Embedding non-restrictive relative clauses

Claudia POSCHMANN — *Goethe University Frankfurt a.M.*

Abstract. Schlenker (2010) recently provided data from English and French suggesting that, contrary to standard assumptions (McCawley, 1982; Potts, 2005; Arnold, 2007; AnderBois et al., 2011), non-restrictive relative clauses (NRCs) can take narrow scope under operators of the sentence within which they are embedded. This paper presents three experiments in German confirming this claim. The results show that embedded readings are available with NRCs in German and give first insights into the puzzle under which conditions these embedded readings do or do not show up.

Keywords: relative clauses, appositives, projection, rhetorical relations.

1. Introduction

1.1. Standard assumptions

Standardly, it is assumed that non-restrictive-relative clauses (NRCs), despite their embedded position, do not contribute to the truth-conditions of the sentences they are embedded within (their host-clause) but are interpreted similar to independent matrix clauses involving a discourse pronoun (Sells, 1985; Potts, 2005; Arnold, 2007; Nouwen, 2007; AnderBois et al., 2011). Indeed, NRCs pattern quite consistently with their discourse anaphoric matrix clause paraphrases. For example, (1a) roughly can be paraphrased by (1b), but not by (1c).

(1) (Adapted from Schlenker (2013: 7))
   a. If Peter called the dean$_1$, **who$_1$ hates me**, I would be in deep trouble.
   b. ≈ If Peter called the dean, I would be in deep trouble. **He hates me.**
   c. ≉ If Peter called the dean **and he hated me**, I will be in deep trouble.

This sticky wide-scope behavior of NRCs has long been taken as evidence for the assumption that NRCs attach high up in the syntactic tree (McCawley, 1982) or even represent syntactic orphans that are only loosely connected to their host-clause at surface structure (Safir, 1986; Fabb, 1990; Espinal, 1991). Alternatively, it has been assumed that NRCs are attached to their anchor at DP-level (e.g. to *the dean* in (1a)), but contribute projective content (content which is interpreted independently of the main-clause assertion), either because it is semantically interpreted at a different dimension (e.g. as non-at-issue content, Potts (2005)) or because it does not relate to the current question under discussion of the discourse (Simons et al., 2011).[1]

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[1] Most of the projection approaches are motivated by the observation that NRCs take widest scope but differ from matrix clause information in their information status (Potts, 2005; AnderBois et al., 2011; Simons et al., 2011). For example, NRCs, unlike assertive (at-issue) content, often cannot be directly denied and in many cases only make poor answers to a direct question.

1.2. Recent challenges

Schlenker (2010, 2013), however, provided examples from English and French, in which the NRCs take narrow scope with respect to operators of the host-clause and in this case contribute conjunctively to the truth-conditions of the complex sentence.

(2)   (Adapted from Schlenker (2013: 7))
       a.   If Peter called the dean, who then called the chair, I would be in deep trouble.
       b. $\neq>$ The dean called the chair.   *(wide scope)*
       c. $\neq>$ If Peter called the dean, the dean would call the chair. *(modally subordinated)*
       d. $=>$ If Peter called the dean and the dean called the chair, I would be in trouble.
             (narrow scope)

The NRC in (2a), for example, does not tell us that the dean called the chair (*global reading*), it does not even have the reading that in any case in which Peter called the dean, the dean would call the chair (which would be equivalent to a potential *modal subordination reading*), it really seems to have the reading that the speaker only would be in trouble, if Peter called the dean and the dean (happened to) call the chair (*local reading*), which is comparable to the interpretation of a local conjunction. As Schlenker (2010, 2013) notes, the sentence is ungrammatical if the NRC is replaced by a parenthetical (3a) or a postponed matrix clause (3b), since in these cases the past tense is no longer bound by the conditional. This provides quite a strong argument for the assumption that the NRC in (2a) is indeed interpreted locally.

(3)   (Adapted from Schlenker (2013: 7))
       a.   *If Peter called the Dean (he then called the Chair), I would be in deep trouble.
       b.   If Peter called the Dean, I would be in deep trouble. *He then called the chair.

Empirical evidence for these embedded readings, however, is rather rare. Schlenker (2013) only reports judgements of very few English and French speakers. Data from other languages is missing completely. Moreover, it still is quite a puzzle under which conditions embedded readings are acceptable, or put otherwise, what makes the difference between (1a) and (2a). Note that (1a) is getting ungrammatical as soon as we turn the NRC's predicate into past-tense (Schlenker, 2013: 7).

(4)   *If Peter called the Dean, who hated me, I would be in trouble.

With the experiments reported in this paper, we will provide a first empirical evidence for the existence of such embedded readings in German and try to test some factors that might affect the embeddability of NRCs in German.

1.3. Potential factors affecting embeddability

Schlenker (2013), himself, makes two crucial observations concerning the embeddability of NRCs. First, he observes that the embeddability is dependent on the *position* of the NRC in its

host-clause. Embedded readings are best available if the NRC is located at the right edge of the host-clause (in this case at the right edge of the antecedent of the conditional).

