On trees blocking roads and cameras recording burglars– An Experimental Comparison of the Availability of Inverse Scope in English and German

Abstract: We present two off-line experiments on the interpretation of sentences with existential subject-QPs and universal object-QPs in German and English, which have been reported to allow for inverse readings only in English. We show for this specific syntactic configuration that there is no categorical cross-linguistic difference, but only a gradual one, with English more readily allowing for inverse scope than German. This supports a cross-linguistically unified analysis of inverse scope on which gradual differences between languages follow from language-specific properties and exposure effects. The results moreover suggest that relative clauses with indefinite head NPs allow for inverse readings, thereby challenging their status as scope islands (May 1977, Huang 1995), while being in line with introspective claims in semantic accounts (Barker 2012, 2019). Finally, our results suggest a high between-speaker variability and a strong impact of context.

Keywords: inverse scope, quantifier raising, islands, reconstruction, cross-linguistic

1. Introduction

Quantifier scope ambiguities have been studied extensively both from a theoretical and from an empirical perspective. Such ambiguities can arise when a sentence contains more than one QP. An example is given in (1) with an existential quantifier a drone in subject position and a universal quantifier every building in object position. This sentence has two interpretations: On the surface reading (SR), the existential QP takes scope over the universal QP, expressing that there is a single drone that
surveilled all the buildings. On the inverse reading (IR), the universal QP takes scope over the existential QP, thereby expressing that for each building there is a (potentially different) drone that surveilled it.

(1) A drone surveilled every building.

May (1977, 1985) developed an early structural account of quantifier scope ambiguities, implementing earlier ideas on *Quantifying In* from Montague (1973). May proposed a covert syntactic operation of Quantifier Raising (QR). According to this account, scope relations are determined via the hierarchical relations of quantifiers at the abstract representational level of Logical Form (LF). QR was conceptualised as a covert A’-movement operation that can raise a QP at LF for it to take wide scope. In (1), the inverse reading arises when the universal QP is QRed to a position c-commanding the existential QP. This QR-based account was then developed further in subsequent work, see, e.g., Fox (2000). Next to QR-based accounts, there are also more surface-oriented syntactic analyses that derive inverse readings by means of A’-reconstruction (Frey 1993) or feature-driven A-movement (Hornstein 1995). In addition, there are multi-factorial accounts (Ioup 1975, Pafel 2005), and there are also various semantic accounts of inverse scope that employ type-shifting or other semantic mechanisms, such as, e.g., function composition; see, e.g., Jacobson (1996), Barker (2005, 2012), Barker & Shan (2014), and Steedman (2012). There is general agreement between theoretical accounts (e.g., Reinhart 2006, Bobaljik & Wurmbrand 2012, Blok 2019), on the one hand, and empirical studies (e.g. Kurtzman & MacDonald 1993, Anderson 2004, Radó & Bott 2018), on the other, that inverse scope readings are dispreferred when compared to their surface scope counterparts. In some theories, this preference for surface scope receives a
principled account. In QR-analyses, it can be explained by the additional covert movement step of QR that is required for deriving the inverse scope reading, thereby leading to higher processing costs; see, e.g., Wurmbrand (2018). In other analyses and frameworks, it may be tied to the application of additional semantic operations, such as, e.g., type-shifting.

From a cross-linguistic perspective, there are two perspectives on the availability of quantifier scope ambiguities. First, one could account for cross-linguistic differences in quantifier scope by drawing a categorical distinction between languages. That is, the availability of inverse readings is constrained or conditioned by the specific grammar of a language. In English, for instance, inverse scope readings are considered generally available, and, consequently, there are many QR-based accounts (e.g., May 1977, 1985, Fox 2000, Bruening 2001, Reinhart 2006, Blok 2019). For German, by contrast, the availability of scope ambiguities is generally considered to be much more restricted (Frey 1993, B&W 2012). Because of this, a large part of the literature on German scope refers to other factors, such as reconstruction after overt movement (Frey 1993), or to the interaction of different structural, semantic and information-structural factors (Pafel 2005).

On the alternative view, inverse scope readings are in principle available across languages under the same mechanism, such that, for instance, all languages have the covert syntactic operation of QR in their grammars. On this account, variability between languages in the availability of inverse scope readings would not follow from the presence or absence of QR in the individual grammars, but from additional language-specific properties. In the most explicit treatment to date, Bobaljik & Wurmbrand (2012) (henceforth: B&W) offer a unified QR-based account of cross-
linguistic differences in the availability of inverse scope. Their account introduces the concept of *local scope rigidity* in an OT-analysis with violable constraints, and it holds that QR is generally available across languages. Any language-related differences arise due to peculiarities in the grammars of these languages, such as the observable word order freedom in overt syntax. The rigid word order language English, for instance, cannot express scope differences overtly, since overt movement is not grammatical most of the time. Thus, inverse readings should be readily available in English, as the expression of inverse scope in the canonical word order is not blocked by alternative, and more scope-transparent syntactic means. By contrast, in German with its relatively free word order, the intended inverse scope reading can be expressed transparently via overt scrambling. According to B&W (2012), overt movement is preferred over covert movement, which they capture in the form of a violable interface constraint, *Scope Transparency (ScoT)*. *ScoT* requires the linear order of two QPs at PF to reflect their semantic scope at LF, where this is syntactically possible at all. Thereby, inverse readings in German are not ruled out altogether, but they will only be allowed in cases where overt movement is blocked by general syntactic constraints. By way of example, they discuss the complex DPs in (2). The lower QP in (2a) is realised as the genitive complement of the higher QP, and, since genitive complements cannot overtly extract, cf. (2a’), both readings are available. The PP-complement in (2b), in contrast, can move overtly, cf. (2b’), for which reason the sentence should only allow for the pragmatically odd surface reading on which there is one record featuring every musician.
(2) **Context:** Two friends are talking about last night, when one of them visited Peter, who is crazy about jazz. On that occasion, Peter played a record by Miles Davis, a record by John Coltrane, and a record by Fred Frith.

a. Peter hat [ eine Platte [jedes Musiker]] aufgelegt.

Peter has a record every\textsubscript{GEN} musician\textsubscript{GEN} played

a’. *Peter hat [jedes Musiker] [ eine Platte t₁] aufgelegt]*

Peter has every\textsubscript{GEN} musician\textsubscript{GEN} a record played

‘Peter played a record by every musician.’

b. #Peter hat [eine Platte [von jedem Musiker]] aufgelegt.

Peter has a record by every musician played

b’. Peter hat [von jedem Musiker], [ eine Platte t₁] aufgelegt.

Peter has by every musician a record played

‘Peter played a record by every musician.’ (B&W 2012: 381)

As a soft constraint, ScoT can also interact with other constraints, some of which pertain to the expression of information structure. B&W (2012:401) discuss the concrete example of inverse scope readings under the rise-fall contour, as prominently discussed in Krifka (1998a). They show that an inverse scope reading is possible for (3) with a rise-marked (/) contrastive topic in subject position because it is impossible to simultaneously satisfy ScoT for \(\exists > \forall\) and the equally ranked information structural constraint of Topic > Focus (which they treat as an information-structural subcase of ScoT). As a result, the inverse reading is possible for (3) in violation of ScoT, but in satisfaction of Topic>Focus.
This paper presents the results of a novel experiment on relative quantifier scope in German and English, which allows for a comparison of the relative availability of inverse scope in a specific structural configuration in the two languages. This focus on cross-linguistic comparison distinguishes our study from a recent experimental study of inverse scope in German in Rado & Bott (2018), which aimed at a detailed comparison of the theoretical accounts of relative quantifier scope in Frey (1993) and Pafel (2005), respectively. In our study, we focus specifically on sentences such as (1), in which an existential subject QP precedes and c-commands a universal object QP in canonical word order under verum focus. For English, it is generally accepted that this configuration gives rise to inverse readings in the existing literature. For German, by contrast, most existing accounts (Frey 1993, Pafel 2005) reject the availability of inverse scope readings in this specific configuration altogether. As for B&W (2012), while they do not discuss the specific configuration under experimental investigation, their analysis would also seem to suggest that this configuration cannot express inverse scope readings, at least in the absence of additional factors counteracting the effects of ScoT.1 The existing accounts hence predict the two languages to exhibit a categorical difference concerning the availability of inverse readings in the tested configuration. In contrast with this prediction, our experimental results show that English and German differ only gradually in the availability of inverse scope readings in the relevant configuration. In the absence of a categorical cross-linguistic difference (i.e., a different parametrization), we assume that the same

(3) … weil mindestens EIN/ Student JEDEN\ Roman gelesen hat.

because at least one student each novel read has

‘… because at least ONE student read EVERY novel.’
underlying mechanism of QR must be at work in the derivation of inverse scope readings in both languages, with language-specific properties, such as, e.g., overall word order flexibility, responsible for the observable gradual differences.

The paper is structured as follows. Section 2 gives an overview of previous experimental work on quantifier scope in English and German. Section 3 presents the two experiments on German and English and their results. This is followed by a general discussion of the observable cross-linguistic differences and similarities in section 4. Section 5 concludes with a brief discussion of the (limited) availability of inverse scope over the existential NP-head of restrictive relative clauses.

2. **Background: Previous experimental work**

Quantifier scope ambiguities have been investigated in previous experiments for both English and German. We will sum up the main results of these experiments and highlight the ways in which our experiment differs from them.

2.1. **German**

Previous experiments on quantifier scope ambiguities in German mainly focus on the four factors (i.) linear order, (ii.) syntactic configuration, (iii.) semantic features of the Q-determiners, and (iv.) discourse anaphoricity (Bott & Radó 2007, Bott & Radó 2009, Radó & Bott 2012, Bott & Schlotterbeck 2012, Bott & Schlotterbeck 2015, Radó & Bott 2018). The experiments investigated to what extent German speakers accept inverse readings in different syntactic configurations, and what impact these factors have. Most of these studies employed a picture-matching-task with abstract set representations. The main results are summed up in (4):

(4)  
 i. Linear order: Surface readings are generally preferred over inverse readings.
ii. Syntactic configuration: Inverse readings are more readily available in inverse linking constructions (May 1977, Zimmermann 2020), in which the existential and universal QP form part of the same complex DP, than between independent subject and object QP arguments.

iii. Semantic features of Q-Dets: The distributive universal Q *jeder* ‘every/each’ takes wide scope more readily than the non-distributive universal *alle* ‘all’.

iv. Discourse anaphoricity: Discourse-linked entities such as partitive constructions take wide scope more easily than non-discourse-linked entities.

Overall, the results show that IR is possible in at least some syntactic configurations in German, and they seem to favour multi-factorial accounts à la Ioup (1975) and Pafel (2005) over QR-based structural accounts on German quantifier scope. Crucially, though, the availability of IR has never been investigated so far for the relevant configurations from our experiment, which feature an existential subject QP and a non-discourse-linked universal object QP under verum focus. If IR is attested even in this configuration, we can safely conclude that inverse scope readings are generally available in German, same as in English.

2.2. English

The experimental literature on quantifier scope is much more extensive for English than for German. Since our experiments focus on the ultimate offline interpretations of potentially scopally ambiguous sentences with two QPs by adult native speakers, rather than on online processing aspects, we will only discuss the semantic aspects here. The interested reader is referred to Kurtzman & MacDonald (1993), Anderson (2004), Filik et al. (2004), Paterson et al. (2008), Dwivedi et al. (2010), Freunberger &
Nieuwland (2016) for more information on the online processing of scope ambiguities in English.

Same as German, English shows a general preference for the surface reading over the inverse reading. This is the case for all constructions tested in the literature to the exception of inverse linking constructions, for which the inverse reading seems to be preferred (Zimmermann, 2020). Anderson (2004), for instance, found that the surface reading was accepted in 81% of the cases in an SR-biasing context, while the IR was only accepted 53% of all cases in an IR-biasing context. However, in all other constructions, the inverse reading – albeit dispreferred – was still available.

Nevertheless, there are multiple factors that seem to have an impact on the degree to which inverse scope readings are available. A relatively consistent finding in the studies on English is an effect of quantifier type (Ioup 1975, VanLehn 1978, Gillen 1991, Brasoveanu & Dotlačil 2015, Feiman & Snedeker 2016), which is mostly consistent with Ioup’s (1975) Quantifier Hierarchy. Another common theme is the effect of linear order and/or c-command (VanLehn 1978, Gillen 1991, Kurtzman & MacDonald 1993). VanLehn (1978), Ioup (1975), and Micham et al. (1980) also found evidence for a major role of Grammatical Function. In fact, the latter two studies argue that surface order is only an apparent factor, which can largely or fully be reduced to the workings of grammatical function. In addition to the Quantifier and Grammatical Function Hierarchy, Kurtzman & MacDonald (1993) also argue for a Thematic Hierarchy, based on voice and verb type effects. They claim that inverse readings are more acceptable in passive than active sentences, contrasting with Catlin & Micham (1975) and Gillen (1991), who did not find such differences. Finally, Scontras et al. (2017) present a cross-linguistic study of relative quantifier scope with
experimental means in the form of a picture-matching truth-value-judgment task. The experimental results confirm earlier introspective claims that inverse scope is possible in English, whereas it is not in Mandarin Chinese.

Some of the experiments obtained results that stand in contrast to commonplace assumptions in the theoretical literature: For instance, Micham et al. (1980) and Tunstall (1998) found inverse scope to be available in double object constructions. According to Micham et al. (1980), however, indirect objects take wide scope more easily than direct objects. Another example is VanLehn’s (1978) study, which found that each can scope out of a reduced relative clause. Similarly, Tsai et al. (2014) found that wide scope of every over an indefinite RC-head received 3.1 on a 7-point rating scale, which – according to these authors – is higher than what would be expected for an absolute scope island in structure-based accounts.

Finally, the results in Anderson (2004) appear to contradict a central assumption in Fox (1995, 2000) regarding the availability of inverse scope under VP-ellipsis: The results show that inverse scope is possible even when the elided clause comes with a referential subject, as in (5) (Anderson 2004:335):

(5) A helpful member tested every recipe. The club’s president [vp did], too.

This conflicts with the analysis in Fox (2000), in which economy and parallelism constraints interact to preclude an inverse reading for the antecedent clause in (5). The economy constraint requires that the application of QR must have a semantic effect, i.e., that it induces a different scope reading. As referential expressions are considered scopally inert, economy should block QR in the elided clause. Secondly, parallelism requires that the syntactic derivation of antecedent and ellipsis clauses
must be the same. As QR is blocked in the ellipsis clause (due to economy), so it must be in the antecedent clause, resulting in the surface reading only.

In the next section, we will present a novel experimental study that differs from previous studies on English and German scope ambiguities in several ways: To begin with, it is the first study comparing German and English construction types in the same experimental paradigm, thereby allowing for conclusive inferences on cross-linguistic differences, or the absence thereof, and on the impact of freedom in overt word order on the availability of inverse scope. Second, the experiment looks at sentence structures that have so far not been subject to experimental investigation in German. These are canonical SOV sentences, carefully controlled for prosody, with an existential subject QP headed by the reduced indefinite ‘n(e) preceding and c-commanding the universal object QP jede/r/s NP. Third, the experiment provides evidence on the impact of extra-linguistic factors in the form of world knowledge, which has only been investigated for English, but not for German. Finally, the experiment systematically probes for the possibility of inverse scope for QPs that are embedded inside relative clauses in both German and English, thereby shedding light on an ongoing controversial discussion between different structure-based accounts, on the one hand, and between QR-based accounts and semantic accounts, on the other.

Whereas classic QR-based accounts (Huang 1995, Fox 2000) systematically rule out inverse scope from such finite relative clause islands, there are modified structural accounts that would in principle allow for inverse scope from relative clauses: either because these constitute no absolute scope islands (e.g., Wurmbrand 2018), or else because the NP-head reconstructs back into the relative clause (Bhatt 2002). Finally, the semantic account in Sharvit (1999), as well as the Categorial Grammar analysis in
Steedman (2012), and the Continuation Semantics analysis in Barker & Shan (2014) allow for inverse scope from within relative islands as well, mostly based on introspective judgments; see also Szabolcsi (2011) and Barker (2012).

3. Measuring the availability of inverse scope in German and English

We conducted the same experiment in English and German to directly compare the availability of inverse scope in the relevant syntactic configuration. The German experiment is described in more detail in AUTHORS. We will repeat the design and results of this experiment here to allow for an immediate comparison. Our experiment targeted three research questions:

Q1. To what extent is inverse scope available between $\exists$-subject and $\forall$-direct object in German vs. English? Is there a categorical or a gradual difference?

In the theoretical accounts from above, inverse readings are generally said to be more readily available in English than in German. With regards to the specific syntactic configuration under investigation in the experiments, namely sentences with existential subject QP and universal object QP in default word order and with controlled intonation, the inverse reading should only be available for English, but not for German, at least on a strict interpretation of existing accounts of German quantifier scope; see Frey (1993), Pafel (2005), B&W (2012). See also FNs 1 and 2 and sub-section 3.2.1 for additional discussion.

Q2. Does context plausibility have an impact on the availability of inverse scope?

Whereas most work on quantifier scope ambiguities focusses on structural factors, the impact of pragmatics has been considered much less, with a few exceptions such as Villalta (2003), Saba & Corriveau (2001), Reinhart (2006), and, in parts, Kurtzman &
MacDonald (1993); see also Sanford & Garrod (1998) for a more general treatment of the influence of world knowledge on processing and interpretation. These papers showed that the influence of context/world knowledge is strong. We added this as a factor to the design of our experiments to see what role pragmatics plays in scope ambiguity resolution in general, and in relationship to structural factors as addressed in Q3:

**Q3.** Does embedding of the lower QP inside a relative clause render inverse readings impossible?

Under a structural QR-based account, a sentence with one QP inside and with the other QP outside of a relative clause should not allow for inverse readings, given standard constraints on overt and covert movement, and in particular the tensed clause constraint; see, e.g., Huang (1995) for discussion. QR is a covert movement operation that is supposed to be subject to the same constraints as overt movement. This would block the application of QR out of tensed relative clauses, same as with overt extractions, thereby making inverse readings unavailable in such configurations in either language. As already observed at the end of section 2, this strong position on non-extractability and on the absence of inverse scope from relative clauses has recently been modified and weakened in two different ways, which we subsume under the label *liberal QR-based accounts*. First, experimental work on overt extraction and inverse scope from various island types (adjunct islands, complex NPs) showed that such environments may not be fully opaque for extraction, and thereby for inverse scope, contrary to received wisdom (Tanaka 2015, Wurmbrand 2018). These findings may generalise to relative clauses (Tsai et al. 2014). Second, Sauerland (1998, 2000), Bhatt (2002), and Hulsey & Sauerland (2006), i.a., discuss the possibility that
restrictive relative clauses may receive two different, and possibly competing syntactic analyses in terms of raising vs matching. The raising analysis would offer a possibility for inverse scope-like interpretations if the NP-head of the relative clause could reconstruct to its relative-internal base position. On these analyses, then, inverse scope may be possible from within relative clauses after all, at least to some extent, same as on the semantic accounts from above. Part of the experiment was intended to shed light on the empirical adequacy of classic QR-based accounts, one the one hand, as opposed to more liberal QR-based accounts and semantic accounts, on the other.

