjects to engage in metalinguistic analysis.
 - Remarkable differences between experiments that test for (non-)co-reference in local extraction: In Exp1, non-co-reference is clearly preferred, in Exp2, co-reference is preferred
- Bruening and Al Khalaf (to appear):
 - Since speakers can choose only one referent, coreference with the other referent cannot be ruled out with certainty; cannot diagnose optionality.
 - definiteness/prominence of R-expressions not controlled for: R-expression inside wh-phrase always definite, R-expression in matrix sometimes indefinite; R-expression inside wh-phrase often much more prominent than matrix R-expression (Hillary Clinton, Putin, president, Queen vs. reporter, secret service agent, literature professor, female aide)