(5)   Schlenker (2013: 46)
    a.   If tomorrow John sent a 2 carat diamond to Ann, *who got all excited as a result*, he would have a better chance of marrying her.
    b.   (#) If tomorrow Ann, *who got all excited as a result*, received a 2 carat diamond, he would have a better chance of marrying her.

Moreover, he notes that, even if we keep the NRC at the right edge of its host-clause, embedded readings are not necessarily available. Note that the ungrammatical NRC in (4) (repeated here as (6b)) is located at the same position as the grammatical one in (2a) (repeated here as (6a)).

(6)   a.   If Peter called the Dean, *who then called the Chair*, I would be in deep trouble. (NARRATION)
    b.   *If Peter called the Dean, *who hated me*, I would be in deep trouble. (EXPLANATION)

But what makes the difference between (6a) and (6b)? At first sight, the two NRCs differ at least in (i) the *predicate-type* of the NRC (state/event) and (ii) the presence/absence of the *anaphoric expression* "then". Moreover, Schlenker (2013) observes that the two sentences additionally differ with respect to the *rhetorical relation* (Asher and Vieu, 2005) the NRCs establish with their host-clauses. While in (6a) the event described in the NRC follows in time the event described in the antecedent of the if-clause and the NRC, hence, establishes a kind of *Narration* relation with its host-clause, the NRC in (6b) seems to provide sort of an *Explanation* for the assumption asserted in the main clause that the speaker would be in trouble if Peter called the dean. According to Asher and Vieu (2005), *Narration* is a coordinating rhetorical relation while *Explanation* is subordinating. A possible hypothesis might be that the contrast reported in (6) is due to a contrast between NRCs expressing two different types of rhetorical relations (coordinating vs. subordinating). These observations are particularly interesting for German, for which Holler (2005) distinguishes between two types of non-restrictive relative clauses, *appositive* and *continuative* relative clauses, which differ in the position and the rhetorical relation they hold with respect to their host-clause. While appositives can be found in sentence internal and sentence final position and typically express a subordinating rhetorical relation (e.g. EXPLANATION or BACKGROUND), continuatives are characterized by a sentence-final position, establish a coordinating rhetorical relation with their matrix clause (such as NARRATION or RESULT) and typically describe an event which follows in time the event described in the matrix clause. Often continuatives come with an explicit "then" or "as a result" marking the coordinating link to the sentence to which they are attached. Since continuative NRCs typically relate two events, Holler (2005) assumes that state-predicates are degraded in continuative NRCs, as well as in their matrix clauses. Another immediate hypothesis that emerges from Schlenker's data might be that only continuatives (Holler, 2005) can be embedded.[2]

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[2]Note, however, that the analysis suggested in Holler (2005) does not make correct predictions about the embeddability of NRCs. Based on differences in position and prosody between the two types of NRCs, Holler (2005)

With three experiments in German, we tried to address the following questions: **(Q1)**
Are embedded readings available for (host-final) NRCs in German? (Q2) And if so, is
the embeddability dependent on (. . .) **(a)** the presence or absence of **anaphoric** elements
(then) relating NRC and host-clause, **(b)** the **predicate-type** of the NRC, **(c)** the type of
rhetorical relation (coordinating vs. subordinating) holding between the NRC and host-
clause, or **(d)** on the **type of the NRC** (continuative vs. appositive in the sense of Holler 2005)?

2. Experiments

To test the availability of embedded readings, we set up three web-questionnaires (SoSciSur-
vey) in which we presented the test-sentences together with a context-story. The participants
were told to imagine a scenario in which pupils were asked to summarize the information
given by a story without leaving out or adding crucial information. The participants had to
judge whether or not certain sentences of the pupils (the test-sentences) were appropriate as
part of a summary of the respective context-stories. Each story was constructed such that
the wide-scope reading (and a potential modal subordination reading) of the target sentence
was explicitly ruled out. Thus, if the participants only got a wide-scope reading, they were
expected to judge the sentence as inappropriate as part of a summary of the context story.

2.1. Experiment 1

In a first experiment, with 62 German native speakers, we tested the availability of embedded
readings depending on the CLAUSE-TYPE of the embedded construction (NRCs, conjunctions,
V2-parenthetical) and the PREDICATE TYPE (event vs. state).

2.1.1. Design

The survey consisted of 18 test-items in six conditions in which we compared the interpreta-
tions of NRCs to those of the corresponding conjunctions and verb-second-parentheticals. In
addition to the CLAUSE-TYPE, we manipulated the PREDICATE-type of the examples (event,
state). The items were tested interspersed with 24 filler items in a pseudo-randomized Latin
square design such that every participant judged every condition three times, but each item
only in one condition. (7) gives an example for a test-item in all conditions.

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suggests that appositives are attached at DP-level, while continuatives are attached much higher, at CP-level. Ac-
cording to this analysis, one would expect that, if at all, only appositives (and not continuatives) could take narrow
scope. The data reported in Schlenker (2013), by contrast, suggest just the opposite pattern.