3.1  Design

3.1.1 Materials: The two experiments employed a 2x3 factorial design with two factors: (i.) Context Plausibility and (ii.) Embedding. Context Plausibility as a between-item factor had two levels, neutral and IR-biased. In the neutral condition, both surface reading (SR) and inverse reading (IR) are equally plausible on general pragmatic grounds in the form of world knowledge, whereas in the IR-biased condition only the inverse reading is a plausible interpretation compatible with stereotypical world knowledge. A pre-test was carried out to make sure that participants perceived these interpretations as expected. This factor was supposed to test Q2. Embedding as a within-item factor had three levels, 0-emb, 1-emb, and 2-emb. In 0-emb there was no embedding. In 1-emb, the universal object QP was embedded inside a relative clause to find an answer to Q3. Finally, in 2-emb, the universal object was doubly embedded inside a finite complement clause within the relative clause. 2-emb was included after we encountered a surprisingly high acceptance rate for 1-emb relative clauses in a pre-test (Winkel 2018). Each item was
presented with one of the two question types, testing for the availability of surface and inverse reading respectively.

The examples in (6) and (7) illustrate the neutral condition, and examples (8) and (9) do so for the IR-biased condition, for English and German, respectively. We tried to keep the items as close as possible across languages, but in some problematic cases we chose to sacrifice similarity in favour of naturalness. Therefore, the German and the English versions of the test items, despite being very similar, are not 100% literal translations of one another; see Appendix C for the full list of target items.

(6) neutral/English:

a. The police officer hoped that the burglars might be recorded by newly installed surveillance cameras, and then, in fact …

0-emb … a newly installed surveillance camera recorded every burglar.
1-emb … there was a newly installed surveillance camera that recorded every burglar.
2-emb … there was a newly installed surveillance camera which hung in such a way that it recorded every burglar.

b. Can this sentence be understood to mean that, overall, …

i. Q-ONE … only a single newly installed surveillance camera recorded the burglars? yes/no

ii. Q-MORE … more than one newly installed surveillance camera recorded the burglars? yes/no

(7) neutral/German (translation of the English version in (6))

a. Der Polizeibeamte hatte vermutet, dass die Einbrecher von neu angebrachten Überwachungskameras aufgenommen worden sein könnten, und tatsächlich
0-emb ... hat dann 'ne neu angebrachte Überwachungskamera jeden Einbrecher aufgenommen.

1-emb ... hat dort dann 'ne neu angebrachte Überwachungskamera gehangen, die jeden Einbrecher aufgenommen hat.

2-emb ... war dort dann 'ne neu angebrachte Überwachungskamera, die so gehangen hat, dass sie jeden Einbrecher aufgenommen hat.

b. Kann man diesen Satz so verstehen, dass es hier insgesamt...

i. Q-ONE ... nur eine einzige neu angebrachte Überwachungskamera gab, die die Einbrecher aufgenommen hat? ja/nein

ii. Q-MORE ... mehr als eine neu angebrachte Überwachungskamera gab, die die Einbrecher aufgenommen hat? ja/nein

(8) IR-biased/English

a. Before the storm the police made an announcement that the access roads to the city centre could be blocked by fallen trees, and then, in fact, ...

0-emb ... a fallen tree blocked every access road.

1-emb ... there was a fallen tree that blocked every access road.

2-emb ... there was a fallen tree which was positioned in such a way that it blocked every access road.

b. Can this sentence be understood to mean that, overall, ...

i. Q-ONE ... only a single fallen tree blocked the access roads? yes/no

ii. Q-MORE ... more than one fallen tree blocked the access roads? yes/no

(9) IR-biased/German (translation of the English version in (8))

a. Die Polizei hatte vor dem Sturm davor gewarnt, dass die Zufahrten in die Innenstadt durch umgestürzte Bäume blockiert werden könnten, ...
0-emb … und tatsächlich hat dann 'n umgestürzter Baum jede Zufahrt blockiert.

1-emb … und tatsächlich hat dort dann 'n umgestürzter Baum gelegen, der jede Zufahrt blockiert hat.

2-emb … und tatsächlich war dort dann 'n umgestürzter Baum, der so gelegen hat, dass er jede Zufahrt blockiert hat.

b. Kann man diesen Satz so verstehen, dass es hier insgesamt …

i. Q-ONE … **nur einen einzigen** umgestürzten Baum gab, der die Zufahrten blockiert hat? ja/nein

ii. Q-MORE … **mehr als einen** umgestürzten Baum gab, der die Zufahrten blockiert hat? ja/nein

All the target sentences had an existential QP with the indefinite article in subject position and a distributive universal QP with *every/jeder* in object position and came in canonical SUBJ>OBJ order with no overt movement. In the German items, we employed the reduced indefinite article ‘n/’ne instead of the full form *ein/eine*. This was done in order to control for the silent intonation with which participants read the items. There are two prosodic intonation patterns that could otherwise have confounded our results: Firstly, a pitch accent on the full indefinite determiner *ein(e)* would push towards a specific numeral interpretation, making the surface reading (SR) more likely. Secondly, a rise-fall-contour (Krifka 1998a) would bias towards the inverse reading; see discussion of (3) above. Crucially, the reduced form of the article cannot be stressed, thereby rendering both potentially confounding intonation patterns impossible. Moreover, by adding adjectives such as *wide* and *fallen* in (6) and (8) to the existential QP we tried to reduce the potential confound of a type-referential or
kind-referring interpretation, such that the indefinite NP is interpreted as referring to instance(s) of the NP-kind (Kratzer 2008).

To control for information structure and prosody, we presented each target sentence in a short context introducing both NPs and the main verb, so that all lexical material in the target sentences had the information status of given. This was important, since information structure can have an impact on scope readings, as discussed in connection with (3) above. Specifically, information-structural constraints (such as Topic>Focus) may compete with the scope-governing constraints ScoT in B&W’s (2012) account, making inverse readings available in sentences where they would otherwise be predicted to be ruled out on syntactic grounds. An additional reason for deaccenting all lexical material is that it gives the sentences a verum focus intonation with pitch accent either on the initial sentential adverb tatsächlich ‘indeed’ or on the finite verb in C (Höhle 1982). It was on such prosodic patterns that Frey (1993) based his strong empirical claim that inverse readings with subject and object QPs in canonical word order are absent. Notice, finally, that both NPs in the context carried plural morphology, thereby resulting in a potential confound in the form of a morphologically driven bias for a ‘yes’-answer to Q-MORE. We opted for the plural over the singular form, because the plural form in both English and German is assumed to be the inclusive, or number-neutral form (Corbett 2000), at least in negative and other downward entailing contexts, such as questions (e.g. Link 1983, Krifka 1989, Sauerland et al. 2005, Renans et al. 2020). Importantly, this potential confound is controlled for by participants’ behaviour in one of the filler conditions (F2). See below, and also sub-section 4.5, for more discussion of this confound.
In addition to the target items, we included five types of filler items F1 to F5, which simultaneously functioned as controls. The fillers were either unambiguous, or else they strongly favoured one of the two suggested interpretations, as shown below. Examples for each filler/control type are given in (10)-(14):

**F1**  
*No:* In this condition, sentences contained only an existential QP, but no universal QP. **Expected response:** Q-ONE *yes*; Q-MORE *no*

(10) i. **English:** The employees of the ski patrol announced they would temporarily close a ski slope due to the danger of avalanches, and then, in fact, they did close a ski slope.

Can this sentence be understood to mean that, overall, …

Q-ONE … *only a single* ski slope was closed by the employees?

Q-MORE … *more than one* ski slope was closed by the employees?

ii. **German:** Die Angestellten der Pistenwache ham wegen der Lawinengefahr angekündigt, ’ne Piste vorübergehend zu sperren, und tatsächlich ham sie dann auch ’ne Piste gesperrt.

Kann man diesen Satz so verstehen, dass es hier insgesamt …

Q-ONE … *nur eine einzige* Piste gab, die die Angestellten haben sperren lassen?

Q-MORE … *mehr als eine* Piste gab, die die Angestellten haben sperren lassen?

**F2**  
*No, 2-emb:* In this condition, sentences only contained an existential QP, but no universal QP. Additionally, the sentences came with double embedding, thereby paralleling the 2-emb target items. This condition checks for whether participants’ behaviour is simply driven by the additional syntactic complexity
of the sentences, independent of scope relations, and for the potentially confounding effects of plural expressions in the context. **Expected response:**

Q-ONE *yes*; Q-MORE *no*

(11) i. *English*: The secretary suggested that the missing letter might be hidden under folders, and then, in fact, there was a *folder* [that was positioned in such a way [that it covered the letter]].

Can this sentence be understood to mean that, overall, …

Q-ONE … *only a single* folder covered the letter?

Q-MORE … *more than one* folder covered the letter?

ii. *German*: Die Sekretärin hat vorgeschlagen, dass der verschwundene Brief unter Mappen versteckt sein könnte, und tatsächlich war dort dann ’ne *Mappe*, [die so gelegen hat, [dass sie den Brief bedeckt hat]].

Kann man diesen Satz so verstehen, dass es hier insgesamt …

Q-ONE … *nur eine einzige* Mappe gab, die den Brief bedeckt hat?

Q-MORE … *mehr als eine* Mappe gab, die den Brief bedeckt hat?

F3  **Referential:** This condition is comparable to the 0-emb target items in that sentences contained an existential subject QP and a universal direct object QP. However, we added a follow-up clause with a SG pronoun anaphorically referring back to the existential subject QP. **Expected response:** Q-ONE *yes*; Q-MORE *no*

(12) i. *English*: The travellers demanded that a trip to the Baltic Sea be offered, and then, in fact, a *bus driver* drove *every traveller* to the Baltic Sea. But I forgot her name.

Can this sentence be understood to mean that, overall, …
Q-ONE … only a single bus driver drove the travellers to the Baltic Sea?

Q-MORE … more than one bus driver drove the travellers to the Baltic Sea?

ii. German: Die Reisenden ham verlangt, dass 'ne Fahrt an die Ostsee angeboten wird, und tatsächlich hat dann 'ne Busfahrerin jeden Reisenden zur Ostsee gefahren. Ich hab’ aber ihren Namen vergessen.

Kann man diesen Satz so verstehen, dass es hier insgesamt …

Q-ONE … nur eine einzige Busfahrerin gab, die die Reisenden zur Ostsee gefahren hat?

Q-MORE … mehr als eine Busfahrerin gab, die die Reisenden zur Ostsee gefahren hat?

F4  Binominal Each: In this condition, sentences included the distance-distributive quantifier jeweils ‘(binominal) each’ in object position (Zimmermann 2002), distributing over a plural subject DP. Expected response: Q-ONE no; Q-MORE yes

(13) i. English: The tenants on the ground floor threatened to file a complaint about the drums on the 1st floor, and then, in fact, they filed a complaint each.

Can this sentence be understood to mean that, overall, …

Q-ONE … only a single complaint was filed by the tenants?

Q-MORE … more than one complaint was filed by the tenants?


Kann man diesen Satz so verstehen, dass es hier insgesamt …
Q-ONE  … nur eine einzige Beschwerde gab, die die Mieter eingereicht haben?
Q-MORE  … mehr als eine Beschwerde gab, die die Mieter eingereicht haben?

F5  ➠ ➤: In this condition, sentences came with the order of QPs reversed, with a universal subject QP and an existential object QP. Expected response: Q-ONE no; Q-MORE yes

(14)  i.  English: The doctor ordered that the nurses should be supported by caregivers, and then, in fact, each caregiver supported a nurse.
Can this sentence be understood to mean that, overall, …
Q-ONE  … only a single nurse was supported by the caregivers?
Q-MORE  … more than one nurse was supported by the caregivers?

ii. German: Der Arzt hat angewiesen, dass die Krankenschwestern von Pflegern unterstützt werden solln, und tatsächlich hat dann jeder Pfleger ’ne Krankenschwester unterstützt.
Kann man diesen Satz so verstehen, dass es hier insgesamt …
Q-ONE  … nur eine einzige Krankenschwester gab, die die Pfleger unterstützt haben?
Q-MORE  … mehr als eine Krankenschwester gab, die die Pfleger unterstützt haben?

There were 18 items of F1, 6 items of F2, 6 items of F3, 6 items of F4, and 12 items of F5. The English experiment had only 6 items of F5, since there was yet another filler condition F6 with another 6 items, see below. Same as the target items, each filler item was always presented with only one of the two question types. That is, each
participant saw half of the filler items for each filler type with one question type and the other half with the other question type.

As already stated above, condition F2 controls for the potentially confounding effects of a plural NP in the context in the following manner: If participants’ behaviour were simply guided by shallow morphological processing, this should become visible in an increased percentage of unexpected ‘yes’-answers to Q-MORE, both in the main conditions and in F2. F3 to F5 are also important as the items in these conditions resemble the target items in terms of semantic complexity. They all express relations between two quantified (or plural) DPs. The participants’ task in processing and interpreting such sentences is therefore directly comparable to that of the target sentences. We will therefore take the response patterns of participants to F3 through F5, specifically, as a negative baseline for the general (un)availability of a particular semantic interpretation, and here specifically for the availability of inverse scope in the tested configurations. In what follows, we will assume that a scope interpretation is absent if its acceptability rate is not clearly higher than that of the unexpected response for the unambiguous items in the fillers.

The English part of the experiment contained an additional filler condition F6, VP-ellipsis, which tested for the availability of inverse readings under VP-ellipsis with a referential subject DP, cf. (5) above. We included this condition to replicate the experimental results in Anderson (2004), which were at odds with empirical claims in Fox (2000). To avoid a potential confound in Anderson’s experimental design, we moreover adjusted the relevant filler items so that the two subject denotations come from disjoint sets, cf. (15):
The Dingaling Circus presented their elephant show to the excited audience.

The trainer announced that the elephants could be rewarded by spectators, and then, in fact, a spectator rewarded every elephant, and the trainer [vp did], too.

Can this sentence be understood to mean that, overall, …

Q-ONE … only a single spectator rewarded the elephants?

Q-MORE … more than one spectator rewarded the elephants?

Overall, we had 48 target items and 48 filler/control items in the English and German versions, respectively, which came in randomised order. The three-level within-item manipulation Embedding together with the two alternating question types Q-ONE and Q-MORE resulted in six lists of a total of 96 sentence-question pairs to be answered by each participant.

3.1.2 Task: After each target sentence, participants had to answer one of the two questions Q-ONE or Q-MORE in (6b) to (9b), which were pseudo-randomly assigned to the items. The first question type Q-ONE asked if an interpretation of the sentence corresponding to the surface reading was available, while the second question type Q-MORE asked whether an interpretation corresponding to the inverse reading was available. Participants could answer with either ‘yes’ or ‘no’. We opted for this type of forced choice task – as opposed to a direct choice between the two simultaneously presented readings – because we were mainly interested in the general availability of a given interpretation. The chosen procedure was meant to ensure that we do not miss any readings that are in principle available, but dispreferred for processing or other reasons. We thereby increased the experiment’s sensitivity for inverse scope readings.

3.1.3 Linking Hypothesis: The linking hypothesis was as follows: An answer ‘yes’ to Q-ONE or Q-MORE means that the tested reading is available for the relevant target
item. An answer ‘no’ means that the tested reading is not available. Let us elaborate on the linking hypothesis for ‘yes’-answers to Q-MOREs, which were designed for detecting inverse readings, our central concern in this paper. Recall that a ‘yes’-answer to Q-MORE affirms that more than one entity has the relevant NP-property in question. An anonymous reviewer comments that, strictly speaking, such answers would also be logically compatible with a surface scope reading, namely on a non-exhaustive construal of the indefinite NP. If so, this would increase the probability of false positives. This could happen, for instance, if participants were to accommodate the existence of other objects of the same NP-type. And this in turn might be facilitated by the restricting adjective in target sentence and Q-MORE. For (6), the explicit mention of ‘newly installed camera’ in the target clause might thus lead participants to accommodate the existence of other, e.g., older cameras. And this might in turn induce participants to answer Q-MORE with ‘yes’ on a surface scope construal. The logic behind this is that, in answering Q-MORE, participants would also take into consideration the pragmatically accommodated cameras on top of the single newly installed one provided by semantic surface scope. We would like to maintain, though, that this type of accommodation is blocked in the given context on general discourse semantic grounds. In (6), the police officer’s hope is for the burglars to be recorded by newly installed cameras, and the presence of the consecutive marker and then signals that this hope was satisfied in the literal sense. By contrast, the accommodation of older cameras, as indicated by the underlined NP in (16a), is inconsistent with such consecutive marking. Instead, it requires the presence of contrastive but then, as shown in (16b).
a.# The police officer hoped that the burglars might be recorded by newly installed surveillance cameras, \textit{and then}, in fact, both a newly installed surveillance camera \textit{and an old camera} recorded every burglar. \\
b. The police officer hoped that the burglars might be recorded by newly installed surveillance cameras, \textit{but then}, in fact, both a newly installed camera \textit{and an old camera} recorded every burglar.

All context predicates were of this kind, i.e., introducing a projected event in the future (order, predict, plan, promise, \ldots). The presence of a restricting adjective in target sentence and Q-MORE therefore does not increase the risk for false positives.\textsuperscript{9} Moreover, participants were explicitly advised to focus only on the literal content of the target sentences to further reduce the risk of unwanted ‘yes’-answers to Q-MORE on a surface scope construal.\textsuperscript{10} In sum, we take a ‘yes’-answer to Q-MORE to be clearly indicative of an inverse scope reading, at least in the neutral context conditions. This conclusion receives further support by the results of a follow-up experiment with an unambiguous picture-matching design, which we will present in sub-section 4.5.

3.1.4 Procedure: The experiment was conducted online for both languages, using the free software OnExp, version 1.3.1 (GNU General Public License) of the University of Göttingen (http://onexp.textstrukturen.uni-goettingen.de/). Participants read the general instructions, which were followed by three practice items. After that, participants saw the stimuli in randomised order. Participants could take a break after the first half. They were encouraged to only rely on their own intuition when answering the questions.
3.1.5 Subjects: The participants in the German online experiment were recruited through the SONA-participants pool of Potsdam University. They could take the experiment for monetary compensation (8€) or for course credit (1h) for their participation. 70 students of the University of Potsdam participated in the German experiment. Three of them were excluded from the analysis, because they answered less than 2/3 of the control conditions as expected, leaving 67 participants. Participants were between 17 and 58 years old and had a mean age of 24. 59 of them were female and 8 of them were male. All of them were native speakers of German.

The 58 participants in the English online experiment were recruited through Prolific and received a monetary compensation of 8£ for their participation. We restricted the participant pool to the US. 15 of the participants were excluded from the analysis because they answered less than 2/3 of the control conditions correctly, leaving 43 participants\textsuperscript{11}. They were between 21 and 45 years old and had a mean age of 33. 19 of them were female and 24 of them were male. All of them were native speakers of American English.

3.2 Predictions

We will discuss the predictions of the existing theoretical accounts for German and English separately. For German, we will furthermore distinguish between a literal interpretation of existing accounts, on the one hand, and a more flexible modified version that will increase the chances for inverse scope, on the other. Finally, we will discuss the predictions for the embedding conditions in sub-section 3.2.3.

