

QR OUT OF A TENSED CLAUSE: EVIDENCE FROM ANTECEDENT-CONTAINED DELETION

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Abstract

This paper presents an argument based on evidence from experiments featuring Antecedent-Contained Deletion (ACD) sentences situated in carefully-manipulated discourse contexts, that covert movement is not grammatically constrained by tense. ACD is a form of Verb Phrase Ellipsis in which ellipsis is embedded in its antecedent. Under an account appealing to Quantifier Raising, the quantificational phrase containing the ellipsis site raises to a VP-external position, allowing the VP to become the antecedent. When ACD is embedded in a non-finite clause, such sentences are ambiguous, since multiple VPs can serve as an antecedent. However, when ACD is embedded in a finite clause, the range of interpretations has been claimed to be restricted, because of an independent ‘clause-bounded’ movement constraint on Quantifier Raising. However, there are exceptions to this generalization. I present evidence from an experimental investigation of finite-clause-embedded ACD sentences, relying on Cecchetto (2004), to demonstrate that under the right discourse conditions, the supposedly unavailable Matrix reading surfaces robustly, at a percentage that is surprising if the constraint were rooted in the grammar. I argue that these results call into question the source of this locality restriction, and propose that it has nothing to do with an arbitrary grammatical constraint on movement.¹

Introduction

In this article, I present experimental evidence from a special case of Verb Phrase Ellipsis known as Antecedent-Contained Deletion

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(ACD), which calls into question the grammatical status of a rather well-known – but arbitrary – constraint barring Quantifier Raising out of finite clauses. The results demonstrate that under certain discourse conditions, participants robustly access a supposedly unavailable reading that arises precisely because of such covert movement. I begin by outlining previous approaches to the resolution of ACD that rely on Quantifier Raising, and point out consequences that arise when ACD occurs in an embedded clause. I draw special attention to ACD embedded in a *finite* clause, and appeal to an account by Cecchetto (2004). I then present a set of experiments investigating judgments of this type of ACD construction. I close by summarizing how the results bear on theories of covert movement.

Verb Phrase Ellipsis and Antecedent-Contained Deletion

In a canonical case of Verb Phrase Ellipsis (VPE), as in (1), the interpretation of the elided VP (signaled by *did*) depends on the presence of a salient antecedent (Hankamer & Sag 1976).²

- (1) a. John read every book, and Mary **did**, too.
 b. John [VP read every book] and Mary [did], too
 c. John read every book, and Mary did [read every book], too

Antecedent-contained deletion (ACD), shown in (2), is a unique instance of VPE, in that the site of the elided VP is contained within its antecedent (Bouton 1970).

- (2) John [VP read every book that Mary did].

As a result, the antecedent and elided VP cannot be parallel (i.e., identical in form at Logical Form) (Fox, 2002). Moreover, if we assume that the linguistic material in the antecedent is copied into the ellipsis site for interpretation, then any attempt to copy in the antecedent (as in (b-c) above) also copies in the VPE, resulting in an infinite regress (Fox 2002; Sag 1976).

² Here, the antecedent is supplied earlier in the sentence, but it need not be (Sag 1976).

The proposal to resolve antecedent containment proposed by May (1985), and elaborated upon by Fiengo & May (1994) Fox (2000), Kennedy (1997), Merchant (2000a), is to move the Quantificational NP (QNP) at LF via a covert movement operation known as Quantifier Raising (QR).³ Under a QR account, the quantificational phrase (*every book . . .*) raises from its base position at an abstract level of representation called Logical Form to a position external to the VP in which it is contained, as shown in (b) below. At this point, it is able to look to the antecedent VP and copy in the lexical content in order to interpret the VPE, as shown in (c-d).