(7)   **Geschichte (Story):**

Gerd wurde von einer Schlange gebissen und hat nur wenig Chancen zu überleben. Denn das Gift wirkt schnell tödlich. Wenn überhaupt, kann er nur noch Dr. Meier erreichen, der ganz in der Nähe wohnt. Ob dieser jedoch über das äusserst seltene Gegengift verfügt, ist mehr als ungewiss. Nur falls Dr. Meier ihm noch rechtzeitig das richtige Gegengift verabreicht, kann er gerettet werden.

(Gerd got bitten by a snake. There is only little chance that he will survive. The venom is quite deadly. His only chance is to reach Dr. Meier in time, who lives close by. But it's quite unlikely that Dr. Meier has got the antidote Gerd needs. Only if Dr Meier gives him the antidote in time, can Gerd be saved.)

Aus der Zusammenfassung des Schülers *(Part of the pupil's summary):*
Wenn Gerd rechtzeitig Dr. Meier erreicht *(If Gerd reaches Dr. Meier in time)*

a.   (NRC/event)

, der ihm das passende Gegengift verabreicht,

, who gives him the right antidote,

b.   (and/event)

und der ihm das passende Gegengift verabreicht,

and he gives him the right antidote

c.   (parenthetical/event)

(der verabreicht ihm das passende Gegengift),

(he gives him the right antidote)

d.   (NRC/state)

, der über das passende Gegengift verfügt,

, who has got the right antidote available,

e.   (and/state)

und der über das passende Gegengift verfügt,

and he has got the right antidote available,

f.   (parenthetical/state)

(der verfügt über das passende Gegengift),

(he has got the right antidote available),

kann Gert gerettet werden.

Gert can be saved.

According to the context story in (7), it is unclear, whether Gerd can be saved even if he reaches Dr. Meier, since we don't know whether Dr. Meier has got the right antidote available. Thus, if the participants only got a wide-scope or modally subordinated reading for the NRC in (7a) (as expected for (7c)), according to which Gerd is saved as soon as he reaches Dr. Meier (since in this case he will inject him the antidote), they were expected to reject the target as part of a summary of the story. Only if the participants interpreted the NRC as contributing to the antecedent of the *if*-clause (such as the conjunction in (7b)), were they expected to accept the target as a summary of the context-story.

In all items the NRCs were presented in clause-final position of the antecedent of the conditional. Unlike in English, relative clauses in German are always obligatorily marked

by comma. To ensure that the relative clause is interpreted non-restrictively, the relatives throughout are attached to proper name heads (e.g. "Dr. Meier"), which should rule out a restrictive interpretation. Additional discourse particles or anaphors in the NRC were deliberately omitted. Parentheticals were graphically marked by setting them off with brackets. Note that in German, relative pronouns and discourse pronouns are homophonous. NRCs and parentheticals, however, are clearly disambiguated by word order. Whereas parenthetical constructions are obligatorily marked by verb-second word-order, NRCs, like other embedded clauses in German, are obligatorily verb-final.[3]

2.1.2. Predictions:

If NRCs invariantly take widest scope, all NRCs should be rejected since the context stories were designed to rule out wide scope interpretations. If NRCs, however, are flexible in scope (Schlenker, 2013), one might assume that at least in some conditions NRCs are judged as acceptable. Under the hypothesis that embedded readings of NRCs are only available with coordinating rhetorical relations (Schlenker 2013) or continuative NRCs in the sense of Holler (2005), we should expect to find a contrast between the conditions with state and event predicate. The test-sentences with conjunctions and parentheticals were used as positive and negative controls. Parentheticals, according to standard assumptions, only have wide scope interpretation and hence should be rejected independently of the predicate-type. Conjunctions, by contrast, only should have embedded readings and be accepted independently of the predicate-type.
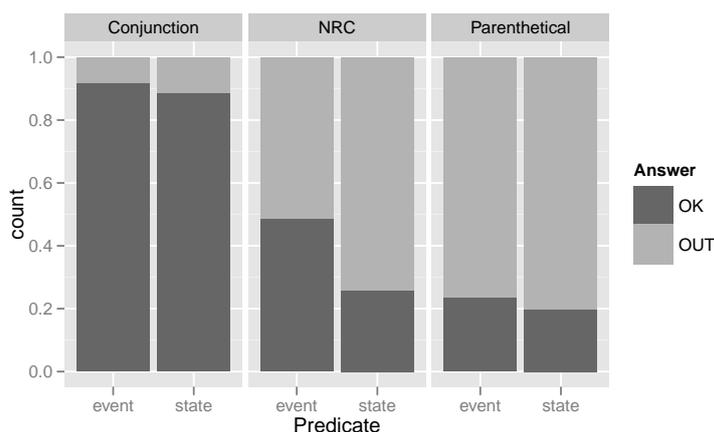
2.1.3. Results:

Figure 1: Results Experiment 1

The results of Experiment 1 indicate that NRCs with an event predicate can indeed be interpreted as truly embedded. Although, as expected, a small subset of participants (6) re-

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[3]Filler items consisted equally of a context story and a sentence summarizing it either correctly or incorrectly, but did not contain relative clauses.