3.2.1 Predictions for German: The central accounts of relative quantifier scope in German are Frey (1993), Krifka (1998a), Pafel (2005), and B&W (2012). On a literal interpretation, all four accounts predict, or at least strongly suggest (see FN1), that
inverse readings should be unavailable in German across the six conditions of our experiment. Even though the accounts differ in detail regarding the general availability of inverse scope, they all agree on the central point that inverse readings in German are only available in exceptional cases. Relevant factors are the actual or potential application of overt movement (Frey 1993, B&W 2012), specific syntactic configurations, such as inverse linking (Zimmermann 2020) or specific prosodic patterns (Frey 1993, Krifka 1998a, Pafel 2005), or the inherent lexical properties of the two quantifiers involved (Pafel 2005). Without additional assumptions, all the accounts predict inverse readings to be systematically absent in German in the specific syntactic configuration tested in our experiments, namely clauses with subject QP and object QP in canonical word order under a verum intonation. We illustrate this for the main clause condition 0-emb on the account in B&W (2012). The authors argue that this syntactic configuration allows for the application of overt scrambling in order to transparently express the intended scope configuration. In the absence of additional constraints on overt movement, the expression of inverse readings by this syntactic configuration should therefore be disfavoured by the violable constraint ScoT; see section 1. (17) shows that overt movement is indeed available in the German 0-emb target items. The structure in (17) with scrambling should therefore be the optimal structural representation of the intended reading, as it satisfies ScoT, unlike the canonical sentence without scrambling in (7) above.

(17) Der Polizeibeamte hatte vermutet, dass die Einbrecher von neu angebrachten Überwachungskameras aufgenommen worden sein könnten, und tatsächlich hat dann
The police officer suspected that the burglar might have been recorded by newly installed surveillance cameras, and then, in fact, …

… [jeden Einbrecher], [ [ ‘ne neu angebrachte Kameral] t₁ aufgenommen].

every<ACC> burglar a newly installed camera<NOM> recorded.

‘… every burglar was recorded by a newly installed camera.’

In fact, the application of overt movement in (17) is also the preferred option on information-structural grounds, which in other cases may counteract the application of overt movement in the account of B&W (2012); see the discussion of (3) above. The definite subject DP die Einbrecher ‘the burglars’ in the immediately preceding passive clause is structurally prominent and referential, thereby setting up the fronted object QP jeden Einbrecher in the target clause as the most likely sentence topic. The indefinite DP Überwachungskameras, by contrast, does not qualify as a topic in the absence of an accented indefinite determiner; see Ebert & Hinterwimmer (2010) on the dependency of indefinite topics on accenting. This way, (17) satisfies the IS-constraint of Topic>Focus (which B&W treat as a specific instance of ScoT) in addition to quantifier-based scope transparency.¹⁴ Finally, the domain restriction of the object QP refers anaphorically to the definite antecedent DP, thereby giving it the information status of definite or given (Krifka 2008). This way, the scrambling structure in (17) satisfies yet another information-structural constraint on word order in the German middle field, namely DEF>INDEF from Lenerz (1977), whereas the canonical sentence in (7) violates it. Given that (17) is the preferred option over canonical (7) both on scope-related and information-structural grounds, then, we do not see which independent factors should block the application of overt scrambling in
But if so, inverse scope should be systematically ruled out for the canonical configuration in (7), which was the configuration of interest in the experiments.

An anonymous reviewer points out that it may be possible, in principle, to extend B&W’s (2012) system by including additional constraints, so that the enriched version will also allow for the derivation of inverse scope readings with canonical German sentences, cf. (7). And indeed, there is a way of modifying B&W’s system so that it will allow for inverse readings in the condition IR-biased, in which the inverse reading is the only plausible interpretation given world knowledge. As has been frequently observed for English (Gillen 1991, Kurtzman & MacDonald 1993, Saba & Corriveau 2001, Villalta 2003, Anderson 2004, Reinhart 2006, Srinivasan & Yates 2009), plausibility considerations facilitate or support the availability of inverse readings. Reinhart (2006) proposes an interface constraint of C(ontext)Plausibility that licenses the application of otherwise illicit QR to ensure a plausible interpretation by way of a last resort mechanism. In the specific architecture of B&W’s (2012) OT-system, which takes the semantic interpretation as input and yields different surface realisations as outputs to be evaluated against the interface constraint ScoT, we could model the effects of C-Plausibility by slightly revising the workings of ScoT. From an interface perspective, ScoT will only be applicable, or useful, in syntactic configurations that allow for two plausible scope interpretations. Only in such cases will it effectively help to resolve scope ambiguities under scope transparency. In the condition IR-biased, however, there is only one plausible interpretation to begin with, such that ScoT would be inapplicable or vacuously satisfied. This is indicated by the two ‘✓’ in the ScoT cells in Table 1 below. If overt movement is further constrained by the additional economy constraint *MOVE (Grimshaw 1997), and if this constraint
ranks below vacuously satisfied ScoT, the enriched OT-system will give out canonical configurations without scrambling as the optimal structures for expressing inverse readings in condition IR-biased, cf. Table 1, but not in condition neutral, cf. Table 2.

INSERT TABLE 1 HERE

INSERT TABLE 2 HERE

The use of the canonical syntactic configuration A>>B for expressing the inverse scope reading B>>A in (9) and Table 1 would then constitute an instance of the Emergence of the Unmarked, which is typically the result of violating lower-ranked constraints. To conclude, a slightly revised version of B&W’s (2012) system would predict differences across context conditions, while still ruling out inverse readings for canonical SUBJ>OBJ sentences in the neutral context condition.16

3.2.2 Predictions for English: For the English experiment, B&W (2012) predict inverse readings to be generally available, modulo hard syntactic constraints (e.g., island constraints), since the application of overt movement is strongly constrained by the rigid word order of English. With regards to the target items, scrambling of the object before the subject is illicit in English, as shown in (18), which makes the canonical SUBJ>OBJ configuration the only available structure in English.

(18) *… an then, in fact, [every burglar]obj,1 [a newly installed camera]sbj recorded t1

Inverse readings should therefore be available in the 0-emb condition in both the neutral and IR-biased condition. Even though the authors do not specifically discuss the impact of context and world knowledge (see sub-sections 3.1.1 and 3.2.1), we predict that these should also have an impact. The effects of context are incorporated in the analyses of Fox (2000) and Reinhart (2006), which hold that the LF-operation of QR is in principle available in English, but its application generally blocked by
economy constraints. However, QR can be triggered by interface constraints, such as C-Plausibility (or the emergence of a new reading, see Fox 2000). Given the discussion in Reinhart (2006), we predict the acceptance rate of inverse readings to be higher in the IR-biased/0-emb condition, as compared to the neutral/0-emb condition.

3.2.3 Predictions for Embedding: As for embedding, traditional generative accounts rule out inverse readings in English and German. Since B&W’s (2012) account is based on Quantifier Raising, inverse readings are expected to be blocked by general island constraints on overt and covert movement; see, e.g., Huang (1995) for extensive discussion. Since relative clauses have been traditionally considered strong islands for extraction, it should be impossible to extract QPs in condition 1-emb, so that inverse scope readings should not be attested. By contrast, semantic accounts of inverse scope in terms of type-shift or continuation semantics tend to be more liberal in allowing for inverse scope from out of tensed (relative) clauses; cf., e.g., Szabolcsi (2011), Barker (2012) and Steedman (2012). The examples (19ab) from Barker and Shan (2014: 111) and Barker (2012: 624, ex. 33) illustrate this for the strongly distributive universal quantifier each. According to Barker (2012), the properties of wide scope and pronominal binding outside the relative clause in (19ab) go hand in hand. 17

(19) a. [[The man who builds] each clock] also repairs it.

b. The grade [that each student receives] is recorded in his file.

Inverse scope readings in condition 1-emb are likewise predicted to be available, to some extent, by QR-based syntactic analyses of scope that take a more liberal view on relative scope islands; see sections 2 and 3.1. If relative clauses do not constitute absolute islands for movement, inverse readings should be available to some degree.
(Wurmbrand 2018). Alternatively, the indefinite head NP may reconstruct to its base position inside the relative clause on raising analyses of relative clauses (Bhatt 2002, Hulsey & Sauerland 2006). Finally, we expected inverse scope readings to be difficult to obtain in the 2-emb-condition, in which the universal object QP is embedded inside yet another finite clause within the relative clause.

3.2.4 Predictions Overview: The different accounts leave us with a complex array of predictions for the different conditions in the two languages, as summed up in Table 3. **Structural Literal** stands for the explicit syntax-based accounts of German quantifier scope in Frey (1993) and B&W (2012), but the predictions would be the same for Pafel’s multi-factorial model at least in the 0-emb conditions. **Structural + Modified** stand for QR-based analyses, such as B&W’s (2012), that are modified to account for the effects of plausibility considerations on the derivation of inverse scope readings. **Structural + Modified + Liberal** stands for modified QR-based analyses in combination with a more liberal position on the island status of restrictive RCs, at least relative to their indefinite head NP. ‘?’ indicates that the relevant configurations with double embedding have not been discussed much in the literature on semantic scope and syntactic extractions. The general expectation would be that inverse readings and/or wide extractions should be difficult to obtain from these environments on structural accounts as this would involve the crossing of two island boundaries (marked by ‘?*’).

**INSERT TABLE 3 HERE**

The structure-based accounts stand in opposition to semantic accounts, which make identical predictions across context conditions and languages. The latter are quite permissive, possibly also allowing for inverse scope under double embedding.
This way, they incur the risk of overgeneration and of obscuring subtler differences between languages, contexts, and individual speakers. We turn to the experimental results next.

3.3 Results

Table 4 shows the descriptive results for German, the results for English are shown in Table 5. A visual representation of the data is given in Figure 1. The full set of data together with the list of items is retrievable from to be provided. The tables show the proportion of ‘yes’-answers to Q-ONE and Q-MORE in the six experimental conditions, where ‘yes’ indicates that the targeted scope reading (SR vs IR) is available.

INSERT TABLE 4 HERE

INSERT TABLE 5 HERE

INSERT FIGURE 1 HERE

The results for the surface readings are shown in the first two rows of Table 4 for German and the first two rows of Table 5 for English. In neutral contexts, the German participants accepted the surface reading in 83% of the cases in the 0-emb condition, which increased with deeper embedding to 90% in 1-emb and 93% in 2-emb. The English participants accepted the surface reading only in 69% of the cases in the 0-emb condition. Here, too, the acceptability increased with deeper embedding to 80% in 1-emb and 89% in 2-emb, respectively. Moving on to the IR-biased condition, we can see that the German participants still accepted the surface reading in 49% of the cases in the 0-emb condition. This again increased to 71% in 1-emb and 81% in 2-
The English participants accepted the surface reading in 34% of the cases in both 0-emb and 1-emb, which increased to 68% in 2-emb.

As for the availability of inverse readings, the results are shown in the two bottom rows of Table 4 for German and the two bottom rows of Table 5 for English, respectively. Most importantly, the German participants accepted the inverse reading in 39% of the cases in neutral contexts without embedding, which decreased to 21% and 16% with single and a double embedding, respectively. The English participants even accepted the inverse reading in 52% of the cases with no embedding, but also in 52% of cases with single embedding! This decreased to 19% in the 2-emb condition.

Moving to the IR-biased contexts, we see that in the German experiment, the availability of inverse readings increased to 65% of the cases in 0-emb, which then decreased to 50% in 1-emb and 34% in 2-emb. In the English experiment, the inverse reading was available in in 84% in 0-emb, which also decreased in 1-emb and 2-emb to 74% and 44% respectively.

We analysed our data in the free software R (version 3.6.1; R Core Team, 2019) with a generalised linear mixed model fit by maximum likelihood using the package lme4 (Bates et al., 2015). The factor Context Plausibility was analysed using a treatment contrast with neutral as the baseline. The factor Embedding was analysed using a sliding contrast, comparing the 1-emb to the 0-emb condition, and the 2-emb to the 1-emb condition. The formula is given in (20).  

\[(20) \quad \text{Formula: interpretation } \sim \text{ plausibility } \times \text{ embedding } + (1 | \text{ participant}) + (1 | \text{ item})\]

In the statistical data analysis, we collapsed the two types of questions in the following way: ‘yes’-answers to Q-ONE were collapsed with ‘no’-answers in Q-
MORE, and ‘no’-answers to Q-ONE were collapsed with ‘yes’-answers to Q-MORE. This was done in order to allow for a simpler analysis and to avoid taking in question type as an additional factor. The analysis of the German data set revealed a main effect of plausibility and embedding, with a significant difference between the neutral vs. the IR-biased condition (p < 0.01), the single-embedding vs. the zero-embedding condition (p < 0.01), and the double-embedding vs. the single-embedding condition (p < 0.01). None of the interactions came out as significant (neutral/IR-biased vs. 0-/1-emb: p < 0.47; neutral/IR-biased vs. 1-/2-emb: p < 0.19).

As for the analysis of the English data set, there was again a main effect of plausibility and embedding, with a significant difference between the neutral vs. the IR-biased condition (p < 0.01), and the double-embedding vs. the single-embedding condition (p < 0.01). However, the difference between the single-embedding vs. the zero-embedding condition did not reach significance (p < 0.09). Again, the interactions did not come out as significant. (neutral/IR-biased vs. 0-/1-emb: p < 0.93; neutral/IR-biased vs. 1-/2-emb: p < 0.3).

The results for the filler/control items are shown in Tables 6 and 7 for German and English, respectively. The response patterns match our expectations for the five filler conditions that were tested for both English and German: responses were in line with our a priori expectations between 87% and 98% of all cases.

INSERT TABLE 6 HERE

INSERT TABLE 7 HERE

4. General Discussion
Not only do the two experiments provide data on German and English scope interpretation in isolation, but more importantly, they allow for a direct comparison between the two languages. To our knowledge, this is the first in-depth cross-linguistic investigation of quantifier scope in German and English with quantitative experimental data, and we consider this the main empirical and theoretical contribution of the paper. In the discussion, we will first discuss the results of the fillers. We will then proceed to discuss the results for the target items for each language in turn, before focusing on the cross-linguistic comparison. The main insight will be that English and German show no categorical difference in the availability of inverse scope readings in the relevant subject–object configurations: the observable differences are only gradual in nature. Following a discussion of the observable by-participant variability, we will then turn to the findings for embedding conditions. The section concludes with a discussion of possible confounds, and why these confounds do not affect our overall cross-linguistic conclusions.

The results of the filler items for both English and German presented in 3.3 show, first, that our experimental design is ecologically valid, and that, overall, participants attended to the task and processed the linguistic items in sufficient depth to come up with an appropriate answer. Secondly, the percentage of responses deviating from the expected answers (6% - 13%) gives us a measure for the expected effects of noise arising from lack of attention or processing problems, or for some remaining confounds with the experimental design, such as the type-token ambiguity mentioned in 3.1.1. Notice specifically that deviations from the expected response took place in between 5% and 11% of all cases in the filler conditions F3 to F5. Recall from above that these filler conditions paralleled the target items in complexity, namely by
expressing a relation between two quantified (or plural) NPs. The processing effort should therefore be comparable to that in the target items. The deviation in F3 to F5 thus gives us a reliable diagnostic measure for the unavailability of a particular interpretation: we will only consider percentages that are clearly above the noise threshold of 11% (i.e., >20%) to be indicative of a given scope reading. Notice, finally, that the percentage of unexpected ‘yes’-answers to Q-MORE in the doubly embedding condition F2 does not exceed this noise-threshold either, not even in the potentially confounding presence of a plural DP in the context; see sub-section 3.1.1. We take this as evidence that the presence of plural DPs does not lead to shallow processing-related effects in the form of false positive answers to Q-MORE readings.23

Turning to the target items in the German experiment, the results suggest that contrary to recurring claims in the theoretical literature, German does indeed allow for inverse scope readings in our target sentences with existential subject QPs and universal object QPs in canonical word order with verum intonation. This is most obvious in neutral contexts, where there is no pragmatic pressure for choosing the inverse scope reading, given that the surface scope reading is a plausible interpretation to begin with. Crucially, although the inverse reading is dispreferred in our neutral baseline condition [neutral, 0-emb], it is still acceptable in 39% of the cases. Considering the absence of pragmatic pressure, and, given that our design did not directly prompt for a forced choice between the two readings, participants’ behaviour in this condition provides evidence that speakers of German have in fact access to inverse readings in the structural configuration of interest. At the same time, there are also effects of syntactic structure observable in the 0-emb conditions in
German, such as the relatively low 65%-percentage of ‘yes’-answers to Q-MORE in the IR-bias condition. If participants were solely driven by pragmatic considerations, this percentage should have been much closer to the ceiling (modulo the noise threshold).  

Structural effects are also visible in the embedding conditions 1-emb and 2-emb, such as, for instance, the increasing percentage of ‘yes’-answers to Q-ONE in both neutral and IR-biased context, and the decreasing percentage of ‘yes’-answers to Q-MORE in both contexts. In neutral contexts, the percentage of ‘yes’-answers to Q-MORE in 1-emb (21%) and 2-emb (16%) is quite close to the noise threshold set by the control conditions F3 to F5 (≤11%). In particular, the difference in percentage between 2-emb and the more robust 1-emb, on the one hand, and between 2-emb and F3 to F5, on the other, is the same, so that we lack evidence for the availability of inverse readings in the condition neutral/2-emb.  

This is different in IR-biased contexts, where the percentage of ‘yes’-answers is way above the noise threshold with 50% and 35%, respectively. This would suggest that inverse readings are available in these configurations after all, of which more below.  

As for the English results, the acceptance of the inverse reading in 52% of the cases in the neutral 0-emb baseline condition is in line with previous experiments on English, which all showed that inverse readings are readily available for native speakers of English (see section 2.2). In contrast to German, effects of syntactic structure are largely restricted to the embedding conditions. Interestingly, though, the conditions 0-emb and 1-emb both show a 52% acceptability of IR-readings in neutral contexts. This suggests that restrictive relative clauses are not strong scope islands, at
least in English, much in line with introspective and corpus-based claims from the semantic literature (Sharvit 1999, Barker 2012). Same as in German, English shows a strong effect of context on the availability of inverse readings across all three embedding conditions, which is in line with claims and predictions in previous literature on English quantifier scope (Gillen 1991, Kurtzman & MacDonald 1993, Saba & Corriveau 2001, Villalta 2003, Anderson 2004, Reinhart 2006, Srinivasan & Yates 2009). The effect of context is so strong that the inverse reading, which is generally considered dispreferred in both English and German, was in fact the preferred reading in the 0-emb condition in German, and in the 0-emb and 1-emb condition in English, with a higher proportion of ‘yes’-answers to Q-MORE than to Q-ONE.

Comparing German and English, we see that the acceptance of inverse readings is higher across all conditions in English than in German. However, inverse readings are still available to speakers of German in most conditions, with the percentage of affirmative answers to Q-MORE being above the noise threshold in the baseline condition [neutral, 0-emb] and in the three embedding conditions in IR-biased contexts. Whereas plausibility considerations are helpful in the derivation of inverse scope readings in German, their presence is certainly not a necessary condition, as witnessed by the availability of inverse scope readings in the 0-emb/neutral baseline condition.

