

## Reconstruction in German *wh*-movement – an experimental investigation

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**1. Abstract.** We report on the first experimental investigation of Condition A and C reconstruction effects in German. The major contributions are the following: First, we propose an enhanced method to elicit coreference judgments. Second, we provide evidence that reconstruction in German behaves differently from both English and what has been reported for German in the literature. Third, we explore the theoretical implications of our findings: Among other things, they show that anaphor binding in derived and intermediate positions of *A'*-mvt is possible in German, that Condition C reconstruction is more robust than reported in recent experimental work, and that there are no argument-/adjunct asymmetries.

**2. Background.** Reconstruction effects in *A'*-movement have played a prominent role in linguistic theorizing concerning argument-adjunct asymmetries (Lebeaux 1991) and as a diagnostic for movement as well as for intermediate landing sites (Fox 1999). However, while part of the data, especially the robustness of Condition C effects, has been controversial for some time, reconstruction effects have been subjected to empirical scrutiny only very recently, and only in English, cf. Adger et al. (2017), Bruening and Al Khalaf (2017). Their results suggest a reassessment of our views on reconstruction because Condition C effects were found to be systematic only with predicates (cf. Heycock 1995), while partially absent with (nominal) arguments. Furthermore, the argument-/adjunct asymmetry was found to be rather weak.

**3. Previous research.** In Adger et al. (2017) subjects were explicitly asked whether a pronoun and a proper name could refer to the same individual (yes/no). In Bruening and Al Khalaf (2017), reconstruction was tested with embedded *wh*-questions. The matrix clause contained another R-expression as in (1):

(1) John told me which statue of Bill he likes.

Subjects were presented with a question asking for the referent of the subject pronoun (*Who likes the statue? John/Bill*). A low percentage of answers for the embedded R-expression was interpreted as a Condition C effect. Both methods have shortcomings in our view: The task in Adger et al.'s experiment may be unnatural and lead subjects to engage in metalinguistic analysis. Bruening and Al Khalaf's design is more natural, but since speakers can choose only one referent, coreference with the other referent cannot be ruled out with certainty.

**4. A new method.** We adopt Bruening and Al Khalaf's approach with embedded *wh*-questions so that there are two possible referents, but we explicitly test for both whether coreference is possible or not. In a sentence like (2), we would ask the questions in (3):

(2) Hans erzählt, welche Statue von Peter er mag. *'John tells (us) which statue of Peter he likes'*

(3) Kann man den Satz so verstehen, dass... *'Can this sentence be interpreted such that...'*

a. ...Hans eine Statue mag? *'John likes a statue?'* yes/no

b. ...Peter eine Statue mag? *'Peter likes a statue?'* yes/no

This method not only involves a rather natural task for subjects, it also ensures that one knows explicitly which referents are possible antecedents for the pronoun and which are not. It can also be extended to Principle A. In that case we also used embedded *wh*-questions and thus two possible antecedents:

(4) Maria erzählt, wie stolz auf sich Anna ist. *'Mary tells (us) how proud of herself Anna is.'*

To avoid repeating the reflexive in the answer, we formulated the questions slightly differently:

(5) Kann man den Satz so verstehen, dass... *'Can this sentence be interpreted such that...'*

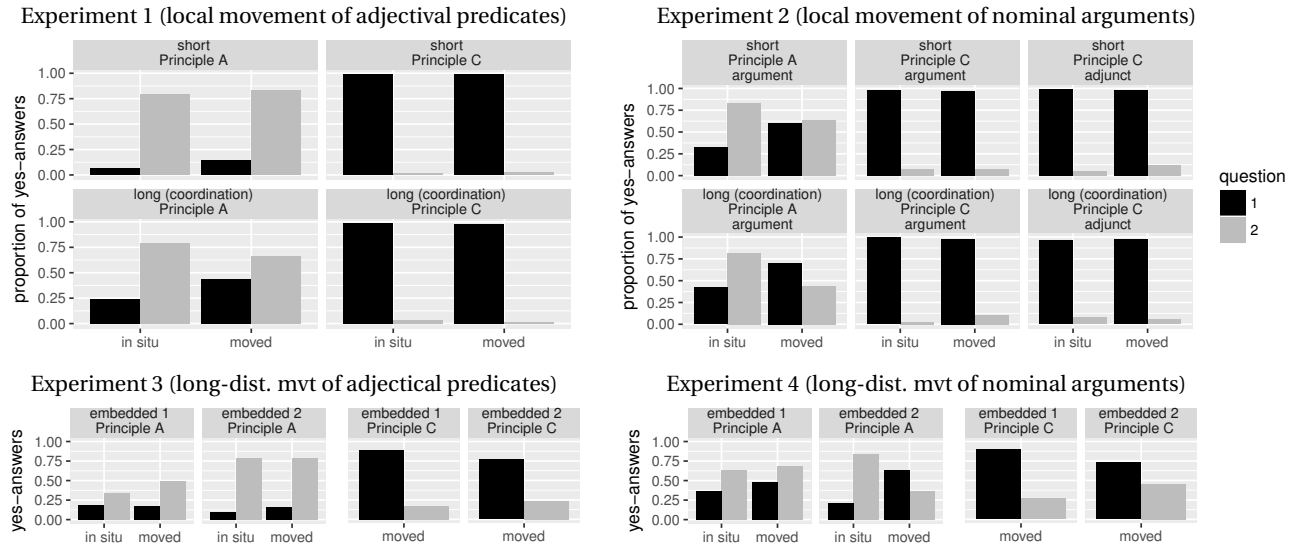
a. ...jemand stolz auf Maria ist? *'...someone is proud of Mary?'* yes/no

b. ...jemand stolz auf Anna ist? *'...someone is proud of Anna?'* yes/no

Checking the interpretive options for both referents is crucial in the case of Principle A to investigate the possibility of binding in derived and intermediate positions.