- (3) a. John read every book that Mary did
- b. John read [QNP every book that Mary did]₁
- c. John [QNP every book that Mary did]₁ [read t₁]
- d. John [QNP every book that Mary did <read>]₁ [read t₁]
 'John read every book that Mary read'
-

While Fiengo and May (1994) argued that QR in ACD targets IP, there is by now convincing evidence coming from Principle C (Fox 1995b) and Negative Polarity Items (Merchant 2000a) that QR either also/instead targets a landing site lower than both the subject and negation (e.g., adjunction to VP) (Fiengo & May 1994; Sag 1976; Williams 1977; May 1985).⁴ Indeed, adjunction to VP in obviates Principle C in (4), but not in (5).

- (4) I bought him_i everything that John_i thought I would
 I [everything that John_i thought I would <buy him_i>]₁ [bought
 him_i t₁]
- (5) *He_i bought me everything that John_i thought he_i should
 He_i [everything that John_i thought he_i should <buy me>]₁
 [bought me t₁]
 Fox (1995b, (12))

³ The QR (covert A-bar movement) account is contra the A-movement account proposed by Hornstein (1994). An alternative non-QR account is also espoused by Baltin (1987).

⁴ See Bruening (2001) for discussion of the possibility of further movement motivated by feature-driven attraction to *v*P after adjunction to VP.

In the first case, the referring expression *John* is no longer in the c-command domain of the pronoun, while in the second, it has not raised high enough – and scope economy restricts it from raising any higher than it needs to – to escape the domain of the co-referential subject pronoun (Fox 1995b). (See also Merchant (2000b).) Likewise, in (6), the italicized Negative Polarity Item must remain in the scope of negation. Allowing it to QR and adjoin to the *do* VP (instead of IP) satisfies this requirement at the same time as it allows it to raise high enough to refer to the VP antecedent for ellipsis resolution.

- (6) That boy won't do *a damn thing* Merchant (2000a, (1a))
I ask him to.

Embedded ACD

Interesting consequences arise when ACD occurs in a complex sentence in which it is embedded in multiple VPs. In this case, each VP serves as a potential landing site for QR, and therefore a potential antecedent to resolve the ellipsis. As a result, such sentences are ambiguous, and there is a correlation between the landing sites targeted and the readings made available.

This ambiguity can be observed in (7), where ACD is embedded in a non-finite clause. The different interpretations are captured in (8). If QR targets the Embedded VP (in so-called 'short QR'), the resulting interpretation is the Embedded reading in (8a); if it targets the Matrix VP (in so-called 'long QR'), the Matrix reading is licensed. However, since the QNP would also have raised out of both VPs, either the Matrix or Embedded reading is possible.

- (7) John [_{VP} wanted to [_{VP} read every book that Mary **did**]].
 (8) a. Embedded VP antecedent: *read . . .*
 = 'John wanted to read every book that
 Mary *<read>*.
 b. Matrix VP antecedent: *wanted . . .*
 = 'John wanted to read every book that
 Mary *<wanted to read>*.

Syrett & Lidz (2011) have shown experimentally that four-year-olds and adults are able to access both the Embedded and Matrix interpretations of such sentences. These findings receive further support from follow-up work by Sugawara *et al.* (2013).

Finite Clauses, QR, and ACD

At the same time that there is flexibility in the interpretations that arise from having multiple landing site options, there also appear to be constraints on the movement QNPs that restrict the number of potential interpretations. Specifically, it has been claimed that QR is clause-bounded (cf. Farkas 1981; Hornstein, 1994; Larson & May 1990; May 1985). QR thus poses an interesting puzzle in that it seems to exhibit stricter locality constraints on movement than its overt counterpart, *wh*-movement.⁵

Typically, a QNP in object position is able to take wide scope over an indefinite in subject position. (I leave aside Comparative Quantificational Phrases here, which are outliers in this respect.)

- (9) A technician inspected **every plane**. $a > \textit{every}$, $\textit{every} > a$
Cecchetto (2004, (1))

However, a QNP embedded in a finite embedded clause appears not to be able to take wide scope over an indefinite in subject position. This is seen in (10) with the tensed verb *believes* and in (11) with *says*.