4.1. Comparison with Predictions

Our findings on the availability of inverse scope between existential subject QPs and universal object QPs in German clash with the empirical claims and with the concrete formal analyses in the German-specific literature (e.g., Frey 1993, Krifka 1998a, Pafel
The unanimous position there is that inverse readings are systematically ruled out for this specific structural configuration under verum prosody. Likewise, our results are not fully compatible with the predictions of the more permissive modified version of B&W (2012), that is Structural + Modified + Liberal from section 3.2. Recall that this QR-based model is additionally endowed with a sensitivity for context plausibility (Reinhart 2006) and takes a more permissive take on relative clauses as scope transparent (Wurmbrand 2018, Bhatt 2002). The model would hence predict the general availability of inverse scope in the conditions IR-biased and 1-emb for both languages, but inverse scope in the baseline condition neutral/0-emb in German would still be ruled out. The relevant percentages for IR-readings in the six conditions in English and German are shown again in Table 8, which also shows the predictions of the more permissive theoretical model Structural + Modified + Liberal and of the semantic accounts, respectively.

As can be seen, the predictions of Structural + Modified + Liberal are fairly accurate for English and for the context factor IR-biased in German (to the exception of IR-biased/2-emb), but the model fails to account for the availability of inverse scope readings in the neutral baseline condition. Semantic accounts, by contrast, fail to account for the cross-linguistic differences between English and German. Crucially, neither account captures the observable gradual differences in the availability of IRs between German and English, or the observed by-participant variability to be discussed below. This would seem to call for an altogether different probabilistic approach to the generation of inverse scope readings in languages. The likelihood of inverse readings is not only tied to plausibility considerations, but it seems also
grounded in the independently attested general syntactic properties of a given language. A syntax-based account that attaches a probabilistic measure to the applicability of the cross-linguistically available operation QR would hence seem overall better suited to account for the gradual differences in inverse scope availability between languages and speakers. This brings us to the question of which independent cross-linguistic differences in the syntax would have a bearing on the availability of inverse scope. The answer to this question will take up a central idea of B&W (2012), namely that relative differences in the availability of inverse scope readings across languages are tied to the independently attested possibilities for syntactic reordering in that language.

4.2 Word order freedom and relative exposure to scope-transparent configurations

Our experiments provide novel evidence that the observable cross-linguistic differences in the availability of (inverse) scope readings should not be captured in the form of universal parameters (+/- global scope rigidity), nor in the form of language-specific rules that are tied to word order freedom in particular syntactic configurations (local scope rigidity). Either account would completely block the derivation of inverse readings in German in contrast to English. By contrast, we take the difference between English and German to be only gradual in nature. In analysing this gradual difference, we follow B&W (2012) in assuming that inverse scope readings are generated in both English and German via the universally available syntactic operation of QR.26 We deviate from them, however, in no longer assuming local scope rigidity, as driven, for instance, by ScoT. Instead, we consider QR to be in principle available across-the-board, in whichever syntactic configuration. The relative availability of QR for a particular syntactic configuration in a given language will
then differ depending on several factors: (i.) the semantic factor of context plausibility (Reinhart 2006); (ii.) the semantic properties of the existential (indefinite) and universal quantifiers involved (Ioup 1975, Brasoveanu & Dotlačil 2015); and (iii.) on the existence of alternative, more scope-transparent ways of expressing the intended \( \exists \forall \)-scope interpretation for that configuration in a given language. This last aspect invokes the notion of a global transderivational comparison; see Reinhart (2006) and Szendrői et al. (2017). Speakers assess the relative likelihood of the two scope interpretations for a single syntactic surface string, that is, the relative likelihood of different sound-meaning pairs \(<p_0, i_1>, <p_0, i_2>, \text{ etc. }\) against the background of more transparent alternative ways of expressing the individual scope readings; see also Scontras et al. (2018). As the number of alternatives is correlated with the degree of freedom in overt word order, there is indeed a correlation between language-specific freedom in word order, on the one hand, and the availability of inverse scope, on the other. However, this correlation is only indirect, and it is conditioned by mere exposure effects. Such exposure effects may, for instance, be formally modelled in the form of an appropriate prior probability in the Bayesian Rational Speech Act framework (Frank & Goodman 2012): As German speakers have the option of overt scrambling available most of the time, though not in inverse linking constructions, they will be exposed to canonical sentences with inverse scope to a much lesser degree in production as well as in perception. In other words, the greater flexibility in word order in German has the effect that German speakers are not used to producing or processing inverse scope to the same degree as English speakers. This in turn will significantly reduce their prior probability for inverse readings for sentences with canonical word order, thereby making the computation of inverse scope readings
more effortful for German speakers, and thereby less likely. In the same vein, different degrees of exposure may be responsible for the observable by-participant variability; see below. Finally, the exposure-driven analysis in terms of Bayesian reasoning and decision-making between two available scope interpretations makes two additional predictions to be tested in future work: We expect that a higher acceptance rate of inverse scope readings should be trainable by a higher degree of exposure. In addition, we expect that inverse readings with canonical word order will be more frequent in English written corpora than in German ones.

4.3 By-participant variability

There is an additional argument for a cross-linguistic analysis of scope in terms of gradual probabilistic differences against analyses that systematically license or block inverse readings by means of categorical language-specific rules. The argument is based on the observable variability in by-participant data. Both German and English participants exhibit a significant variability in the extent to which they accept the two different scope readings. This is shown in Figures 2 and 3.

INSERT FIGURE 2 HERE

INSERT FIGURE 3 HERE

While the grand mean is overall lower for German as compared to English, the individual participants deviate strongly from this value. In either language, some participants always accepted the inverse scope reading in a given condition, whereas others always rejected it in a given condition. Unfortunately, most experiments on quantifier scope interpretation do not provide these by-participant data. However, the study by Brasoveanu & Dotlačil (2015) on English quantifier scope also found a strong by-participant variability. They sort the participants into three groups: with SR
bias, with IR bias, and without a strong bias (the largest group). Gil (1982) also discovered a highly variable behaviour between participants in an empirical investigation of scope with numeral expressions. It is difficult to see how to align this between-speaker variability, which is observed in both English and German, with a grammatical specification that would systematically block inverse readings in German, whilst systematically allowing for them in English. The exposure-hypothesis, in contrast, predicts inverse readings to be generally available across languages and speakers, but at the same time it allows for individual differences between participants, which may be tied to the amount of exposure (dialectal differences, foreign language contact, …), general cognitive capacities (e.g. working memory), language-related processing capabilities, or simply to personal style.

4.4 Inverse scope and embedding

The two embedding conditions provide a final interesting data point. On traditional syntactic accounts of scope, the prediction is that inverse readings should be ruled out not only in German but also in English if we consider inverse scope to be achieved via QR. This would follow from the island status of relative clauses for movement (Huang 1995). Quantifier Raising across the finite clause boundary should be blocked, and especially so in condition 2-emb, in which the lower QP is embedded in another finite clause. However, the acceptance rate of IRs under embedding is higher than the rate of unexpected responses in the unambiguous fillers in both English and German with the exception of condition neutral/2-emb in German (compare the values in Table 4 and 5 to those in Table 6 and 7). More importantly, the difference between the 0-emb and the 1-emb conditions in English does not come out as significant in either context condition. This suggests that the English relative clause
configuration under investigation exhibits a relatively high degree of scope transparency and a potential for inverse scope relative to the indefinite NP-head. This is in line with Tsai et al. (2014), who, employing a different method, found that speakers of English accept the inverse reading to a certain degree, even out of relative clause embeddings. However, their experiment showed a difference in acceptability between embedding and no embedding. In fact, inverse scope effects with relative clauses have also been reported in theoretical work on scope, though mostly with definite RC-heads (e.g., Sauerland 2005, Hulsey & Sauerland 2006, Szabolcsi 2010, Barker 2019). In effect, the data suggest that we may have to reconsider some basic assumptions on QR and on the scope opacity of relative clauses from the traditional literature. In section 5, we will briefly discuss possible theoretical approaches to the relatively high acceptance rate of inverse scope readings from the specific relative clause configuration under investigation.

4.5 Confounds again

Before doing so, we would like to conclude this section with a brief discussion of the insignificance of potential experimental confounds for our cross-linguistic conclusions regarding the availability of inverse scope in English and German. As already discussed above in sub-section 3.1.1, there are a number of possible confounds that might affect the relative percentages of answers to Q-MORE and Q-ONE in the two languages: Speakers could, for instance, arrive at non-exhaustive surface scope readings through accommodation, which would lead them to answering Q-MORE in the affirmative (and Q-ONE in the negative) despite the presence of the consecutive discourse marker and then; cf. (16) above. Second, they could derive a type-referential surface reading from which to derive an affirmative answer to Q-
MORE via the different instantiations of the type. Third, speakers might also float structural considerations in favour of purely pragmatic factors in terms of plausibility considerations. We concede that this may actually be the case in condition \([IR\text{-}bias, 2\text{-}emb]\), in which the answer patterns suggest that IRs were accepted to an unexpectedly high degree (even considering other confounding factors) with 44% (English) and 35% (German), respectively; but see section 5 for additional discussion. At the same time, we see clearly that pragmatics is not everything. As discussed above, the importance of structural factors shows in the relatively low acceptability of inverse readings in condition \([IR\text{-}bias, 0\text{-}emb]\), in which we would expect a higher percentage of ‘yes’-answers if participants’ behaviour were only guided by pragmatic considerations. More importantly, though, such confounding factors should affect the response behaviour of German and English speakers in parallel ways, as the experimental design and the experimental items were built in parallel. In conclusion, whereas the relative availability of inverse scope readings, or their exact nature as structure- or pragmatic-driven, may be subject to debate for individual conditions in the individual languages, this does not affect our central cross-linguistic conclusion: The two languages exhibit no categorical difference in the availability of inverse scope readings in the configurations under investigation – the observable differences are only gradual in nature, as also evidenced by the high inter-speaker variability in participants’ responses. In addition, the availability of inverse readings is robustly attested in the baseline condition \([neutral, 0\text{-}emb]\) not only in English, but also in German. This shows that German does allow for inverse scope readings between subject and object QPs, contrary to claims in the existing literature.
An anonymous reviewer proposes an alternative account of the data that is based on another potential confound already alluded to above. This alternative would maintain a global categorical difference between English and German as [+/-IR], respectively, with the observable differences following from interaction with two other factors, plausibility and number features. Plausibility would sometimes favour ‘yes’-responses to Q-MORE, especially in the presence of a plural DP in the context (see section 3.1.1). Recall that our experiments explicitly control for context plausibility. The ‘yes’-boosting effect of plausibility to Q-MORE in condition IR-bias would then be counteracted by the factor number features. The higher the number of elements with unambiguous SG morphology in the target clause (NP, relative pronoun, verbs), the lower the number of ‘yes’-answers to Q-MORE should be. The reduction would thus be greater in German than in English. This alternative meets with several problems, though. First, it would mean that the 39% yes-responses in the condition neutral/0-emb in German are exclusively triggered by the presence of a plural NP in the context. Second, although the plausibility conditions neutral/IR-bias are held constant across all three embedding conditions, we see different answer patterns. With plausibility controlled for, it should again be the second factor of number features that is responsible for the observable differences, i.e., the greater number of SG-marked elements in the German targets. However, as already mentioned in section 3.3, the control condition F2 provides no evidence at all that number features would have any effect on participants’ responses: First, participants only give ‘yes’-answers to Q-MORE in 6% (English) and 11% (German) of all cases, i.e., well within the noise range, even though there is a plural DP in the context. Second, there is no clear cross-linguistic difference even though – same as in the 2-
**emb** target items – there are between five and seven unambiguous morphological markers of SG number in the German F2 clauses, depending on the gender of the existential subject QP (see below for further discussion), as opposed to only five in English: If anything, the percentage of yes-responses to Q-MORE should therefore have been higher across all items in English than in German, contrary to fact.

Still, following the reviewer’s suggestion, we undertook another check to make sure that shallow morphological factors related to number features did not affect our experimental results in any significant way. For this, we divided the German items into two subsets: those with a feminine existential QP, and those with a masculine/neuter QP in subject position. The German case paradigm exhibits a syncretism between feminine SG nouns in the nominative case (eine neue Kamera ‘a new camera’, die ‘that.SG.FEM’, …) and neutral/masculine NPs with PL marking (neue Bücher ‘new books’, die ‘that.PL.MASC/NEUT). By contrast, masculine and neuter SG QPs are unambiguously identifiable as singular forms, such as, e.g., neuer Wagen/der ‘new car/that.SG.MASC’ and neues Buch/das ‘new book/that.SG.NEUT’. This means that our target items with masculine and neuter SG QPs in subject position exhibit more morphological forms that are unambiguously singular than our targets with feminine SG QPs. Now, according to the reviewer’s suggestion the number of ‘yes’-responses should increase with the amount of (potential) PL morphology in the target items. We would therefore expect more ‘yes’-responses to Q-MORE in the items with (syncretic) feminine QPs than in the corresponding items with masculine and neuter QPs. Moreover, the effect should be stronger with deeper embedding as feminine relative and personal pronouns (die, sie) also exhibit SG/PL
syncretism. All this is exemplified in (21), where we register the number of unambiguous SG markers and ambiguous SG/PL markers, respectively:

(21) (i) feminine NP

zero: … hat(SG) dann 'ne(SG) neu angebracht(SG/PL)
Überwachungskamera(SG) jeden Einbrecher aufgenommen.

unambiguous SG features: 3  ambiguous SG/PL features: 1

single: … hat(SG) dort dann 'ne(SG) neu angebracht(SG/PL)
Überwachungskamera(SG) gehangen, die(SG/PL) jeden Einbrecher aufgenommen hat(SG).

unambiguous SG features: 4  ambiguous SG/PL features: 2

double: … war(SG) dort dann 'ne(SG) neu angebracht(SG/PL)
Überwachungskamera(SG), die(SG/PL) so gehangen hat(SG), dass sie(SG/PL) jeden Einbrecher aufgenommen hat(SG).

unambiguous SG features: 5  ambiguous SG/PL features: 3

(ii) masculine/neuter NP

zero: … hat(SG) dann 'n(SG) umgestürzter(SG) Baum(SG) jede Zufahrt blockiert.

unambiguous SG features: 4  ambiguous SG/PL features: 0

single: … hat(SG) dort dann 'n(SG) umgestürzter(SG) Baum(SG) gelegen, der(SG) jede Zufahrt blockiert hat(SG).

unambiguous SG features: 6  ambiguous SG/PL features: 0
double: … war(SG) dort dann 'n(SG) umgestürzter(SG) Baum(SG),
der(SG) so gelegen hat(SG), dass er(SG) jede Zufahrt blockiert hat(SG).

unambiguous SG features: 8  ambiguous SG/PL features: 0

The experimental results do not support this idea, however: With the feminine items in the neutral condition (n=6), the overall response to Q-MORE is yes in 36%, 23%, and 12% of all cases under zero, single, and double embedding respectively. With the masculine/neuter items (n=18), the response was yes in 41%, 23%, and 17% of all cases, respectively. As can be seen, the acceptance rate of IR is the same, or even slightly higher, in the masculine/neuter items, which exhibit more unambiguous SG morphology, than in the feminine items with more potential PL forms. This contradicts the predictions of shallow morphological number matching. Taken together with the F2-data, these experimental findings make us conclude that participants’ behaviour is not governed by shallow processing-related factors such as surface number matching, thereby invalidating the alternative analysis. By contrast, an analysis that takes inverse scope to be available (though costly) to different degrees in both languages can account for the gradual differences observed.

Finally, we ran another follow-up experiment to address a potential confound raised in sub-section 3.1.3. As pointed out by a reviewer, our question-based task and the linking hypothesis behind it may not be 100% reliable. As discussed in 3.1.3, this is because it is possible to falsely answer Q-MORE with yes on an SR-construal. Participants might do so, according to the reviewer, if they accommodate the existence of other NP-referents of the relevant type next to the single referent made available by the surface-scope construal. In addition to our theoretical and
introspection-based argument against this line of reasoning from 3.1.3, we followed the advice of the reviewer and conducted an additional picture-matching experiment for German to remove all remaining doubts about the reliability of our question-based method, and the specific questions employed in probing for surface and inverse scope interpretations. The experimental set-up was almost identical to the German experiment, but we replaced the two question types Q-ONE and Q-MORE by schematic pictures. These schematic pictures gave abstract representations of surface scope and inverse scope construal and were of the kind that was successfully employed in previous experiments on quantifier scope (e.g., Bott & Radó 2007, Radó & Bott 2018). The schematic representations of SR and IR are shown in Figs. 4 and 5, respectively:

INSERT FIGURE 4 HERE

INSERT FIGURE 5 HERE

Participants now had to answer the question whether the abstract schematic relations on the pictures matched the meaning of the target item, or not. The advantage of this method is that the picture representing the inverse scope interpretation does so unambiguously. In other words, if participants answer ‘yes’ to the question of whether this picture matched the meaning of the target clause, they must do so on an inverse scope construal. In total 36 participants were recruited via Prolific. 4 participants had to be excluded because they did not meet the exclusion criterion. The remaining participants were between 18 and 38 years old, with a mean age of 26. 22 of them
were male and 10 of them were female. Table 9 shows the results for the follow-up experiment:

INSERT TABLE 9 HERE

Comparing the results to the original German experiment (see Table 4), we see the same general tendency: the largest differences show up in the question/picture targeting the surface reading. The acceptance rate was a lot higher in the follow-up experiment. The numbers for the question/picture targeting the inverse reading, however, do not differ much. In the neutral condition, the acceptance of inverse readings is slightly lower in the 0-emb condition in the picture-based task (32% vs 39%), but there is no difference in the 1- and 2-emb conditions. In the IR-biased condition, the acceptance is the same in 0-emb and somewhat lower in 1-emb and 2-emb. In sum, the follow-up experiment shows that the choice of a different method did in fact have an effect by moderately increasing the acceptance of surface readings, and by slightly decreasing the acceptance for inverse readings. This is an indication that some ‘yes’-responses to Q-MORE in the original experiment might have indeed been false positives, along the lines proposed by the reviewer. However, the acceptance rate of the inverse scope-picture in the follow-up experiment (32% and 65% in neutral/zero and IR-biased/zero, respectively) is still quite robust, thereby supporting the main outcome of the original experiment. Inverse scope readings, though disprefered, are available in German, too!

5. Inverse scope from relative clauses
This final section briefly discusses two possible theoretical approaches to our experimental findings on the (restricted) availability of inverse scope from relative clauses, which are unexpected on standard structure-based accounts. In section 5.1, we will briefly point to alternative semantic analyses of inverse scope that do not rely on the application of QR. Such approaches include an account in terms of semantic reconstruction of the head NP into the relatively clause; see e.g. Bhatt (2002) and Hulsey & Sauerland (2006), following earlier work in Kayne (1994). Section 5.2 discusses a more liberal QR-based analysis that takes islands and island violations to be gradient rather than categorical notions, following recent literature (e.g. Wurmbrand 2018). Section 5.3 identifies experimental factors that will allow for distinguishing between the two analyses in future work.