jected all embedded readings of NRCs, NRCs with event predicates still got overall acceptance rates about 49 percent, lower than the corresponding and-conjunctions (0.92), but significantly higher than the corresponding matrix-clause-parenthetical (0.21). NRCs with state predicate, by contrast, rated nearly as low (0.25) as the corresponding matrix-clause parenthetical. Fitting a mixed model regression with CLAUSE-type and PREDICATE-type as fixed effects and random effects for items and participants with the corresponding slopes,[4] we found a highly significant effect of CLAUSE type (p <0.001) as well as a significant effect of PREDICATE type (p <0.001). Event-NRCs got accepted in about 49 percent of all cases, less often than the conjunctions (0.92), but significantly more often than the parenthetical (0.21). State-NRCs rated nearly as low (0.25) as the parentheticals. The interaction of CLAUSE-type and PREDICATE-type didn't reach significance in the overall data. We therefore fitted separate models testing the effect of PREDICATE-Type for each CLAUSE-type separately. Only for the subset of trials with NRC CLAUSE-type the effect of PREDICATE type turned out to be significant (p <0.01). No significant effect of PREDICATE-type could be found in the subsets with conjunctions and parentheticals. Whereas, as expected, the conjunctions, independently of the predicate type rated consistently high, the corresponding matrix clause parenthetical rated rather low with both state or event predicate. A highly significant contrast (p <0.001) between NRCs with event predicate and the corresponding matrix clause parenthetical indicates that the observed embeddability is not only a discourse effect or a last resort repair strategy but the result of a structural embedding of the NRCs.

2.1.4. Discussion:

The results confirm the observation made by Schlenker (2009/2013) that NRCs, contrary to standard assumptions, can indeed get embedded interpretations, at least if they are of event predicate type. NRCs rated significantly higher than the corresponding parentheticals. This might indicate that there is a true structural difference between NRCs and parentheticals with respect to their embeddability. The fact that the NRCs got lower acceptance rates than the corresponding conjunctions can be accounted for if we consider that the former, in contrast to the latter, are ambiguous between an embedded and a wide scope (or modal subordination) reading.[5] Unlike with parentheticals and conjunctions, the availability of embedded readings improved significantly if the NRC was of event-predicate type. We will discuss several possible explanations for this effect in the introduction part to Experiment 3. Unexpected was the relatively high acceptance rate for V2-parentheticals. According to standard assumptions, parentheticals always take widest scope and should not contribute conjunctively to the antecedent of a conditional. To rule out that this relatively high acceptance rate marks the noise level in our experiment, we decided to run a follow-up study in which we compared the interpretation of NRCs with those of postponed matrix clauses. Postponed matrix clauses definitely should resist an embedded interpretation.

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[4]Generalized linear mixed model fit by the Laplace approximation, Formula:
Answer ∼ Clause * Predicate + (1 + Clause + Predicate|Person) + (1 + Clause+ Predicate |Item).
[5]Indeed a good number of participants noted in their comments that both readings (wide and narrow scope) were available for them, but that they decided to reject the target-sentence because the pupil could have taken more care to make explicit which of the two readings she had intended in her summary.

2.2. Experiment 2

For Experiment 2, we took a subset of 12 out of the 18 items of Experiment 1 and this time compared the interpretation of the NRCs to the interpretation of the comparable postponed matrix clauses (CLAUSE-TYPE), again each with event and state PREDICATE-TYPE.

2.2.1. Design

As before, the test-items were presented randomized over a Latin square design such that each participant judged each item only in one condition but each item was tested all conditions. (8) gives an example for a test-item with event-predicate. Task and context story were comparable to those used for Experiment 1.

(8)   a.   Wenn Gerd rechtzeitig Dr. Meier erreicht, **der ihm das passende Gegengift verabreicht**, kann er gerettet werden. (If Gerd reaches Dr. Meier in time, who gives him the right antidote, he can be saved.)   **(NRC/event)**
          b.   Wenn Gerd rechtzeitig Dr. Meier erreicht, kann er gerettet werden. **Der verabreicht ihm das passende Gegengift**. (If Gerd reaches Dr. Meier in time, he can be saved. He gives him the right antidote.)   **(Matrix/event)**
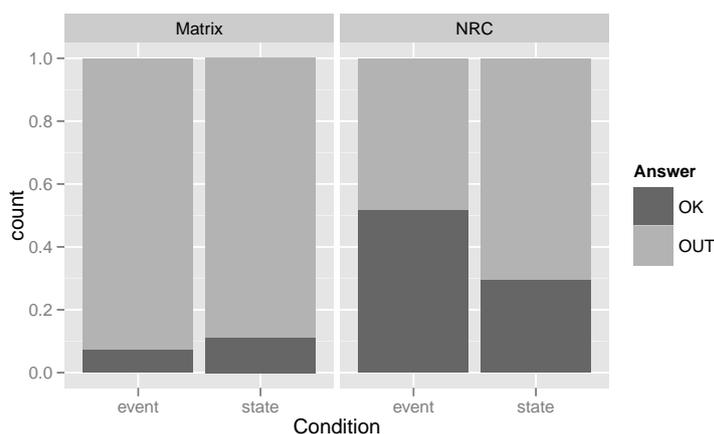
2.2.2. Results