**5. Experiments.** We have investigated reconstruction for Principle A and C in four experiments. In experiment 1, we tested adjectival predicates as in (4), in experiment 2 nominal arguments as in (2) (where the R-expression was contained in either a PP argument or PP adjunct to the noun: *story about John/story in the book about John*). In both experiment 1 and 2, we systematically manipulated the factors BINDING PRINCIPLE (A vs. C), WH-MOVEMENT (in situ/moved) and DISTANCE. The last was included because previous theoretical work (Huang 1993) and the experiment by Adger et al. had found that Condition C effects decreased with increasing distance between R-expression and pronoun. In exps 1 and 2, the (linear) distance was manipulated using coordination (*John told us which statue of Bill and the team he likes*). In exps 3 (adjectival predicates) and 4 (nominal arguments), we additionally tested a different distance manipulation, using embedding (structural distance): emb1: *John told us which statue of Bill*

he said you like; emb2: John told us which statue of Bill you said he likes. In all experiments, the items were distributed using a Latin Square Design and intermixed with an equal amount of fillers. 32 native speakers of German took part in exp1, 48 in exp2, 36 in exp3, 36 in exp4. In the plots below, the black bar shows coreference with the matrix subject, the gray bar with the embedded R-expression. Exps 3+4 also included conditions that were tested in exps 1+2 (omitted in the plots) and replicated their results, supporting the reliability of our method.



**Results on adjectival predicates: in exp1 on local movement,** reconstruction for Principle C is almost exceptionless (close to 100%, similar to the results in Adger et al.). Reconstruction for Principle A is robust (75%). Interestingly, binding by the matrix subject is also accepted to some extent; its likelihood was increased significantly by wh-movement (GLM:  $z = 3.26$ ,  $p = 0.001$ ) and longer distance ( $z = 3.74$ ,  $p < 0.001$ ). In **exp3 on long-distance movement,** reconstruction for Principle C is still quite robust, but reduced compared to local movement; concomitantly, acceptance of coreference increases up to 25%. There is evidence for an embedding effect in that Condition C effects become weaker once a clause-boundary is present (compared to the short local mvt baseline—emb1:  $z = 2.46$ ,  $p = 0.01$ , emb2:  $z = 3.35$ ,  $p < 0.001$ ) but not for an effect of linear distance as in Adger et al. (coordination has no significant effect:  $z = 0.01$ ,  $p = 0.99$ ). Reconstruction for Condition A in long-distance movement is as robust as in local movement. Binding in intermediate position (*how proud of himself John thinks you are*) is accepted by 50%.

**Results on nominal arguments: in exp2 on local movement,** reconstruction for Principle C is very robust (more than in the exps on English). Crucially, reconstruction is equally robust with arguments and adjuncts. Reconstruction for Principle A is less robust, with acceptance rates between 45 and 65%. Matrix binding is more acceptable than in exp1, reaching 35–70% acceptance, with [moved] significantly increasing its likelihood ( $z = 4.68$ ,  $p < 0.001$ ). In **exp4 on long-distance movement,** Principle C effects are somewhat weaker, coreference is accepted 25–45%; unlike in Adger et al., however, there remains a clear preference for non-coreference (75–90%). As in exp3, there is an embedding effect (emb1:  $z = 2.87$ ,  $p = 0.004$ , emb2:  $z = 5.23$ ,  $p < 0.001$ ), but again, coordination has no effect ( $z = 0.21$ ,  $p = 0.83$ ). Reconstruction for Principle A is less robust than in local mvt; binding in intermediate positions (*which statue of himself John thinks you like*) is accepted by 65%. Matrix binding is between 45–65% under [moved].

**6. Theoretical implications.** (i) Our results deviate in two important ways from previous claims about German (cf. e.g. Frey 1993, Kiss 2001): Anaphor binding in (a) the landing site of  $A'$ -movement and (b) in intermediate positions of  $A'$ -movement is possible (as in English). Crucially, such binding obtains with both argument-NPs and, surprisingly, adjectival predicates. Consequently, binding in German cannot be reduced to purely thematic/argument-structural conditions. (ii) Given that anaphors contained in moved adjectival predicates can be bound by the matrix subject or an intermediate subject, our results suggest that fronted predicates do not (necessarily) contain a trace of the subject (pace Huang 1993). (iii) The Principle C pattern in local and long-distance movement argues against a late-merger approach to adjuncts, against an approach in terms of vehicle change (the effect is not alleviated if the coreferential pronoun is in the upper clause) and quite generally casts doubts on recent claims that Principle C effects are illusory.