5.1  *Inverse scope without QR*

The covert movement operation of QR was originally introduced to account for the observable parallels between overt movement patterns and the availability of inverse scope (Rodman 1976). By contrast, our experimental results suggest that inverse readings are in fact available out of RCs, and especially so in English, whereas overt movement out of restrictive RCs seems clearly ungrammatical in both German and English, cf. (22ab). In light of these differences, a central conceptual argument for QR-based approaches to scope appears to vanish.

\begin{tabular}{ll}
(22) & a. *Was$_1$ hat dort ‘ne Kamera gehangen, [die t$_1$ aufgenommen hat]?
 & what has there a camera hung who recorded has \\
 & b. *What$_1$ did there exist a camera [that recorded t$_1$]?
\end{tabular}

Our results are in line with previous experimental findings on the availability of inverse scope from RCs; see Tsai et al. (2014). They are also in line with introspective
judgments and corpus findings as reported in semantic analyses of scope; see section 3.2.3 for data and references. These observations, among other things, support alternative accounts of quantifier scope that do not rely on covert syntactic movement. Among such alternative accounts, are multi-factorial accounts as found in Ioup (1975) and Pafel (2005), or purely semantic analyses of inverse scope in Categorial Grammar (Steedman 2000, 2012, Barker 2012) or Continuation Semantics (Barker & Shan 2014). Some of these accounts provide specific analyses of inverse scope from RCs. For instance, Pafel (2005), accounts for the possibility of inverse scope from relative clauses by analysing the entire RC as a quantified expression, cf. (23). And Barker & Shan (2014) assume for examples such as (19a) above that a quantifier inside an RC can take the rest of the RC as its semantic complement, thereby effectively turning the RC into a generalised quantifier.

(23) die Stücke, [ die jeder bei der Abschlussprüfung gespielt hat].

the pieces that everyone at the final exam played has

‘The pieces which everyone played at the final exam.’ (Pafel 2005: 132)

SR: ‘There is one set of pieces x that all students played and P(x)’

IR: ‘For each student z, such that z played a different set of pieces, P(z)’

Another way of accounting for inverse scope from RCs without QR would consist in reconsidering the syntactic structure of relative clauses, and here in particular the structural relation of the NP-head and the RC containing the universal QP. Sauerland (1998), Sauerland (2000), Bhatt (2002), and Hulsey & Sauerland (2006) argue on the base of binding phenomena that relative clauses in English are structurally ambiguous between a matching and a raising structure. Under raising, the RC-head is generated inside the relative clause, from where it moves to its surface position in the left DP-
periphery. Under a raising analysis, inverse scope from RCs may hence be derived by reconstructing the RC-head into its base position inside the relative clause, as indicated in (24).

(24) a. \[ \text{DP a [ camera } \text{[CP that <camera> recorded every burglar]]} \]

b. \[ \text{REC: [DP a [ <camera> [CP that camera recorded every burglar]]]} \]

A non-trivial problem for this approach consists in the fact that it cannot be the full existential \( \exists \)-QP \( a \text{ camera} \) that reconstructs in (23b), for the following reasons: First, determiner and NP do not form a constituent, and second, existential quantification over the NP-variable would bind it off although it must remain open for relativisation. Given this, there seems to be no way of deriving a bona fide inverse scope reading between the bare NP and the universal object QP. Instead, what appears to be inverse scope from relative clauses may simply be the result of \( \ast \ast \)-cumulation (Sternefeld 1998, Beck 2001) over the denotations of bare NP and \( \forall \)-QP, similar to what happens in (25) with a plural DP; see Champollion (2010).

(25) \textbf{The cameras} recorded \textit{every burglar}.

\( = \) ‘Each burglar is recorded by a camera, and each camera records a burglar.’

This non-scopal construal would then put participants in a position to answer Q-MORE with ‘yes’, at least in principle. Notice, though, that the possibility of deriving a cumulative interpretation for (24b) with a bare singular NP rests on two additional assumptions: The universal DP must be re-interpreted as referring to a plural individual (see also Frey 1993, Champollion 2010, Beck & Götz 2020). And, more controversially, the reconstructed bare NP would need to be semantically analysed as number-neutral with cumulative reference, see Krifka (1998:200) and Kratzer (2008)
for claims that simple lexical predicates in natural language typically come with cumulative reference.\textsuperscript{30}

5.2 Gradient islandhood?

An alternative to semantic accounts of inverse scope from RC islands consists in not treating RCs as absolute islands for overt or covert movement. Syrett (2015), Tanaka (2015), and Wurmbrand (2018) develop the notion of gradient island violations, according to which islands for movement are not absolute, and different island-types are ordered on a scale in terms of their potential for blocking movement. This idea is supported by experimental findings from Tanaka (2015) that show a tight connection between scope and movement; see also Tsai et al. (2014) on the potential availability of inverse scope from relative clauses. Tanaka (2015) directly compares the acceptability of overt \textit{wh}-movement and the availability of inverse scope out of several adjunct islands, though not from relative clauses. The results of these experiments show that both phenomena are gradual rather than categorical, and that islands that are stronger with respect to \textit{wh}-movement also disfavour inverse readings. Building on this, Wurmbrand (2018) links the gradience in acceptability judgments to differences in processing costs, which in turn depend on the number of movement steps required for deriving inverse scope. On this line of reasoning, our experimental results might be taken as evidence for the weak island status of RC, at least for covert movement to a position above the NP-head. What needs explaining, though, is the strongly deviant status of (22ab) with overt \textit{wh}-extraction.

5.3 Choosing between analyses: Towards a Follow-Up
Conceptual and theoretical advantages and disadvantages aside, it should be possible in principle to decide between the two competing analyses (raising + reconstruction vs QR + gradient islandhood) on empirical grounds. In the following, we briefly present five conditions C1 to C5 that can be tested in the same experimental design as our main study, and which should allow for a conclusive assessment as to which analysis is on the right track. We will exemplify the test conditions for English.

Condition C1 tests for inverse readings from subject RCs against a higher DP-external quantifier, cf. (26ab):

(26) a. \[\exists\text{-QP} \ldots [\text{DP} a \text{ NP} [\text{RC} \ldots \forall\text{-QP}]]\]

b. The craftsmen suggested that the windows could be darkened by large blinds.

And then, in fact, a craftsman installed [a large blind [that ___ darkened every window]].

The reconstruction analysis would predict the absence of inverse readings since there is now way for the subject QP to originate inside the RC. By contrast, inverse readings may be marginally available on the gradient islandhood account if the \[\forall\text{-QP}\] underwent long QR to a position above the subject \[\exists\text{-QP}\].

Conditions C2 and C3 test for the availability of inverse scope from out of complex NPs in apparent violation of the CNPC (Ross 1967). C2 tests for inverse scope against the existential NP-head of the complex NP, cf. (27ab). C3 tests for inverse scope against a higher QP outside the complex NP, cf. (28ab).

(27) a. \[\ldots [\text{DP} \exists [\text{NP} [\text{CP} \text{ that} \ldots \forall\text{-QP} \ldots]]]\]

b. The fireman expected that he would soon receive messages with updates about the fires. And then, in fact, the fireman received [a message [that every fire was defeated]].
(28)  a. $\exists$-QP ... $\left[_{DP} a \ NP \left[_{CP} \text{that} ... \forall$-QP$\right]\]$ 

b. The family members hoped to hear news about the patients. And then, in fact, a family member received [a message [that every patient was safe]].

Neither configuration should allow for inverse scope on the reconstruction analysis, as the higher $\exists$-QP does not raise from inside the complement that-clause. On the gradient islandhood account, by contrast, QR may be available to some extent, but presumably less so in C3 with a long extraction than in C2 with shorter movement. Conditions C4 and C5 compare the patterns observed for inverse scope from relative clauses with the inverse scope potential of other island types, namely after-gerunds and because-clauses.  

Again, since reconstruction of the higher $\exists$-QP is impossible in these configurations, inverse scope readings should be impossible. By contrast, if other island types also constitute gradient islands, inverse scope should be available to some degree; see also Tanaka (2015).

(29)  The teacher was worried that the children might be sad about their grades. And then, in fact, a child cried [after receiving every grade].

(30)  The plumber predicted that outdated seals could cause pipe breaks. And then, in fact, a pipe break happened [because every seal was outdated].

Summing up, the two competing analyses make opposite predictions for the availability of inverse scope in each of the conditions C1 to C5. The *Raising + Reconstruction* analysis predicts that inverse scope should be available in none of them. By contrast, the QR-based analysis with gradient islandhood predicts inverse scope to be available – at least to some extent – in all of them. We will leave the experimental investigation for another occasion, though.
6 Conclusion

In this paper we presented the results of two experiments that directly compare the availability of inverse scope readings between existential subject QPs and universal object QPs in German and English. The experiments also tested the impact of context plausibility and island embedding in each language. Our results suggest that inverse readings are available in both German and English in the structures investigated here, but to different degrees. Crucially, the cross-linguistic difference in the availability of inverse scope is gradual rather than categorical in nature, with English allowing for inverse readings more readily than German. We traced this effect back to exposure effects. The results confirm introspection-based claims in Beck & Gergel (2014) that inverse scope is generally available in German, too. In a sense, they are also compatible with a basic assumption in B&W (2012) and elsewhere, namely that word order freedom has an impact on scope interpretation. At the same time, our findings are somewhat at odds with B&W’s (2012) main claim that local syntactic configurations that allow for overt movement (e.g., scrambling) do not express inverse readings, at least in the absence of additional (contextual or information-structural factors). In addition, we found evidence that pragmatics has a strong impact on the resolution of quantifier scope ambiguities in the form of plausibility considerations, in line with Saba & Corriveau (2001) and Reinhart (2006). Finally, our experimental results provide initial experimental support for the availability of inverse readings out of relative clauses with indefinite NP-heads. Such readings were found to be possible to some extent in both languages, which poses a problem for the assumption of relative clauses as absolute scope islands. However, these findings are in line with independent experimental evidence on the availability of inverse scope
from islands (Tsai et al. 2014, Tanaka 2015, Wurmbrand 2018), and they may therefore be taken as further evidence for the concept of gradient islandhood.

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Tables and Figures

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<th>Linear Output</th>
<th>ScoT</th>
<th>*Move</th>
</tr>
</thead>
<tbody>
<tr>
<td>B &gt;&gt; A</td>
<td>B &gt;&gt; A</td>
<td></td>
<td>!</td>
</tr>
<tr>
<td>$A &gt;&gt; B</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Revised OT-system for German (9), condition IR-biased

<table>
<thead>
<tr>
<th>Semantic Input</th>
<th>Linear Output</th>
<th>ScoT</th>
<th>*Move</th>
</tr>
</thead>
<tbody>
<tr>
<td>B &gt;&gt; A</td>
<td>$B &gt;&gt; A</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>A &gt;&gt; B</td>
<td>*!</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Revised OT-system for German (7), condition neutral

<table>
<thead>
<tr>
<th>Structural + Modified + Liberal</th>
<th>0-emb</th>
<th>1-emb</th>
<th>2-emb</th>
<th>0-emb</th>
<th>1-emb</th>
<th>2-emb</th>
</tr>
</thead>
<tbody>
<tr>
<td>German</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Semantic</td>
<td></td>
<td></td>
<td></td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

Table 3: Predictions for the Availability of Inverse Scope

<table>
<thead>
<tr>
<th>Q-ONE</th>
<th>0-emb</th>
<th>1-emb</th>
<th>2-emb</th>
</tr>
</thead>
<tbody>
<tr>
<td>neutral</td>
<td>82%</td>
<td>88%</td>
<td>92%</td>
</tr>
<tr>
<td>IR-</td>
<td>49%</td>
<td>71%</td>
<td>81%</td>
</tr>
<tr>
<td></td>
<td>biased</td>
<td>neutral</td>
<td>0-emb</td>
</tr>
<tr>
<td>----------------</td>
<td>--------</td>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td>Q-MORE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>neutral</td>
<td>39%</td>
<td>21%</td>
<td>16%</td>
</tr>
<tr>
<td>IR-biased</td>
<td>65%</td>
<td>50%</td>
<td>35%</td>
</tr>
</tbody>
</table>

Table 4: German - proportion of ‘yes’-answers across all target conditions

<table>
<thead>
<tr>
<th></th>
<th>0-emb</th>
<th>1-emb</th>
<th>2-emb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q-ONE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>neutral</td>
<td>69%</td>
<td>80%</td>
<td>89%</td>
</tr>
<tr>
<td>IR-biased</td>
<td>34%</td>
<td>34%</td>
<td>68%</td>
</tr>
<tr>
<td>Q-MORE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>neutral</td>
<td>52%</td>
<td>52%</td>
<td>19%</td>
</tr>
<tr>
<td>IR-biased</td>
<td>84%</td>
<td>74%</td>
<td>44%</td>
</tr>
</tbody>
</table>

Table 5: English - proportion of ‘yes’-answers across all target conditions

<table>
<thead>
<tr>
<th></th>
<th>F1: no</th>
<th>F2: no, 2-emb</th>
<th>F3: referential</th>
<th>F4: each</th>
<th>F5: &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q-ONE</td>
<td>94%</td>
<td>95%</td>
<td>94%</td>
<td>8%</td>
<td>12%</td>
</tr>
<tr>
<td>Q-MORE E</td>
<td>10%</td>
<td>11%</td>
<td>11%</td>
<td>89%</td>
<td>95%</td>
</tr>
</tbody>
</table>

Table 6: German - proportion of ‘yes’-answers across all filler/control conditions

<table>
<thead>
<tr>
<th></th>
<th>F1: no</th>
<th>F2: no, 2-emb</th>
<th>F3: referential</th>
<th>F4: each</th>
<th>F5: &gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q-ONE</td>
<td>98%</td>
<td>98%</td>
<td>95%</td>
<td>13%</td>
<td>12%</td>
</tr>
<tr>
<td>Q-MORE E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>67%</td>
</tr>
</tbody>
</table>
Table 7: English - proportion of ‘yes’-answers across all filler/control conditions

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Neutral</th>
<th>IR-biased</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-emb</td>
<td>1-emb</td>
</tr>
<tr>
<td>Results German</td>
<td>31%</td>
<td>21%</td>
</tr>
<tr>
<td>Results English</td>
<td>52%</td>
<td>52%</td>
</tr>
</tbody>
</table>

Table 8: Acceptability of inverse scope in English and German (Experimental Results) & predictions for the Availability of Inverse Scope

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Neutral</th>
<th>IR-biased</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-emb</td>
<td>1-emb</td>
</tr>
<tr>
<td>Q-ONE neutral</td>
<td>97%</td>
<td>98%</td>
</tr>
<tr>
<td>Q-ONE IR-biased</td>
<td>78%</td>
<td>85%</td>
</tr>
<tr>
<td>Q-MOR neutral</td>
<td>32%</td>
<td>21%</td>
</tr>
<tr>
<td>Q-MOR IR-biased</td>
<td>65%</td>
<td>37%</td>
</tr>
</tbody>
</table>

Table 9: German - proportion of ‘yes’-answers across all target conditions
Fig. 1: Availability of inverse scope in German (left side) and English (right side) (= collapsed proportion of ‘yes’-answers to Q-MORE and ‘no’-answers to Q-ONE) Big triangles show the model predictions, and small triangles show the actual outcome. Error bars give the standard deviation of the model value.

Fig. 2: German – proportion of ‘yes’-responses to Q-MORE across conditions by-participants, with 0-, 1-, and 2-embedding.
Fig. 3: English – proportion of ‘yes’-responses to Q-MORE across conditions by-participants, with 0-, 1-, and 2-embedding.

Fig. 4: Schematic picture representing the surface reading of (9).

Fig. 5: Schematic picture representing the inverse reading of (9).

Appendix A: List of Verbs Used in the Two Context Conditions

<table>
<thead>
<tr>
<th>Condition Neutral:</th>
<th>Condition IR-biased:</th>
</tr>
</thead>
<tbody>
<tr>
<td>German:</td>
<td>English:</td>
</tr>
<tr>
<td>überfliegen</td>
<td>surveil</td>
</tr>
<tr>
<td>bewässern</td>
<td>irrigate</td>
</tr>
<tr>
<td>anfahren</td>
<td>service</td>
</tr>
<tr>
<td>erleichtern</td>
<td>simplify</td>
</tr>
<tr>
<td>durchlaufen</td>
<td>perform</td>
</tr>
<tr>
<td>zurückführen</td>
<td>bring back</td>
</tr>
<tr>
<td></td>
<td>German:</td>
</tr>
<tr>
<td></td>
<td>English:</td>
</tr>
<tr>
<td>blockieren</td>
<td>block</td>
</tr>
<tr>
<td>verschönen</td>
<td>adorn</td>
</tr>
<tr>
<td>ab sperren</td>
<td>block off</td>
</tr>
<tr>
<td>ausstatten</td>
<td>equip</td>
</tr>
<tr>
<td>verstopfen</td>
<td>clog</td>
</tr>
<tr>
<td>abdecken</td>
<td>cover</td>
</tr>
</tbody>
</table>
appendix b: tables with results from follow-up experiments

<table>
<thead>
<tr>
<th></th>
<th>0-emb</th>
<th>1-emb</th>
<th>2-emb</th>
</tr>
</thead>
<tbody>
<tr>
<td>q-one neutral</td>
<td>80%</td>
<td>87%</td>
<td>90%</td>
</tr>
<tr>
<td>q-one ir-biased</td>
<td>54%</td>
<td>71%</td>
<td>74%</td>
</tr>
<tr>
<td>q-neutral</td>
<td>25%</td>
<td>17%</td>
<td>16%</td>
</tr>
</tbody>
</table>
Table 9: German follow-up experiment with the full indefinite *ein/eine* instead of *'n/'ne* and in non-colloquial style - proportion of ‘yes’-answers across all target conditions

<table>
<thead>
<tr>
<th></th>
<th>0-emb</th>
<th>1-emb</th>
<th>2-emb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q-ONE</td>
<td>neutral</td>
<td>81%</td>
<td>90%</td>
</tr>
<tr>
<td></td>
<td>IR-biased</td>
<td>50%</td>
<td>73%</td>
</tr>
<tr>
<td>Q-MOR</td>
<td>neutral</td>
<td>40%</td>
<td>23%</td>
</tr>
<tr>
<td></td>
<td>IR-biased</td>
<td>65%</td>
<td>50%</td>
</tr>
</tbody>
</table>

Table 10: German follow-up analysis excluding items without adjective in both target sentence and question - proportion of ‘yes’-answers across all target conditions

<table>
<thead>
<tr>
<th></th>
<th>0-emb</th>
<th>1-emb</th>
<th>2-emb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q-ONE</td>
<td>neutral</td>
<td>69%</td>
<td>81%</td>
</tr>
<tr>
<td></td>
<td>IR-biased</td>
<td>34%</td>
<td>35%</td>
</tr>
<tr>
<td>Q-MOR</td>
<td>neutral</td>
<td>53%</td>
<td>52%</td>
</tr>
<tr>
<td></td>
<td>IR-biased</td>
<td>83%</td>
<td>73%</td>
</tr>
</tbody>
</table>

Table 11: English follow-up analysis excluding items without adjective in both target sentence and question - proportion of ‘yes’-answers across all target conditions

**Appendix C: Full List of Target Items for English and German**

neutral/English:
1. The NSA had ensured that the suspicious buildings would be surveilled by drones, and then, in fact, ...