- (10) Someone [_{VP} believes [_{CP} that $smn > \textit{every}$, * $\textit{every} > smn$
every politician is corrupt]].
Reinhart (1997, (25b))
- (11) A technician [_{VP} said [_{CP} that $a > \textit{every}$, * $\textit{every} > a$
John inspected **every plane**]].
Cecchetto (2004, (11))

Wh-phrase movement in the same contexts is licensed, as shown in (12). Here, the *wh*-phrase can undergo successive cyclic movement out of the object position of a verb in a finite embedded clause to land in a position above the subject.

- (12) **What** did a technician [_{VP} say Cecchetto (2004, (12))
[_{CP} that John inspected *t*]]?

Quantificational phrases that undergo QR thus appear to be more restricted in their movement options than *wh*-phrases.

The same restriction on movement seen in (10)-(11) appears to be applicable to instances of ACD embedded in a finite clause. This is shown in (13), where the italicized QNP would have to

⁵ It is quite possible that a rightward movement account along the lines of Fox (2002) fares just as well. See in particular sections 3 and 4 of Fox (2002) for further details of such an approach and its potential to account for the controversial readings of embedded ACD sentences.

undergo QR out of the Embedded VP, then past the tensed Matrix VP in order to generate the Matrix reading.

- (13) John [_{VP} **said** [_{CP} that he [_{VP} **read** *every book that Mary did*]]].
 a. Embedded: 'John said that he read every book that Mary **read**.'
 b. Matrix: '?John said that he read every book that Mary **said that she read**.'

If one assumes that QR cannot raise the QNP out of the finite clause, then the QNP cannot raise to the Matrix VP. Consequently, the only possible antecedent is the Embedded VP, and therefore the only possible reading is the Embedded reading. This contrast between *wh*-movement and QR is curious if both operations are instances of Move – one overt and the other covert: why should one be subject to stricter locality than the other?

Obviation of Clause-Boundedness

At the same time, exceptions to this pattern have been noted across the literature. For bare-bones scopal interaction between a subject indefinite and a QNP in object position, VanLehn (1978) observed that, 'It is not difficult to use lexical content to override the clauseboundedness of quantifier scope' (pg. 8), providing the following example in support.

- (14) A quick test confirmed that VanLehn (1978, (8))
 each drug was psychoactive.

His casual poll confirmed that some informants were able to access the reading in which there was a different test for each drug. Likewise, Reinhart (1997) observed that the inverse scope reading appears to be available for (15), in that there can be a different doctor for every patient.

- (15) A doctor will make sure that we give every new patient a
 tranquilizer.
 Reinhart (1997, (1c))

The contrast between *wh*-movement and QR, Fox (1995a) argues, lies in the motivation for movement. For *wh*-phrases, movement is motivated by feature checking (Chomsky 1995); whereas for QR, the motivation is the generation of a distinct semantic interpretation. QR is only licensed as long as the movement is not scopally vacuous – his Scope Economy (Fox 2000).

There are two clear consequences to this perspective on QR. First, we can maintain the position that QR is like *wh*-movement in terms of its obligatory successive cyclic movement (i.e., movement does not take place in one fell swoop). Second, QR can proceed as long as each step in the successive cyclic movement path is semantically motivated. If these conditions hold, then we predict that clause-boundedness should be obviated. As a result, we should be able to encounter sentences with ACD embedded in a finite clause, such as (13), for which the Matrix reading is available, if the QNP movement is semantically motivated.

Cecchetto (2004) offers such an account of how Matrix readings of these ACD sentences can be generated. To motivate his account, he outlines a number of working assumptions, consistent with what has been outlined above. The first is that each instance of QR must be semantically motivated – for example, in order to take scope over another QNP (and generate another reading), to resolve a type mismatch, or to resolve the problems inherent to an ACD configuration. Second, he assumes that a QNP that undergoes QR in ACD moves from the complement of a verb out of the VP to one of the proposed landing sites (VP, *v*P, IP, etc., but crucially not CP). This movement, Cecchetto argues, is constrained by a strong version of economy (consistent with Fox's Scope Economy), where successive cyclic movement must be motivated, *and* each sub-link must be motivated. There is therefore no 'look-ahead' in which movement could be motivated at one step as long as at the next step it carries semantic consequences.