Figure 2: Results Experiment 2

As expected, the postponed matrix clauses got only very low acceptance rates (0.09 overall), ruling out that the acceptability rates for NRCs and parentheticals in the first experiment were only due to the relatively high complexity of the experimental taks. Just as in the first experiment, the NRCs reached an acceptance rate of 41 percent overall. Again the NRCs with event predict rated much higher (0.51) than the NRCs with state predicate (0.29). A mixed model regression with the interaction of CLAUSE-type and PREDICATE-type as fixed effects and the

corresponding random effects for items and participants confirms these observations.[6] Overall, we found a significant effect of CLAUSE-type (p <0.001) as well as a significant interaction of CLAUSE-type and PREDICATE-type (p <0.01), such that event predicates improved the ratings of NRCs while the predicate type had no effect on the ratings of the corresponding matrix clauses.

2.2.3. Discussion

The direct comparison with postponed matrix clauses confirmed the embeddability of NRCs. As in the first experiment, embedded readings were accepted for a good proportion of NRC trials. In contrast to the parentheticals in the first experiment, the acceptance rate of postponed matrix clauses dropped almost to zero, confirming that the acceptance rates for NRCs are indeed a reliable indicator for the availability of embedded readings. Just as reported for the first experiment, NRCs with event predicate were much more likely to be interpreted with narrow scope than those with state predicate.

2.3. Experiment 3

The results of Experiments 1 and 2 indicate that the embeddability of NRCs improves significantly if the NRC is of event predicate type. To make a first step in explaining this effect of PREDICATE-type, we decided to set up a third questionnaire designed to tease apart the following potential explanations:

(i) Rhetorical Relations: Schlenker (2013) assumes that the embeddability of an NRC might be dependent on the rhetorical relation (Asher and Vieu, 2005) it establishes with its host-clause. A first guess, hence, would be that by manipulating the predicate type, we manipulated the type of the rhetorical relation holding between the NRC and its host-clause. The test-items of Experiments 1 and 2 were constructed such that all explicit indicators (such as discourse particles or additional anaphoric material) for the rhetorical relation holding between NRC and the clause embedding it were deliberately omitted. Nevertheless, the manipulation of the predicate-type certainly affected the rhetorical relation holding between the NRC and the host-clause. The most salient rhetorical relations for our event-conditions were *coordinating* relations such as NARRATION or RESULT, while in the state-conditions the NRCs most plausibly were related by *subordinating* relations such as EXPLANATION or BACKGROUND. A first hypothesis, hence, could be that embedded readings are only available with coordinating relations.

(i) Structural Ambiguity:
A closely related but much stronger hypothesis would be that the observed contrasts are due to a structural difference between appositive and continuative relative clauses in the sense of Holler (2005).

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[6]Generalized linear mixed model fit by the Laplace approximation, Formula: Answer ~ Type * Condition + (1 + Type * Condition | Person) + (1 + Type * Condition | Item).

(ii) Causal Relation:
NARRATION and RESULT are not only coordinating but also causal relations, in which the occurrence of the second event (the event described in the NRC) is dependent on the occurrence of the first one (the event in the antecedent of the conditional). In our example, Dr. Meier only can give Gert the antidote if Gert reaches him. But whether or not Dr. Meier has got the antidote available, is probably quite independent of Gert's reaching him. This might favor an embedded interpretation in the event-condition, although the NRC is not structurally embedded.

To tease apart the options (i) and (ii) more neatly and rule out the worry in (iii), we set up a third experiment in which we focused exclusively on NRCs and explicitly disambiguated the rhetorical relations holding between NRC and the clause embedding it.

2.3.1. Design

In **Experiment 3**, with 41 participants, and a subset of 12 items out of the 18 of Experiment 1, we exclusively tested NRCs, again with event and state PREDICATE-type and manipulated the RHETORICAL relations holding between the NRC and its embedding clause by introducing explicit markers. We either introduced an explicit "dann" (then) , which should favor RESULT or NARRATION as rhetorical relation, or an explicit "wider Erwarten" (against expectations), which should establish a CONTRAST-relation holding between NRC and the clause embedding it. Note that CONTRAST just as NARRATION and RESULT counts as a coordinating relation (Asher and Vieu, 2005). Unlike in NARRATION or RESULT, however, CONTRAST is not causal. Again, the four conditions were tested in a Latin square design, such that each of the 41 participants judged each condition three times but each item only in one condition.

(9)   a.   (event)
             Wenn Gerd Dr. Meier erreicht, der ihm **(dann/wider Erwarten)** das Gegengift verabreicht, kann Gerd gerettet werden.
             (If Gerd Dr. Meier reaches, who him (then/counter expectations) the antidote gives, can Gerd saved be.)
       b.   (state)
             Wenn Gerd Dr. Meier erreicht, der **(dann/wider Erwarten)** über das Gegengift verfġut, kann Gerd gerettet werden. (If Gerd Dr. Meier reaches, who (then/counter expectations) the antidote has available, can Gerd saved be.)