0-emb ... a drone surveilled every suspicious building.
1-emb ... there was a drone that surveilled every suspicious building.
2-emb ... there was a drone which was piloted in such a way that it surveilled every suspicious building.

2. The agriculture experts had recommended that the fields be irrigated with wide canals, and then, in fact, ...

0-emb ... a wide canal irrigated every field.
1-emb ... there was a wide canal that irrigated every field.
2-emb ... there was a wide canal which was shaped in such a way that it irrigated every field.

3. The city council had decided years ago that the tourist hotspots should be serviced with busses, and then for the first time yesterday, in fact, ...

0-emb ... a bus serviced every tourist hotspot.
1-emb ... there was a bus that serviced every tourist hotspot.
2-emb ... there was a bus which was planned in such a way that it serviced every tourist hotspot.

4. The kitchen staff had hoped that their cooking workload could be simplified by new kitchen gadgets, and then, in fact, ...

0-emb ... a new kitchen gadget simplified every step of their cooking workload.
1-emb ... there was a new kitchen gadget that simplified every step of their cooking workload.
2-emb … there was a new kitchen gadget which was built in such a way that it simplified every step of their cooking workload.

5. The automobile manufacturer Ventus had planned to perform test runs of self-driving taxis at the exposition, and then, in fact, …

0-emb … a self-driving taxi performed every test run at the exposition.
1-emb … there was a self-driving taxi that performed every test run at the demonstration.
2-emb … there was a self-driving taxi which drove in such a way that it performed every test run at the demonstration.

6. The tour had been planned so that visitors would be brought back to the ancient city along historic roads, and then, in fact, …

0-emb … a historic road brought back every visitor to the ancient city.
1-emb … there was a historic road that brought back every visitor to the ancient city.
2-emb … there was a historic road which was routed in such a way that it brought back every visitor to the ancient city.

7. The guest speaker in the self-help group "Become Happy Again" had promised that participants would be healed by special quartz stones, and then, in fact, …

0-emb … a quartz stone healed every participant.
1-emb … there was a quartz stone that healed every participant.
2-emb … there was a quartz stone which was utilized in such a way that it healed every participant.
8. To counteract the downward trend in newspaper sales the editor-in-chief had suggested that disputed political views be highlighted in short essays, and then in the last issue, in fact, …

0-emb ... a short essay highlighted every disputed political view.
1-emb ... there was a short essay that highlighted every disputed political view.
2-emb ... there was a short essay which was written in such a way that it highlighted every disputed political view.

9. In order to attract more tourists the city had approved a plan for the historical monuments to be overlooked by viewing platforms, and then, in fact, …

0-emb ... a viewing platform overlooked every historical monument.
1-emb ... there was a viewing platform that overlooked every historical monument.
2-emb ... there was a viewing platform which was situated in such a way that it overlooked every historical monument.

10. The commissioner had hoped that escaping criminals would be stopped by dead ends in the city center, and then, in fact, …

0-emb ... a dead end stopped every criminal.
1-emb ... there was a dead end that stopped every criminal.
2-emb ... there was a dead end which was positioned in such a way that it stopped every criminal.

11. The mother had worried that the children would be scared by creepy clowns at the parade, and then, in fact, …

0-emb ... a clown scared every child at the parade.
1-emb … there was a clown that scared every child at the parade.

2-emb … there was a clown who moved in such a way that it scared every child at the parade.

12. The weather forecast had predicted that the regions in the north of the country would be threatened by thunderstorms, and then on Monday, in fact, …

0-emb … a thunderstorm threatened every northern region of the country.

1-emb … there was a thunderstorm that threatened every northern region of the country.

2-emb … there was a thunderstorm which raged in such a way that it threatened every northern region of the country.

13. The researcher had hoped that the open issues in her field would be solved by new experimental methods, and then, in fact, …

0-emb … a new method solved every open issue.

1-emb … there was a new method that solved every open issue.

2-emb … there was a new method which was designed in such a way that it solved every open issue.

14. The jury of the competition "Young Researchers" had announced that the winners would be accepted by elite boarding schools, and then, in fact, …

0-emb … an elite boarding school accepted every winner.

1-emb … there was an elite boarding school that accepted every winner.

2-emb … there was an elite boarding school which was such that it accepted every winner.

15. The police officer hoped that the burglars might be recorded by newly-installed surveillance cameras, and then, in fact, …
… a newly-installed surveillance camera recorded every burglar.

… there was a newly-installed surveillance camera that recorded every burglar.

… there was a newly-installed surveillance camera which hung in such a way that it recorded every burglar.

16. The mushroom expert had feared that some participants at the workshop might accidentally poison the dishes at dinner with deadly mushrooms, and then, in fact, …

… a deadly mushroom poisoned every dish at dinner.

… there was a deadly mushroom that poisoned every dish at dinner.

… there was a deadly mushroom which was used in such a way that it poisoned every dish at dinner.

17. The Tourism Board was convinced that the visitors would be impressed by modern buildings, and then, in fact, …

… a modern building impressed every visitor.

… there was a modern building that impressed every visitor.

… there was a modern building which stood in such a way that it impressed every visitor.

18. The organizer of the fair had hoped that the market visitors would be attracted by unusual stands, and then, in fact, …

… an unusual stand attracted every visitor.

… there was an unusual stand that attracted every visitor.

… there was an unusual stand which stood in such a way that it attracted every visitor.
19. In order to introduce the world of mathematics to the public, the filmmaker had suggested that the great contemporary mathematicians be depicted in documentary films, and then, in fact, …

0-emb … a documentary film portrayed every great contemporary mathematician.

1-emb … there was a documentary film that portrayed every contemporary mathematician.

2-emb … there was a documentary film which was made in such a way that it portrayed every contemporary mathematician.

20. Due to recent hygiene scandals the public was afraid that vulnerable patients would be infected by careless doctors, and then at St. Joseph’s hospital, in fact, …

0-emb … a careless doctor infected every vulnerable patient.

1-emb … there was a careless doctor who infected every vulnerable patient.

2-emb … there was a careless doctor who worked in such a way that he infected every vulnerable patient.

21. The fashion designer hoped that the existing sketches would be superseded by new ideas, and then, in fact, …

0-emb … a new idea superseded every existing sketch.

1-emb … there was a new idea that superseded every existing sketch.

2-emb … there was a new idea which was so good that it superseded every existing sketch.

22. After a drop in sales the company hired an advertising agency to present the new products in video clips, and then, in fact, …
… a video clip presented every new product.

… there was a video clip that presented every new product.

… there was a video clip which was made in such a way that it presented every new product.

23. To make the living room a little more comfortable Anna had suggested that the light bulbs be covered with colorful lampshades, and then, in fact, …

… a colorful lampshade covered every light bulb.

… there was a colorful lampshade that covered every light bulb.

… there was a colorful lampshade which hung in such a way that it covered every light bulb.

24. The teachers had complained that the children would be distracted by noises from the construction site, and then yesterday, in fact, …

… a noise from the construction site distracted every child.

… there was a noise from the construction site that distracted every child.

… there was a noise from the construction site which was so loud that it distracted every child.

biased/English:

1. Before the storm the police made an announcement that the access roads to the city center could be blocked by fallen trees, and then, in fact, …

… a fallen tree blocked every access road.

… there was a fallen tree that blocked every access road.
... there was a fallen tree which was positioned in such a way that it blocked every access road.

2. The university president had promised that the lecture halls would be adorned with decorative sculptures, and then, in fact, ...

0-emb ... a decorative sculpture adorned every lecture hall.
1-emb ... there was a decorative sculpture that adorned every lecture hall.
2-emb ... there was a decorative sculpture which was placed in such a way that it adorned every lecture hall.

3. The commissioner had demanded that crime scenes be blocked off by barriers, and then, in fact, ...

0-emb ... a barrier blocked off every crime scene.
1-emb ... there was a barrier that blocked off every crime scene.
2-emb ... there was a barrier which stood in such a way that it blocked off every crime scene.

4. The local council had decided that the parks should be equipped with new equipment sheds, and then, in fact, ...

0-emb ... a new equipment shed equipped every park.
1-emb ... there was a new equipment shed that equipped every park.
2-emb ... there was a new equipment shed which stood in such a way that it equipped every park.

5. The janitor had warned that the toilets would be clogged by paper towels thrown into them, and then, in fact, ...

0-emb ... a paper towel clogged every toilet.
1-emb ... there was a paper towel that clogged every toilet.
there was a paper towel which was stuck in such a way that it clogged every toilet.

The doctor had demanded that the children’s bleeding wounds be covered with sterilizing bandages, and then, in fact, …

… a bandage covered every child’s wound.

… there was a bandage that covered every child's wound.

… there was a bandage which was placed in such a way that it covered every child's wound.

The physicist had claimed that the planets in the constellation Libra were orbited by moons, and then, in fact, it was discovered that …

… a moon orbited every planet in the constellation Libra.

… there was a moon that orbited every planet in the constellation Libra.

… there was then a moon that moved in such a way that it orbited every planet in the constellation Libra.

The tourist group had read that the villages in Turkey were towered over by mosques, and then, in fact, they discovered that …

… a mosque towered over every village in Turkey.

… there was a mosque that towered over every village in Turkey.

… there was a mosque which stood in such a way that it towered over every village in Turkey.

Due to climate change goals, California’s governor had demanded that the living rooms across all counties be lit up by energy-saving LED bulbs instead of old incandescent lights, and then, in fact, …

… an energy-saving LED bulb lit up every living room.
… there was an energy-saving LED bulb that lit up every living room.

… there was an energy-saving LED bulb which hung in such a way that it lit up every living room.

10. Drivers had expected during rush hour that roads would be constantly hindered by vehicles, and then last Friday, in fact, …

… a vehicle hindered every road.

… there was a vehicle that hindered every road.

… there was a vehicle which drove in such a way that it hindered every road.

11. Given the very low prices for materials, the rooms in the basement could be insulated with wood panels, and then, in fact, …

… a wood panel insulated every room in the basement.

… there was a wood panel that insulated every room in the basement.

… there was a wood panel which hung in such a way that it insulated every room in the basement.

12. The plumber had suggested that the rusting pipes in the house be sealed by new gaskets, and then, in fact, …

… a new gasket sealed every rusting pipe in the house.

… there was a new gasket that sealed every rusting pipe in the house.

… there was a new gasket which was positioned in such a way that it sealed every rusting pipe in the house.

13. The entomologist had claimed that moths would be encased in protective cocoons, and then, in fact, …

… a protective cocoon encased every moth.
14. The owners had complained that the walls in the neighborhood were being defaced by graffitied tags, and then, in fact, …

0-emb  … a tag defaced every wall in the neighborhood.
1-emb  … there was a tag that defaced every wall in the neighborhood.
2-emb  … there was a tag which was written in such a way that it defaced every wall in the neighborhood.

15. Residents had been upset that the few free parking spaces in NYC were being occupied by cars from out of state, and then yesterday, in fact, …

0-emb  … a car from out of state occupied every free parking space in NYC.
1-emb  … there was a car from out of state that occupied every free parking space in NYC.
2-emb  … there was a car from out of state which was parked in such a way that it occupied every free parking space in NYC.

16. Because of the cold weather the organizer had arranged for the outdoor seats to be covered with weatherproof blankets, and then, in fact, …

0-emb  … a weatherproof blanket covered every outdoor seat.
1-emb  … there was a weatherproof blanket that covered every outdoor seat.
2-emb  … there was a weatherproof blanket which was placed in such a way that it covered every outdoor seat.
17. As part of a new art installation the famous performance artist had arranged for the newly-erected structures to be surrounded by pieces of cloth, and then, in fact, …

0-emb … a piece of cloth surrounded every newly-erected structure.
1-emb … there was a cloth that surrounded every newly-erected structure.
2-emb … there was a cloth which hung in such a way that it surrounded every newly-erected structure.

18. Due to storms nationwide, experts had predicted that cities near the riverbanks would be flooded by overflowing rivers, and then, in fact, …

0-emb … a river flooded every city near the riverbanks.
1-emb … there was a river that flooded every city near the riverbanks.
2-emb … there was a river which was situated in such a way that it flooded every city near the riverbanks.

19. In order to make the presentations more visible, the teachers had asked the custodian to have the windows obscured by blinds, and then, in fact, …

0-emb … a blind obscured every window.
1-emb … there was a blind that obscured every window.
2-emb … there was a blind which hung in such a way that it obscured every window.

20. After a failure of the central heating, the daughter had suggested having the rooms be temporarily heated by radiant heaters, and then, in fact, …

0-emb … a radiant heater heated every room.
1-emb … there was a radiant heater that heated every room.
2-emb ... there was a radiant heater which stood in such a way that it heated every room.

21. In order to boost sales, the cereal manufacturer had arranged for their cereal boxes to be covered with discount vouchers, and then, in fact, ...

0-emb ... a voucher covered every cereal box.
1-emb ... there was a voucher that covered every cereal box.
2-emb ... there was a voucher which was such that it covered every cereal box.

22. The structural engineer had insisted that the new round arches be supported by steel pillars, and then, in fact, ...

0-emb ... a steel pillar supported every round arch.
1-emb ... there was a steel pillar that supported every round arch.
2-emb ... there was a steel pillar which stood in such a way that it supported every round arch.

23. So that nothing slips during the performance, the dance teacher had suggested that the costumes be held in place by safety pins, and then, in fact, ...

0-emb ... a safety pin held every costume in place.
1-emb ... there was a safety pin that held every costume in place.
2-emb ... there was a safety pin which was placed in such a way that it held every costume in place.

24. The consumer protection organisation had recommended that the cribs should be secured with metal bars, and then, in fact, ...

0-emb ... a metal bar secured every crib.
1-emb ... there was a metal bar that secured every crib.
2-emb ... there was a metal bar which was positioned in such a way that it secured every crib.

neutral/German:

1. Die NSA hatte versichert, dass die verdächtigen Gebäude von unbemannten Drohnen überflogen werden würden, und tatsächlich ...

0-emb ... hat dann vor 'ner Stunde 'ne unbemannte Drohne jedes verdächtige Gebäude überflogen.

1-emb ... ist dann 'ne unbemannte Drohne gestartet, die jedes verdächtige Gebäude überflogen hat.

2-emb ... war dort dann 'ne unbemannte Drohne, die so gestartet ist, dass sie jedes verdächtige Gebäude überflogen hat.

2. Der Agrarexperte hatte empfohlen, dass die Felder durch breite Kanäle bewässert werden sollten, und tatsächlich ...

0-emb ... hat dann 'n breiter Kanal jedes Feld bewässert.

1-emb ... hat sich dort dann 'n breiter Kanal befunden, der jedes Feld bewässert hat.

2-emb ... war dort dann 'n breiter Kanal, der so angelegt war, dass er jedes Feld bewässert hat.

3. Der Stadtrat hatte schon vor Jahren versprochen, dass die Touristen-Hotspots demnächst von Sonderbussen angefahren werden sollten, und tatsächlich ...

90
... hat dann gestern zum ersten Mal 'n Sonderbus jeden Touristen-Hotspot angefahren.

... ist dort dann gestern zum ersten Mal 'n Sonderbus im Einsatz gewesen, der jeden Touristen-Hotspot angefahren hat.

... war dort dann gestern zum ersten Mal 'n Sonderbus, der so eingesetzt worden ist, dass er jeden Touristen-Hotspot angefahren hat.

4. Die Küchenhilfe hatte gehofft, dass die notwendigen Arbeitsschritte beim Kochen von neuen Küchengeräten erleichtert werden würden, und tatsächlich ...

... hat dann 'n neues Küchengerät jeden Arbeitsschritt beim Kochen erleichtert.

... hat dort dann 'n neues Küchengerät gestanden, das jeden notwendigen Arbeitsschritt beim Kochen erleichtert hat.

... war dort dann 'n neues Küchengerät, das so gebaut war, dass es jeden Arbeitsschritt beim Kochen erleichtert hat.

5. Der Autohersteller Ventus hatte geplant, bei 'ner Vorführung die Testfahrten von Taxis mit Selbstfahrsystemen durchlaufen zu lassen, und tatsächlich ...

... hat dann 'n Taxi mit Selbstfahrsystem jede Testfahrt bei der Vorführung durchlaufen.

... ist dort dann 'n Taxi mit Selbstfahrsystem gefahren, das jede Testfahrt bei der Vorführung durchlaufen hat.

... war dort dann 'n Taxi mit Selbstfahrsystem, das so gefahren ist, dass es jede Testfahrt bei der Vorführung durchlaufen hat.
6. Die Führung rund um die Stadt war so geplant gewesen, dass die Teilnehmer am Ende selber auf Erkundungstour gehen und auf historischen Wegen zurück in die Stadt geführt werden sollten, und tatsächlich …

0-emb … hat dann am Ende 'n historischer Weg jeden Teilnehmer in die Stadt zurück geführt.

1-emb … hat sich dort dann am Ende 'n historischer Weg befunden, der jeden Teilnehmer in die Stadt zurückgeführt hat.

2-emb … war dort dann am Ende 'n historischer Weg, der so gelegen hat, dass er jeden Teilnehmer in die Stadt zurückgeführt hat.

7. Der Gastsprecher in der Selbsthilfegruppe „Wieder glücklich werden“ hatte versprochen, dass die Teilnehmer durch besondere Quarzsteine beeinflusst werden würden, und tatsächlich …

0-emb … hat dann 'n besonderer Quarzstein jeden Teilnehmer beeinflusst.

1-emb … hat dort dann 'n besonderer Quarzstein gelegen, der jeden Teilnehmer beeinflusst hat.

2-emb … war dort dann 'n besonderer Quarzstein, der so beschaffen war, dass er jeden Teilnehmer beeinflusst hat.

8. Um dem Abwärtstrend in den Verkaufszahlen entgegenzuwirken, hatte der Chefredakteur vorgeschlagen, dass die verschiedenen politischen Ansichten in kurzen Kolumnen beleuchtet werden sollten, und tatsächlich …

0-emb … hat dann in der letzten Ausgabe 'ne kurze Kolumne jede politische Ansicht beleuchtet.

1-emb … ist dort dann in der letzten Ausgabe 'ne kurze Kolumne geschrieben worden, die jede politische Ansicht beleuchtet hat.
… war dort dann in der letzten Ausgabe ‘ne kurze Kolumne, die so geschrieben worden ist, dass sie jede politische Ansicht beleuchtet hat.

9. Um mehr Touristen anzulocken, hatte die Stadt ‘nen Bebauungsplan bewilligt, laut dem die umliegenden Stadtviertel von Hotels mit Aussichtsplattformen überragt werden sollten, und tatsächlich …

… hat dann ‘n Hotel mit Aussichtsplattform jedes umliegende Stadtviertel überragt.

… hat dort dann ‘n Hotel mit Aussichtsplattform gestanden, das jedes umliegende Stadtviertel überragt hat.

… war dort dann ‘n Hotel mit Aussichtsplattform, das so gestanden hat, dass es jedes umliegende Stadtviertel überragt hat.

10. Der Kommissar hatte gehofft, dass flüchtende Gauner bei dem Einsatz in der Innenstadt durch Sackgassen gestoppt werden würden, und tatsächlich …

… hat dann ‘ne Sackgasse jeden Gauner gestoppt.

… hat sich dort dann ‘ne Sackgasse befunden, die jeden Gauner gestoppt hat.

… war dort dann ‘ne Sackgasse, die so gelegen hat, dass sie jeden Gauner gestoppt hat.

11. Die Mutter hatte sich Sorgen gemacht, dass die Kinder auf dem Karnevalsumzug von grusligen Hexenwagen verängstigt werden könnten, und tatsächlich…

… hat dann auf dem Karnevalsumzug ‘n grusliger Hexenwagen jedes Kind verängstigt.
1-emb … ist dort dann auf dem Karnevalsumzug 'n grusliger Hexenwagen gefahren, der jedes Kind verängstigt hat.

2-emb … war dort dann auf dem Karnevalsumzug 'n grusliger Hexenwagen, der so gefahren ist, dass er jedes Kind verängstigt hat.

12. Der Wetterbericht hatte vorhergesagt, dass die Regionen im Norden des Landes von Unwettern bedroht werden würden, und tatsächlich …

0-emb … hat dann am Montag 'n Unwetter jede Region im Norden des Landes bedroht.

1-emb … hat dort dann am Montag 'n Unwetter gewütet, das jede Region im Norden des Landes bedroht hat.

2-emb … war dort dann am Montag 'n Unwetter, das so gewütet hat, dass es jede Region im Norden des Landes bedroht hat.

13. Der Forscher hatte gehofft, dass die offenen Probleme seines Fachgebiets durch neue Testverfahren gelöst werden würden, und tatsächlich …

0-emb … hat dann 'n neues Testverfahren jedes offene Problem gelöst.

1-emb … hat es dort dann 'n neues Testverfahren gegeben, das jedes offene Problem gelöst hat.

2-emb … war dort dann 'n neues Testverfahren, das so entworfen war, dass es jedes offene Problem löste.

14. Die Jury des Wettbewerbs “Forschung für Jugendliche” hatte angekündigt, dass die Gewinner durch Eliteinternate aufgenommen werden würden, und tatsächlich …

0-emb … hat dann 'n Eliteinternat jeden Gewinner des Wettbewerbs aufgenommen.
1-emb … hat es dort dann 'n Eliteinternat gegeben, das jeden Gewinner des Wettbewerbs aufgenommen hat.

2-emb … war dort dann 'n Eliteinternat, das so war, dass es jeden Gewinner des Wettbewerbs aufnahm.

15. Der Polizeibeamte hatte vermutet, dass die Einbrecher von neu angebrachten Überwachungskameras aufgenommen worden sein könnten, und tatsächlich…

0-emb … hat dann 'ne neu angebrachte Überwachungskamera jeden Einbrecher aufgenommen.

1-emb … hat dort dann 'ne neu angebrachte Überwachungskamera gehangen, die jeden Einbrecher aufgenommen hat.

2-emb … war dort dann 'ne neu angebrachte Überwachungskamera, die so gehangen hat, dass sie jeden Einbrecher aufgenommen hat.

16. Der Pilzexperte hatte befürchtet, dass einige Teilnehmer des Workshops zu unvorsichtig sein und die Gerichte bei dem gemeinsamen Dinner versehentlich durch Knollenblätterpilze vergiften könnten, und tatsächlich …

0-emb … hat dann 'n Knollenblätterpilz jedes Gericht vergiftet.

1-emb … wurde dort dann 'n Knollenblätterpilz verwendet, der jedes Gericht vergiftet hat.

2-emb … war dort dann 'n Knollenblätterpilz, der so verwendet wurde, dass er jedes Gericht vergiftet hat.

17. Der Tourismusverband war überzeugt, dass die Besucher durch moderne Bauwerke beeindruckt sein würden, und tatsächlich …

0-emb … hat dann 'n modernes Bauwerk jeden Besucher beeindruckt.
1-emb ... hat dort dann 'n modernes Bauwerk gestanden, das jeden Besucher beeindruckt hat.

2-emb ... war dort dann 'n modernes Bauwerk, das so gestanden hat, dass es jeden Besucher beeindruckt hat.

18. Der Organisator des Jahrmarkts hatte gehofft, dass die Marktbesucher durch ungewöhnliche Stände angelockt werden würden, und tatsächlich ...

0-emb ... hat dann 'n ungewöhnlicher Stand jeden Marktbesucher angelockt.

1-emb ... hat dort dann 'n ungewöhnlicher Stand gestanden, der jeden Marktbesucher angelockt hat.

2-emb ... war dort dann 'n ungewöhnlicher Stand, der so gestanden hat, dass er jeden Marktbesucher angelockt hat.

19. Um der Öffentlichkeit die Welt der Mathematik näher zu bringen, hatte der Filmemacher vorgeschlagen, dass die bedeutenden Mathematiker der Gegenwart durch Dokus porträtiert werden könnten, und tatsächlich ...

0-emb ... hat dann 'ne Doku jeden bedeutenden Mathematiker der Gegenwart porträtiert.

1-emb ... ist dort dann 'ne Doku gelaufen, die jeden bedeutenden Mathematiker der Gegenwart porträtiert hat.

2-emb ... war dort dann 'ne Doku, die so gemacht war, dass sie jeden bedeutenden Mathematiker der Gegenwart porträtiert hat.

20. Durch die Hygieneskandale war die Angst groß, dass die besonders anfälligen Patienten von unvorsichtigen Ärzten angesteckt werden könnten, und tatsächlich ...
0-emb … hat dann im Josefia-Krankenhaus 'n unvorsichtiger Arzt jeden besonders anfälligen Patienten angesteckt.

1-emb … hat dort dann im Josefia-Krankenhaus 'n unvorsichtiger Arzt gearbeitet, der jeden besonders anfälligen Patienten angesteckt hat.

2-emb … war dort dann im Josefia-Krankenhaus 'n unvorsichtiger Arzt, der so gearbeitet hat, dass er jeden besonders anfälligen Patienten angesteckt hat.

21. Der Modedesigner hoffte, dass die bisherigen Entwürfe von neuen Ideen übertroffen werden würden, und tatsächlich …

0-emb … hat dann 'ne neue Idee jeden bisherigen Entwurf übertroffen.

1-emb … ist dort dann 'ne neue Idee aufgekommen, die jeden bisherigen Entwurf übertroffen hat.

2-emb … gab es dort dann 'ne Idee, die so gut war, dass sie jeden bisherigen Entwurf übertroffen hat.

22. Nach Umsatzzrückgängen hatte eine Firma eine Werbeagentur beauftragt, die Produktneuerungen in Videoclips darzustellen, und tatsächlich …

0-emb … hat dann 'n Videoclip jede Produktneuerung dargestellt.

1-emb … ist dort dann 'n Videoclip gelaufen, der jede Produktneuerung dargestellt hat.

2-emb … war dort dann 'n Videoclip, der so gemacht war, dass er jede Produktneuerung dargestellt hat.

23. Um das Wohnzimmer etwas gemütlicher zu gestalten, hatte Anna vorgeschlagen, dass die grellen Glühbirnen von bunten Lampenschirmen abgeschirmt werden könnten, und tatsächlich …

0-emb … hat dann 'n bunter Lampenschirm jede Glühbirne abgeschirmt.
1-emb … hat dort dann 'n bunter Lampenschirm gehangen, der jede Glühbirne abgeschirmt hat.

2-emb … war dort dann 'n bunter Lampenschirm, der so hing, dass er jede Glühbirne abgeschirmt hat.

24. Die Lehrer hatten sich beschwert, dass die Kinder von Geräuschen auf der Baustelle abgelenkt werden würden, und tatsächlich …

0-emb … hat dann gestern wieder 'n Geräusch jedes Kind abgelenkt.

1-emb … hat es dort dann gestern wieder 'n Geräusch gegeben, das jedes Kind abgelenkt hat.

2-emb … war dort dann gestern wieder 'n Geräusch, das so laut war, dass es jedes Kind abgelenkt hat.

biased/German:

1. Die Polizei hatte vor dem Sturm davor gewarnt, dass die Zufahrten in die Innenstadt durch umgestürzte Bäume blockiert werden könnten, und tatsächlich …

0-emb … hat dann 'n umgestürzter Baum jede Zufahrt blockiert.

1-emb … hat dort dann 'n umgestürzter Baum gelegen, der jede Zufahrt blockiert hat.

2-emb … war dort dann 'n umgestürzter Baum, der so gelegen hat, dass er jede Zufahrt blockiert hat.

2. Der Unipräsident hatte versprochen, dass die Hörsäle durch dekorative Skulpturen verschönert werden würden, und tatsächlich …
0-emb ... hat dann 'ne dekorative Skulptur jeden Hörsaal in der Uni verschönert.

1-emb ... hat dort dann 'ne dekorative Skulptur gestanden, die jeden Hörsaal in der Uni verschönert hat.

2-emb ... war dort dann 'ne dekorative Skulptur, die so gestanden hat, dass sie jeden Hörsaal in der Uni verschönert hat.

3. Der Kommissar hatte verlangt, dass die Tatorte durch rote Flatterbänder abgesperrt werden müssten und tatsächlich ...

0-emb ... hat dann 'n rotes Flatterband jeden Tatort abgesperrt.

1-emb ... hat dort dann 'n rotes Flatterband gehangen, das jeden Tatort abgesperrt hat.

2-emb ... war dort dann 'n rotes Flatterband, das so gehangen hat, dass es jeden Tatort abgesperrt hat.

4. Der Gemeinderat hatte beschlossen, dass die Parkanlagen mit neuen Geräteschuppen ausgestattet werden sollten, und tatsächlich ...

0-emb ... hat dann 'n neuer Geräteschuppen jede Parkanlage ausgestattet.

1-emb ... hat dort dann 'n neuer Geräteschuppen gestanden, der jede Parkanlage ausgestattet hat.

2-emb ... war dort dann 'n neuer Geräteschuppen, der so gestanden hat, dass er jede Parkanlage ausgestattet hat.

5. Der Hausmeister hatte gewarnt, dass die Toiletten durch eingeworfene Binden verstopft werden könnten, und tatsächlich ...

0-emb ... hat dann 'ne eingeworfene Binde jede Toilette verstopft.

1-emb ... hat dort dann 'ne eingeworfene Binde festgesteckt, die jede Toilette verstopft hat.
2-emb … war dort dann 'ne eingeworfene Binde, die so feststeckt hat, dass sie jede Toilette verstopft hat.

6. Der Arzt hatte verlangt, dass die Blutwunden der Kinder mit desinfizierten Pflastern abgedeckt werden sollten, und tatsächlich …

0-emb … hat dann 'n desinfiziertes Pflaster jede Wunde der Kinder abgedeckt.
1-emb … hat dort dann 'n desinfiziertes Pflaster geklebt, das jede Wunde der Kinder bedeckt hat.
2-emb … war dort dann 'n desinfiziertes Pflaster, das so geklebt hat, dass es jede Wunde der Kinder bedeckt hat.

7. Der Physiker hatte behaupropt, dass die Planeten im Sternbild Waage von Monden umkreist würden, und tatsächlich …

0-emb … hat dann 'n Mond jeden Planeten im Sternbild Waage umkreist.
1-emb … hat sich dort dann 'n Mond bewegt, der jeden Planeten im Sternbild Waage umkreist hat.
2-emb … war dort dann 'n Mond, der sich so bewegt hat, dass er jeden Planeten im Sternbild Waage umkreist hat.

8. Im Reiseführer hatte die Touristengruppe gelesen, dass die Dörfer in der Türkei von Moscheen überragt würden, und tatsächlich …

0-emb … hat dann 'ne Moschee jedes Dorf in der Türkei überragt.
1-emb … hat dort dann 'ne Moschee gestanden, die jedes Dorf in der Türkei überragt hat.
2-emb … war dort dann 'ne Moschee, die so gestanden hat, dass sie jedes Dorf in der Türkei überragt hat.
9. Wegen der Klimaschutzziele hatte die EU verlangt, dass die Wohnzimmer der Mitgliedsstaaten statt von alten Glühbirnen von energiesparenden LED-Lampen erhellten werden sollten, und tatsächlich …

0-emb … hat dann 'ne energiesparende LED-Lampe jedes Wohnzimmer erhellt.
1-emb … hat dort dann 'ne energiesparende LED-Lampe gehangen, die jedes Wohnzimmer erhellt hat.
2-emb … war dort dann 'ne energiesparende LED-Lampe, die so gehangen hat, dass sie jedes Wohnzimmer erhellt hat.

10. Autofahrer hatten sich im Winter darüber beschwert, dass die Verkehrswege während der Rushhour ständig durch Streugutfahrzeuge verengt werden würden, und tatsächlich …

0-emb … hat dann letzten Montag während der Rushhour 'n Streugutfahrzeug jeden Verkehrsweg verengt.
1-emb … ist dort dann letzten Montag während der Rushhour 'n Streugutfahrzeug gefahren, das jeden Verkehrsweg verengt hat.
2-emb … war dort dann letzten Montag während der Rushhour 'n Streugutfahrzeug, das so gefahren ist, dass es jeden Verkehrsweg verengt hat.

11. Wegen der reflektierenden Beschichtung und dem günstigen Preis hatte sich's angeboten, dass die Räume im Dachgeschoss durch reflektierende Steinwollplatten gedämmt werden, und tatsächlich …

0-emb … hat dann 'ne reflektierende Steinwollplatte jeden Raum im Dachgeschoss gedämmt.
1-emb … hat dort dann 'ne reflektierende Steinwollplatte gehangen, die jeden
Raum im Dachgeschoss gedämmt hat.

2-emb … war dort dann 'ne reflektierende Steinwollplatte, die so gehangen hat,
dass sie jeden Raum im Dachgeschoss gedämmt hat.

12. Für die Übergangszeit hatte der Klempner vorgeschlagen, dass die rostenden
Rohre im Haus durch neue Dichtungsringe abgedichtet werden könnten, und
tatsächlich …

0-emb … hat dann 'n neuer Dichtungsring jedes rostende Rohr im Haus
abgedichtet.

1-emb … hat sich dort dann 'n neuer Dichtungsring befunden, der jedes rostende
Rohr im Haus abgedichtet hat.

2-emb … war dort dann 'n neuer Dichtungsring, der so angebracht gewesen ist,
dass er jedes rostende Rohr im Haus abgedichtet hat.

13. Der Entomologe hatte behauptet, dass Schlehen-Bürstenspinner im Mai von
Kokons umhüllt seien, und tatsächlich …

0-emb … hat dann 'n schützender Kokon jeden Schlehen-Bürstenspinner
umhüllt.

1-emb … hat dort dann 'n schützender Kokon gehangen, der jeden Schlehen-
Bürstenspinner umhüllt hat.

2-emb … war dort dann 'n schützender Kokon, der so gehangen hat, dass er jeden
Schlehen-Bürstenspinner umhüllt hat.

14. Die Eigentümer hatten sich beschwert, dass die Hauswände in dem Viertel
durch angesprühte Graffiti verunstaltet werden würden, und tatsächlich …
0-emb … hat dann 'n angesprühtes Graffito jede Hauswand in dem Viertel verunstaltet.

1-emb … hat sich dort dann 'n angesprühtes Graffito befunden, das jede Hauswand in dem Viertel verunstaltet hat.

2-emb … war dort dann 'n angesprühtes Graffito, das so angebracht gewesen ist, dass es jede Hauswand in dem Viertel verunstaltet hat.

15. Bürgerinnen und Bürger hatten sich aufgeregt, dass die wenigen kostenlosen Parkplätze in Berlin durch Autos aus dem Ausland belegt werden würden, und tatsächlich …

0-emb … hat dann gestern wieder 'n Auto aus dem Ausland jeden kostenlosen Parkplatz in Berlin belegt.

1-emb … hat dort gestern wieder 'n Auto aus dem Ausland gestanden, das jeden kostenlosen Parkplatz in Berlin belegt hat.

2-emb … war dort gestern wieder 'n Auto aus dem Ausland, das so gestanden hat, dass es jeden kostenlosen Parkplatz in Berlin belegt hat.

16. Wegen der Kälte hatte der Veranstalter veranlasst, dass die Sitzplätze durch witterungsfeste Sitzschoner abgedeckt werden sollten, und tatsächlich …

0-emb … hat dann 'n witterungsfester Sitzschoner jeden Sitzplatz abgedeckt.

1-emb … hat dort dann 'n witterungsfester Sitzschoner gelegen, der jeden Sitzplatz abgedeckt hat.

2-emb … war dort dann 'n witterungsfester Sitzschoner, der so gelegen hat, dass er jeden Sitzplatz abgedeckt hat.
17. Als Teil von 'ner Kunstatzestellung hatte der berühmte Aktionskünstler veranlasst, dass die neu errichteten Bauwerke von Tüchern verhüllt werden sollten, und tatsächlich …

0-emb … hat dann 'n Tuch jedes Bauwerk eingehüllt.
1-emb … hat dort dann 'n Tuch gehangen, das jedes Bauwerk eingehüllt hat.
2-emb … war dort dann 'n Tuch, das so gehangen hat, dass es jedes Bauwerk eingehüllt hat.

18. Experten hatten vorausgesagt, dass wegen der landesweiten Unwetter die ufernahen Städte durch Flüsse überschwemmt werden würden, und tatsächlich …

0-emb … hat dann 'n Fluss jede ufernahe Stadt im Land überschwemmt.
1-emb … hat dort dann 'n Fluss gelegen, der jede ufernahe Stadt im Land überschwemmt hat.
2-emb … war dort dann 'n Fluss, der so gelegen hat, dass er jede ufernahe Stadt im Land überschwemmt hat.

19. Damit die Power-Point-Präsentationen besser gesehen werden können, hatten die Dozenten den Hausmeister darum gebeten, dass die Fenster durch Jalousien abgedunkelt werden, und tatsächlich …

0-emb … hat dann 'ne Jalousie jedes Fenster abgedunkelt.
1-emb … hat dort dann 'ne Jalousie gehangen, die jedes Fenster abgedunkelt hat.
2-emb … war dort dann 'ne Jalousie, die so gehangen hat, dass sie jedes Fenster abgedunkelt hat.
20. Nach dem Totalausfall der Zentralheizung hatte die Tochter vorgeschlagen, die Räume vorübergehend von Heizstrahlern beheizen zu lassen, und tatsächlich …

0-emb … hat dann 'n Heizstrahler jeden Raum beheizt.

1-emb … hat dort dann 'n Heizstrahler gestanden, der jeden Raum beheizt hat.

2-emb … war dort dann 'n Heizstrahler, der so gestanden hat, dass er jeden Raum beheizt hat.

21. Um die Verkaufszahlen anzukurbeln, hatte der Müslihersteller veranlasst, dass die Müslipackungen mit Einkaufsgutscheinen beklebt werden sollten, und tatsächlich …

0-emb … hat dann 'n Einkaufsgutschein jede Müslipackung beklebt.

1-emb … hat es dort dann 'nen Einkaufsgutschein gegeben, der jede Müslipackung beklebt hat.

2-emb … gab es dort dann 'nen Einkaufsgutschein, der so war, dass er jede Müslipackung beklebt hat.