2.3.2. Predictions:

If coordinating rhetorical relations are responsible for the embeddability of certain NRCs, all NRCs should be acceptable, since in all conditions a coordinating relation is forced (by inserting "dann"/"then" and "wider Erwarten"/"counter expectations"). If the embeddability is

limited to continuative relative clauses, only NRCs with event predicate are expected to be accepted (both with "dann" and "wider Erwarten"), whereas conditions with state predicates would be expected to be degraded (independently of the inserted particle), since according to Holler (2005) state-predicates block continuative readings. If causality plays a role, only NRCs with event-predicate and "dann" are expected to be acceptable, while "wider Erwarten" is expected to block embedding.

2.3.3. Results:

In Experiment 3, the results improved overall for all test-sentences independently of the predicate-type.[7] The condition with event-predicate and "wider-Ewarten" was accepted in 82 percent of all trials, the condition with state-predicate and "dann" still reached 62 percent of acceptance judgements. In between these two conditions, the results display a clear down step pattern such that NRCs with "wider Erwarten" rated better than those with "dann" and within each rhetorical relation, just as in the previous experiments, sentences with event predicate rated better than those with state predicate.
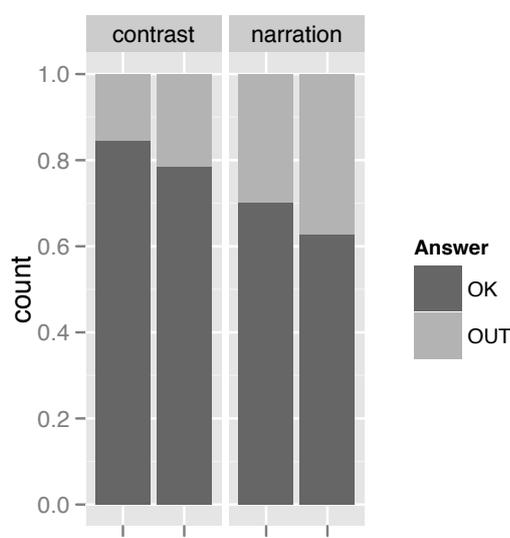
Figure 3: Results Experiment 3

The statistical model confirmed these observations. Fitting a mixed model regression with the interaction of sentence-type and predicate-type as fixed effects and the corresponding random effects for items and participants, we found a significant effect of PREDICATE-type ($p<0.05$) as well as a significant effect of RHETORICAL RELATION ($p<0.05$), but no interaction between these two factors.[8]

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[7]Compared to the acceptance rates reached in the first two experiments for test-sentences with NRC sentence-type)

[8]Generalized linear mixed model fit by the Laplace approximation, Formula: Answer $\sim$ Relation * Predicate + (1 + Relation + Predicate | Person) + (1 + Relation + Predicate | Item).

2.3.4. Discussion

The data confirm impressively that sentence-final NRCs in German can be interpreted as embedded. Moreover, they suggest that forcing a coordinating rhetorical relation seems to improve the embeddability.[9] This holds even if the NRC is of state predicate type and even if the relation established between NRC and host-clause is not causal. We therefore assume that the embeddability is neither restricted to continuatives in the sense of Holler (2005) nor to NRCs that are causally dependent on the content of the antecedent.

3. Analysis

The findings confirm that NRCs are flexible in their scope and under certain conditions can contribute locally to the truth conditions of their host-clause (Schlenker, 2010) . The availability of embedded readings, however, seems to be dependent both, on the *position* of the NRC Schlenker (2013) and on the *rhetorical* relation holding between the NRC and its host-clause (this paper). This challenges most of the existing approaches, which presume or predict that NRCs invariantly take widest scope (McCawley, 1982; Potts, 2005; Arnold, 2007; AnderBois et al., 2011). In the following, we will sketch very briefly how far we can go with very basic and traditional assumptions about NRCs to account for the observed scope pattern of NRCs. We will start from the following basic assumptions: (i) NRCs are attached low at *DP-level* (von Stechow, 1979). (ii) *In situ* (host-internal) NRCs are interpreted with widest scope. (iii) Extraposed (host-final) NRCs are flexible in scope. (iv) In the *extraposed* case, the type of rhetorical relation established between NRC and host-clause affects which sentential-node is considered as a suitable attachment point.

3.1. NRCs in situ

Let us assume that NRCs, just like their restrictive counterparts, are of type $< e, t >$ and attached at DP-level to their head DP (von Stechow, 1979; Heim and Kratzer, 1998). To prevent the NRC from ending up invariantly in the scope of a sentential operator, such as a conditional, we assume that the NRC is attached to the DP by a tentative relation which, at this point in the derivation, is temporarily abstracted from (λR_{ttt}), see figure 4 and rule (10).

(10)   **NRC Attachment Rule (in situ):** If C is a branching node consisting of two sister nodes A and B, A with the translation α of type ((et)t) and B with the translation β of type (et), C translates as: $\lambda R.\lambda P.R(\alpha(P))(\alpha(\beta))$

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[9]A further reason for the increase in acceptability might be that in Experiment 3, in contrast to the two previous experiments, we only tested NRCs and the design did not include a direct comparison with competing constructions such as and-conjunction or matrix-clause paraphrases.