22. Der Statiker hatte drauf bestanden, dass die neuen Rundbögen von Stahlpfeilern gestützt werden sollten, und tatsächlich …

0-emb … hat dann 'n Stahlpfeiler jeden Rundbogen gestützt.

1-emb … hat dort dann 'n Stahlpfeiler gestanden, der jeden Rundbogen gestützt hat.

2-emb … war dort dann 'n Stahlpfeiler, der so gestanden hat, dass er jeden Rundbogen gestützt hat.
23. Damit bei der Performance nichts verrutscht, hatte die Tanzlehrerin vorgeschlagen, dass die Kostüme durch Sicherheitsnadeln am Platz gehalten werden sollten, und tatsächlich …

0-emb … hat dann 'ne Sicherheitsnadel jedes Kostüm am Platz gehalten.

1-emb … hat dort dann 'ne Sicherheitsnadel gesteckt, die jedes Kostüm am Platz gehalten hat.

2-emb … war dort dann 'ne Sicherheitsnadel, die so gesteckt hat, dass sie jedes Kostüm am Platz gehalten hat.

24. Die Verbraucherschutzorganisation hatte empfohlen, dass die Kinderbetten durch metallene Gitter gesichert werden sollten, und tatsächlich …

0-emb … hat dann 'n metallenes Gitter jedes Kinderbett gesichert.

1-emb … hat es dort dann 'n metallenes Gitter gegeben, das jedes Kinderbett gesichert hat.

2-emb … war dort dann 'n metallenes Gitter, das so angebracht war, dass es jedes Kinderbett gesichert hat.
B&W’s analysis (2012) does not make any strict predictions for our particular experimental design, for the following reasons: First, their analysis considers LF-to-PF mappings only, i.e., it only looks at the optimal syntactic way of expressing a particular scope interpretation at PF, and therefore has nothing to say on the question of which scope readings are available for a given syntactic PF-realisation. Second, B&W’s analysis is an OT-analysis with soft, violable constraints. This leaves room for including additional (e.g., information-structural, prosodic, contextual, etc.) constraints, as discussed in connection with (3) in the main text. The workings of additional constraints would thereby make an otherwise unavailable interpretation possible, or, in B&W’s terms, they would allow for a violation of ScoT in expressing an inverse scope reading. In sub-section 3.2.1, we will discuss one such plausible additional constraint in a modified version of B&W (2012). However, we will also show that the addition of this constraint does not account for the full range of our experimental data, leaving open the question of which additional constraints would instead.

One of the three tested syntactic configurations in Rado & Bott (2018:11, ex. (15c)) was similar to the German configurations from our experiment in that it also involved an existential subject NP preceding and c-commanding a universal object QP; cf. (i):

(i) Genau ein Lehrer lobte jeden dieser Schüler.

‘Exactly one teacher praised each of these students.’

Sentence (i) differs from the target sentences of our experiment in three crucial respects. First, only one of the QPs is placed in the midfield and there is no verum focus accent. Second, (i) features a bona fide generalised quantifier built on the numeral one instead of a plain existential NP with an indefinite article. Third, (i) contains a d-linked universal QP containing a partitive DP (dieser Schüler) headed by a demonstrative. In addition, the sentences were presented out of context. Because of d-linking of the universal QP, Pafel (2005) predicts (i) to allow for an inverse reading, whereas Frey’s (1993) purely structure-based account does not. By contrast, both analyses make the same predictions for the German target sentences in our experiment, in which the universal QPs are NOT morpho-syntactically d-linked. The numeral values assigned to the two QPs in Pafel’s system, reflecting their respective wide scope potential, will be as follows for the non-d-linked variant of (i) in (ii):

(ii) und tatsächlich hat dann ‘n Lehrer jeden Schüler gelobt.

‘And in fact has then a teacher every student praised

Q1 (‘n Lehrer ‘a teacher’): precedence + subject (1.5x5 + 1x5 = 12.5);
Q2 (jeden Schüler ‘every student’): inherent distributivity (1x5 = 5)

On Pafel’s account, the difference in scope potential of 7.5 between Q1 and Q2 is too large for licensing the inverse reading.

The pre-test was conducted in German only. Participants read contexts that corresponded to the contexts used in our main experiments to ensure that their ratings were based on the same context information. They then had to indicate on a scale, which scenario out of two they considered to be the more plausible. On one end of the scale, they had a situation with a single X. On the other end of the scale, there was a situation with multiple X. If they checked a cross in the middle, this meant that they considered both situations similarly plausible. If they shifted the cross towards one side, it meant that they considered that situation more plausible. If they crossed the very end of the scale, it meant that they considered this situation the only possible situation. An example item is given in (i). We used items with values in the middle range for the neutral condition, and items with values towards the right of the scale for the biased condition.

(i) Context: Die Polizei hatte vor dem Sturm davor gewarnt, dass die Zufahrten in die Innenstadt blockiert werden könnten Tatsächlich wurden die Zufahrten dann alle blockiert, und zwar insgesamt von…
‘The police had warned before the storm that the entrances to the city center could get blocked. Indeed, the entrances
did all get blocked, namely by overall …’

Welche Situation halten Sie für plausibler?
‘Which scenario do you consider the more plausible?’

<table>
<thead>
<tr>
<th>einzig mögliche Situation ‘only possible situation’</th>
<th>viel plausibler ‘much more plausible’</th>
<th>etwas plausibler ‘somewhat more plausible’</th>
<th>etwa gleich plausibel ‘about as plausible’</th>
<th>etwas plausibler ‘somewhat more plausible’</th>
<th>viel plausibler ‘much more plausible’</th>
<th>einzig mögliche Situation ‘only possible situation’</th>
</tr>
</thead>
<tbody>
<tr>
<td>…einem einzigen Baum ‘a single tree’</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>…mehr als einem Baum ‘more than one tree’</td>
</tr>
</tbody>
</table>

4 The transitive verbs in the German and English experiments were non-agentive and occurred with non-volitional subjects. They came from the following, possibly overlapping verb classes: change-of-state verbs (e.g. *vergiften* ‘poison’), depictive verbs (e.g. *darstellen* ‘depict’), psych-verbs (e.g. *verängstigen* ‘scare’), comparative verbs (e.g. *übertreffen* ‘supersede’), directional verbs (e.g. *anfahren* ‘service’). Subject DPs typically carried the theta-role of CAUSER, whereas the object DPs had the theta-role of affected THEME throughout. The canonical, base-generated order of DP-arguments was SUBJ>OBJ, as evidenced by standard diagnostics, such as the unmarked linearization patterns in all-given or all-new conditions (Lenerz 1977), and the impossibility of topicalizing the subject together with the lexical verb. This is shown in (i.ab) and (ii.ab) for the verb *bewässern* ‘irrigate’ (the postverbal arguments in (ii) are indefinite to rule out the possibility of scrambling plus remnant movement):

(i) Q: Why is Gabriel happy?
   a. … weil ein Kanal ein Feld bewässert.  b. … weil ein Feld ein Kanal bewässert.
        because a canal a field irrigates  because a field a canal irrigates
        ‘…because a canal irrigates a field.’

(ii) a. [das Feld bewässern] wird ein Kanal.  b. *[der Kanal bewässern] wird ein Feld.
       the field ACC irrigate will a canal  the canal NOM irrigate will a field
       ‘The field will be irrigated by a canal.’

Based on these tests, we conclude that SUBJ>OBJ is the only base-generated order, thereby giving the subject DP syntactic scope over the object DP. See Appendix A for a full list of verbs used in the two context conditions.

5 In order to mask this change, we also adapted the rest of the items and fillers to a somewhat more colloquial register, e.g., by. shortening words like *haben* ‘have’ to *ham*, or by using more colloquial words like *kriegen* ‘receive’ or *schmeißen* ‘throw’.

6 A reviewer expressed concern that the colloquial style of the German stimuli might be perceived as unnatural by the German participants, thereby creating a potential confound. In response to this worry, we conducted a follow-up experiment with 26 participants in which we replaced the reduced indefinite articles by their full counterpart *ein(e)* from the standard register. We also replaced all other colloquial expressions by standard speech. The changes had little effect, as the results were by and large comparable to the findings from the original experiment. The only larger difference was found in the critical neutral/zero condition, in which the acceptance of IR was lower with the full indefinite form; see Table 9 in the appendix for the full list of results. The fact that the response patterns in all other conditions, including fillers, were parallel to those from the original experiment suggests that the colloquial style did not pose a problem for
participants. Further, it seems that the presence of the full indefinite article does indeed increase the likelihood of a specific wide scope interpretation for the indefinite subject QP in the absence of other cues such as plausibility or embedding. Recall that it was this fact that motivated the choice of the reduced form in the main experiment on German. Still, the inverse reading was accepted one out of four times even with the full indefinite forms, thereby providing additional evidence for our claim that inverse readings are available in these syntactic configurations in German.

The confound is related to the fact that the referential subject of the elided clause can be construed as being included in the denotation of the subject of the antecedent clause in several of her experimental items. For instance, the club’s president in (5), repeated as (i), can be considered a club member, too. This means that even if participants only obtain an unambiguous surface \( \exists \forall \)-reading for the antecedent clause, they might still answer Q-MORE in the affirmative as the number of members that tested recipes was greater than one: the helpful club member from the antecedent clause and the club president, another member, from the elided clause.

(i) A helpful member tested every recipe. The club’s president \([\text{VP did}], \text{too}\).

8 An anonymous reviewer raises the question of whether ‘yes’-answers to Q-ONE will be indeed unambiguously indicative of surface scope. After all, a ‘yes’-answer to Q-ONE is also logically compatible with an inverse scope construal, e.g., in the LF-configuration in (i), if and only if every entity in the restriction of the universal quantifier associates with the same entity in the restriction of the existential.

(i) \([\text{jeder} \exists \text{-OBJ}, \ldots [\text{‘nexist} \exists \text{-SUBJ} \ldots t]…]]\)

We agree with this assessment of logical relations, but we would like to maintain that ‘yes’-answers to Q-ONE are a reliable diagnostic for surface scope, for two reasons: First, theoretical and experimental treatments of scope agree on the fact that the derivation of inverse scope readings is more costly. So, on processing grounds, the question arises why participants would put more effort into deriving a semantic reading that is already made available by the less costly surface construal. Second, on theoretical semantic grounds, genuine inverse scope readings must satisfy the semantic criterion of distributivity, so that the different elements of one set, say the existential restriction, are distributed over the elements of another set, such as, say, the universal restriction; see e.g., Matthewson (1998), Reinhart (2006), Nouwen (2015), for extensive discussion. Such distributivity effects are lacking, though, when participants answer Q-ONE with ‘yes’. Hence, a necessary empirical diagnostic for inverse scope would not be satisfied. Finally, as discussed in Reinhart (2006), bona fide inverse scope readings must be independent in the sense that they are not entailed by the surface reading. This criterion is not met by the hypothetical inverse construal in (i). We will therefore continue to take ‘yes’-answers to Q-ONE as directly indicative of surface scope.

A posterior check revealed that the restricting adjective was missing from Q-MORE/Q-ONE in 4/48 items in the German experiment and in 6/48 items in the English experiments. However, the erroneous absence of the adjectives from the content questions had no relevant effect on the experimental results. An analysis without the 4 and 6 items for German and English, respectively, differs only by between 0% and 2% for the individual conditions; see Tables 10 and 11 in the appendix. We therefore decided to include the relevant items in our discussion of the results in section 3.3.

The exact wording for the English experiment was: “… All sentences have been constructed to examine a specific aspect of the English language. It is enough that you tell us your opinion about the sentence in exactly the way it is written there. You do not need to modify anything...”.

We are not sure why the drop-out rate was so high in this experiment. We conducted the same experiment again via Prolific, with the same items, but with a slightly different task. In this experiment, the drop-out-rate was very low. It therefore seems not to be tied to the acquisition of participants via this platform in general, nor to the items that we used.
But see Beck & Gergel (2014) for a different position on the availability of IR-readings in German in this structural configuration. To our knowledge, this is the only published source that acknowledges the general availability of IR-readings in German.

For reasons of space, we will mainly focus on B&W (2012), who make specific cross-linguistic predictions for English and German.

Notice that the same result would obtain if the two QPs in the target clause had the same IS-status as either topic or focus. The only configuration for object scrambling to be blocked on information-structural grounds in canonical (7) would be for the reduced subject $\exists$-QP to be the topic, and for the object $\forall$-QP to be the focus. Given that the antecedent of the $\forall$-QP exhibits prototypical properties of topical expressions (structural prominence, definiteness, referentiality), and given that unaccented non-specific indefinite DPs cannot be topical, we conclude that the configuration TOP>FOC that would block overt scrambling in (7) does not arise.

The factor Context Plausibility could also be directly added to Pafel’s (2005) system of numerically weighed factors. Pafel’s (2005) system can even be further modified to predict inverse scope readings in the conditions IR-biased and neutral, namely by manipulating the numerical weights of the different factors involved.

By contrast, it seems impossible to modify B&W’s system further to predict the availability of inverse readings in the condition neutral. It is of course possible to add a constraint X, the nature of which remains to be identified, that mitigates against syntactic configurations with overt scrambling (*B>>A). If X is ranked higher than ScoT, the canonical syntactic configuration A>>B would be the optimal way of expressing the intended (inverse) scope reading. Notice, though, that whatever the nature of X, it will apply vacuously in English, which does not allow for the generation of scrambling B>>A-structures in the first place. In effect, the inclusion of X would then predict that English and German behave on a par when it comes to the availability of inverse scope, even in configurations in which overt scrambling is an option in German. It seems to us, though, that such an outcome would be in total opposition to the spirit of B&W’s (2012) enterprise, which was after all meant to account for differences between the two languages.

Barker (2012: 621) observes that it is especially easy to find instances of inverse scope/binding out of complex DPs when the container DP is definite. This is different in our experimental items in the embedding conditions, in which the container DP is indefinite.

8 items had to be excluded in two of the 12 lists in the English data due to a coding error which led to a mistaken visual presentation.

Since the German and the English data stem from two distinct experiments, we did not treat language as a factor and hence we did not include the German and the English data in the same statistical analysis. As a result, it is not possible to provide a measure of significance when comparing the two languages. Doing so would be highly problematic as the data was gathered in two distinct studies with two distinct pools of participants and a different set of target items. The latter problem is inherent in any cross-linguistic experimental study, since the translation procedure will always yield distinct corresponding linguistic items, no matter how close to the original item the translation may be. In this respect we follow the example of other cross-linguistic studies in treating the two experiments as separate in the statistical analysis, see also Scontras et al. (2017) for a comparable procedure.

The reason for this simple random effect structure is that more complex models resulted in a singular fit, which is considered problematic. We followed the “keep it maximal” rule in Barr et al. (2013), i.e., we chose the most complex model that allowed a non-singular fit.

A reviewer raised concerns if interpreting the responses, and thereby collapsing the results in this way is a valid procedure. For this reason, we will briefly lay out the logic behind it in some more detail: Participants are either asked if the sentence can be understood to mean that there is only a single X, or that there is more than one X. Logically, the two
types of questions cover all possible interpretations: there can only be either exactly one X, or more than one X. The only other theoretical possibility would be zero X. However, if participants came up with this interpretation, they would not have properly read the target sentence in the first place, as it is contradictory to the information given in context and target clause. Such a behaviour should then also be reflected in the filler/control items, and those participants would therefore be filtered out via our exclusion criterion. Given this, the two interpretations we elicit by means of the two question types are complementary: Whenever a participant said ‘no’ to Q-ONE (exactly one), they were unable at that moment to interpret the sentence under the surface reading, and thus must have had the other interpretation (more than one). Conversely, whenever participants said ‘no’ to Q-MORE (more than one), they were unable to interpret the sentence under the inverse reading, and thus must have had the other interpretation (exactly one). Let us consider condition 0-emb/neutral for illustration: in 100-82=18% of all cases, when being explicitly asked for the surface reading, participants did not obtain it and instead only obtained the inverse reading. The 82% show the number of times when at least the surface reading was available, but potentially sometimes the inverse reading too. In 100-39=61% of the cases, when being explicitly asked for the inverse reading, participants did not obtain it, but they only obtained the surface reading. The 39% thereby show the number of times when at least the inverse reading was available, but potentially sometimes the surface reading too. Collapsing the responses in the way we did therefore gives us, on the one hand, all cases in which the inverse reading was available, independent of whether or not the surface reading was available as well, and, on the other hand, all cases in which the surface reading was available, independent of whether or not the inverse reading was available too.

See also Scontras et al. (2017) for a cross-linguistic experimental investigation of inverse scope in (different varieties of) US English and Mandarin Chinese.

We were also able to replicate the results of Anderson (2004) for the additional ellipsis condition in English. It seems that inverse readings are indeed available under parallelism to VP-elided clauses with referential subjects even in our more controlled experimental items, contrary to the empirical claims in Fox (2000); see also Blok (2019: 177 ff.) for theoretical arguments against Fox (2000).

As for why the percentage of ‘yes’-answers to Q-ONEs was below ceiling in the baseline condition 0-emb/neutral in both languages (German 82%, English 69%), we can only speculate. It is true that, from a structural point of view, this reading should always be available. However, from a processing-oriented view, remember that both semantic construals are plausible in the neutral context condition. It thus seems plausible that participants opt for the first of two plausible construals that comes to mind. Depending on world knowledge and subjective experience, some participants may thus well first come up with a situation verifying the inverse scope reading, and then subsequently stick to this construal in answering Q-ONE with ‘no’. See, e.g., Sanford & Garrod (1998) for such processing-driven, subpropositional derivation of meanings, and Scontras et al. (2017) and Ionin (2014), for comparable non-ceiling responses to the experimental conditions probing for the surface reading.

As the control conditions were not coded for purposes of statistical analysis, we unfortunately could not test for whether the difference between the controls and the target condition neutral/2-emb is statistically significant or not.

An anonymous reviewer proposes an alternative account according to which the observable differences between English and German are largely caused by shallow morphological processing and a difference in unambiguous morphological number marking in the two languages. We will address this issue in section 4.5.

For a more detailed investigation on the by-participant data in German see AUTHORS.

Recall that inverse readings are generally associated with higher processing costs (e.g. Kurtzman & MacDonald 1993, Reinhart 2006).
Interestingly, the examples in (23) involve a definite DP instead of an existential indefinite quantifier as head of the relative clause. These kinds of examples seem to show that IRs are possible out of relative clauses, at the same time contradicting the standard assumption that definite DPs cannot interact scopally (e.g. Fox 2000); see e.g. Meier (2003) and Champollion and Sauerland (2011) for discussion.

Notice that this analytical option in terms of cumulativity does not extend to instances of inverse scope between universal object QPs and clausemate existential subject QPs in the 0-emb condition. This is because the indefinite SG article on the subject QP enforces a quantised SG interpretation, thereby blocking a cumulative construal between two plural groups.

It should be noted, however, that wide scope over a higher quantifier is generally a problem, as Larson (1985) shows for Inverse Linking with three QPs. Inverse readings could therefore be blocked for other reasons in this condition; see also Sauerland (2005) and Charlow (2010) for relevant discussion.

See also Liu et al. (2019) on extractability from factive and manner-of-speaking islands in English.