Since this tentative relation cannot be resolved, it is projected, by standard compositional means (functional composition) up the tree. Notably, it is projected across the IP-node of the conditional antecedent.[10]

Figure 4: **NRC in situ**

$$(\ldots)$$
$$|$$
SpecCP
$$\lambda \mathbf{R_{ttt}}.\lambda q_t.\mathbf{R}(reach'(Gert,Meier)) \to q)$$
$$(have\_antidote'(Meier))$$

C
if
$$\lambda p_t.\lambda q_t.(p \to q)$$

IP
$$\lambda \mathbf{R_{ttt}}.\mathbf{R}(reach'(Gert,Meier))$$
$$(have\_antidote'(Meier))$$

DP"
Gert

VP
$$\lambda \mathbf{R_{ttt}}.\lambda x_e.\mathbf{R}(reach'(x,Meier))$$
$$(have\_antidote'(Meier))$$

V
$$\lambda x_e.\lambda x'_e.reach'(x,x')$$

DP'
$$\lambda \mathbf{R_{ttt}}.\lambda P_{et}.\mathbf{R}(P(Meier))$$
$$(have\_antidote'(Meier))$$

DP
Meier
$$\lambda P_{et}.P(Meier)$$

NRR
$$\lambda x_e.have\_antidote'(x)$$

At CP-level, the tentative relation still is unresolved and has to be instantiated pragmatically by establishing a suitable rhetorical relation.

(11)   Denotation at CP-level:
$$\lambda R.R((reach'(Gert,Meier)) \to (saved'(Gert)))$$
$$(have\_antidote'(Meier))$$

According to this analysis, in situ NRCs always project to matrix level. Note that this analysis makes no predictions about the discourse status of the NRC. Whether or not the NRC is at-

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[10]Note that resolving the tentative relation by inserting the *if* in *C* would result in a crash of the derivation as soon as the consequent-clause is added.

issue, for example, might depend on the position (Syrett and Koev, 2015) and the rhetorical relation (Jasinskaja, sion) holding between NRC and the sentence embedding it.

3.2. NRCs ex situ

Things change, if the NRC is extraposed. We assume that in this case, the NRC is moved from its DP-modifying position, where it leaves a trace Q of type et, to the right edge of a clause (at any sentential level IP or CP), where the trace is bound.

Figure 5: **NRC ex situ**

(12) **NRC Adjunction Rule (ex situ):**
 If C is a branching node consisting of two sister nodes A and B, A with the translation α being of type ((t(tt))((et)t)) and B with the translation β of type (et), C translates as: $(\alpha)(\wedge)(\beta)$

To make an embedded reading available, we now only have to assume that in the case in which the NRC is extraposed and attached at the right edge of a clause, the missing connective can be instantiated by a conjunction, as spelled out by rule (12) and in figure 5 above. Granted, this analysis is not type-driven but requires some construction specific attachment rules for extraposed NRCs. If, however, we assume such additional rules, the differences between in situ and extraposed NRCs fall out quite neatly. While in situ NRCs are predicted to project to CP-level, extraposed NRCs can be attached to any sentential node to which they are right-adjacent and locally conjoined. Which of these potential attachment points are preferred might depend on pragmatic factors such as context information and the rhetorical relation holding between NRC and host-clause. Moreover, there might be a general preference for high-attachment sites even in case of extraposed NRCs, since in case of low attachment the NRC competes with corresponding and-conjunctions, which are not ambiguous.

3.3. Effect of rhetorical relations

In this subsection, we will sketch very briefly two possible explanations for why and how rhetorical relations might affect the choice between low and wide scope readings of NRCs. Comparing the projection patterns of NRCs, conventional implicatures and presuppositions, Simons et al. (2011) assume that (semantic) operators such as conditionals only target material that is "at-issue" in a given context, e.g. addresses the actual QUD (Roberts, 1996). A first explanation for the observed contrasts might be that NRCs with coordinating and subordinating relations differ in the way in which they contribute to the QUD addressed by the host-clause.[11]

(13) Wenn Gert Dr. Meier erreicht,
 (If Gert Dr. Meier reaches)
 a. **der ihm das passende Gegengift verabreicht,**
  (who him the right antidote gives) (NARRATION)
 b. **der über das passende Gegengift verfügt,** (EXPLANATION)
  (who the right antidote has)
 ist Gert gerettet. *(is Gert saved.)*

Let us assume that the QUD the main-clause addresses is the question *If what happens can Gert be saved?*. Intuitively, the in NRC (13a) provides part of the answer to the question addressed

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[11] This in fact is roughly what Jasinskaja (sion) argues for in her paper on the (non-)at-issue status of (non-embedded) NRCs. She assumes that each discourse unit (also subsentential ones) addresses an issue on its own. In case of coordinating discourse relation the subsequent units can be combined to form a coordinated discourse topic (e.g. be coordinated to address an overarching QUD). In case of a subordinating discourse relation, however, the second unit introduces a subquestion of its own and does not contribute directly to the QUD addressed by the previous unit. If we combine the assumptions of Roberts (1996) and Jasinskaja (sion), we might get an explanation for the contrasts observed.

by the host-clause and is interpreted locally. The NRC in (13b), by contrast, does not give an answer to this question but addresses an issue on its own, namely why Gert is saved as soon as he reaches Dr. Meier. Note, however, that the assumption that projectivity and non-at-issueness are generally related is not uncontroversial. Simons et al. (2011: 315) themselves discuss potential counterexamples to this claim.

(14)   Q: Who's coming to the dinner tonight?
         A: Well, I haven't talked to Charles, who probably won't be able to come,
         but I did talk to Sally, who is coming.

Although the NRCs in (14) address the QUD raised by the preceding question, they project. To explain the suitability of the NRCs in (14), Simons et al. (2011: 315) assume that NRCs are non-at-issue by default and, hence, can not address the QUD at all. The utterance of (14) is suitable only since the hearer is able to reconstruct a new QUD for the sentence, for example who A has talked to about the dinner. According to these assumptions, NRCs, are predicted to be always projective, since they are assumed to be inherently non-at-issue. This, however, is not what we found in our experiments.

Another aspect in which coordinating and subordinating discourse relations often differ, is that subordinating discourse relations in contrast to coordinating ones are in many cases *speaker-oriented*. For instance, EXPLANATION is a speaker-oriented relation whose second argument gives support to the first. This, however, means that the speaker must endorse both the explanation and the explanandum, which might explain, why NRCs expressing an EXPLANATION have a strong tendency to be interpreted with widest scope. The example in (15) (provided by Katja Jasinskaja p.c.) illustrates that speaker-orientedness indeed might play a role. In German the discourse connectives "deshalb" and "also" both force a coordinating translation. In contrast to "deshalb", "also", however, is speaker-oriented. "A deshalb B" in German is equivalent to "A, and therefore B", while "A also B" roughly translates as "A, and therefore I believe B". If in (15), the causal relation between Eva's criticism and the Max' anger is expressed by the non-speaker-oriented "deshalb", the NRC is interpreted locally as part of the conditional antecedent: "if Eva criticizes Max and that makes him angry, ...". By contrast, "also" makes the utterance infelicitous because the causal antecedent of the speaker's belief that Max is angry is not accessible in the global context. Similarly, in English, (6a) gets awkward if we mark speaker-orientedness as in (16).

(15)   Wenn Eva Max kritisiert, der sich **deshalb/??also** ärgert, ...
         (*If Eva Max criticizes, who refl therefore/hence is annoyed, ...*)

(16)   *If Peter called the Dean, who then (*frankly/*by the way/...) called the Chair, I would
         be in deep trouble.

As Katja Jasinskaja (p.c.) pointed out to me, asyndetically juxtaposed sentences have a strong tendency to be interpreted as expressing subordinating relations, typically EXPLANATION (Jasinskaja, 2007), while coordinating ones tend to be explicitly marked (cp. (17a) to (17b)).

NRCs, however, are asyndetic (17c). This might contribute to their preference for subordinating relations and high-attachment.

(17) a. Mary fired Bill. He drank too much.   (EXPLANATION: drinking causes firing)
      b. Mary fired Bill. And he drank too much.   (RESULT: firing causes drinking)
      c. Mary fired Bill, who drank too much.   (EXPLANATION: drinking causes firing)

4. Conclusion

In this paper, we presented the results of three experiments, which show that, contrary to standard assumptions (McCawley, 1982; Potts, 2005; Arnold, 2007; AnderBois et al., 2011), embedded readings are available for NRCs in German. In contexts incompatible with a wide-scope interpretation, NRCs were significantly more often accepted as suitable than the corresponding parentheticals and postponed matrix clauses. This strongly confirms an assumption made by Schlenker (2013) that NRCs can have narrow scope interpretations in which they contribute conjunctively to the content of their host-clause. Moreover, the results suggest that the availability of such embedded readings is dependent on the *predicate* type of the NRC and the type of the *rhetorical relation* established between the NRC and its host-clause (coordinating vs. subordinating). NRCs of event-predicate type were interpreted significantly more often as embedded than those of state-predicate type. If, however, a coordinating relation was forced, by introducing coordinating discourse particles like "dann" (then) or "wider Erwarten" (counter expectations), the availability was increased independently of the predicate-type. We took this as a first piece of evidence for the assumption that the embeddability is neither restricted to continuatives in the sense of Holler (2005) nor to NRCs that are causally dependent on the content of the antecedent. Note, however, that we only tested the interpretation of NRCs that were located in clause-final (extraposed) position at the right edge of the antecedent of a conditional. Examples provided by Schlenker (2013) from English and French suggest that embedded readings are available with other (sentential) operators (such as "conceivable"), but only as long as the NRC is extraposed. To account for these observations, we suggested an analysis according to which *in situ* NRCs are forced to project, while *extraposed* NRCs are flexible in their scope. The observation that rhetorical relations affect the scope of (extraposed) NRCs raises interesting puzzles for any analysis of NRCs and for our understanding of projection in general (Simons et al., 2011). To discuss these questions, however, goes beyond the scope of this paper and should be addressed by further research.

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