Next, Cecchetto assumes that the VP headed by the verb taking this QNP as its complement is itself the complement of a light verb *v*. Light verbs (*v*) and complementizers (C) are Phases, in the sense of Chomsky (1999/2001). This leads Cecchetto to invoke a version of the Phase Impenetrability Condition (PIC), as in (16), based on Chomsky's PIC, but exclusively for strong phases.

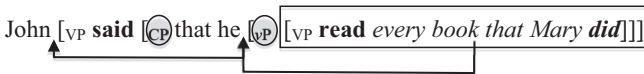
(16) Phase Impenetrability Condition

The complement of a phase α is not accessible to operations at the level of the next highest phase β , but only the head and the edge of α are.

According to the PIC, the complement of the *v*P phase (VP) is not accessible to operations at the level of the next higher phase (CP). As a consequence, no single instance of movement can cross two (or more) heads that belong to the set $\{v, C\}$. Thus, long QR is admitted only when it takes place in a successive cyclic fashion and

each sub-link crosses just one instance of *v* or *C*. Thus, the Matrix reading for sentences in which ACD is embedded in a finite clause should be available, because the object QNP QRs through the structure in successive cyclic fashion, with each step motivated along the way, as outlined in (17b) below. The unavailable movement in one fell swoop is captured in (17b').

- (17) a. John [_{VP} said [_{CP} that he [_{VP} [_{VP} read every book that Mary did]]]]
 b. successive cyclic movement, crossing one phase (○) at a time:



- b'. movement in one fell swoop, crossing more than one phase:



Matrix Readings of Embedded ACD

There have been cases noted in previous studies of ACD in which a Matrix reading appears to be available. Here, I review three such cases in particular. The first two involve sentences in which an otherwise unavailable Matrix reading is not just made accessible, but *forced*, because the Embedded reading is either not sensible or would give rise to a tense mismatch. The third involves experimentally-obtained judgments of ACD sentences presented in a discourse context favoring either the Embedded or Matrix reading. The evidence suggests that the Matrix reading may not be ungrammatical, but highly inaccessible for extragrammatical processing reasons.

In an often-cited exception to the clause-bounded stipulation for QR, Wilder (1997) observed that there are ACD sentences for which the Matrix reading is not only available, but forced. For example, there are, in theory, two possible readings for the comparative in (18).

- (18) a. John thinks that Mary is taller than Bill does. Wilder (1997, (31))
 b. John [_{DegP} -er [than Bill does
 <think that Mary is d-tall>]]
 thinks that Mary is d-tall

The first is the *de dicto* reading: 'John thinks that the degree to which Mary is tall exceeds the degree to which Bill thinks she is tall' (that is, What John thinks is that Mary is taller than however tall Bill thinks she is). The second is the *de re* reading: 'The degree to which John thinks Mary is tall exceeds the degree to which Bill thinks she is tall'. The sentence intuitively seems to have only the *de re* reading. In order to obtain the desired *de re* reading, the VPE must take the matrix VP (*thinks . . .*) as its antecedent. If we assume that the DegP undergoes QR to adjoin to the matrix VP (as shown in (b)), then QR cannot be contained within the finite clause.

Likewise, there are cases like (19) and (20), where the Matrix reading is forced. In these sentences, the site of ellipsis is, as above, signaled by *do* or *did*. If the Embedded VP were targeted as the antecedent, the sentences would read as in the (b) examples. However, both of these strings are ungrammatical. Targeting the Matrix VP as the antecedent results in the grammatical and sensible reading in the (c) examples.⁶

- (19) a. I **expect** (that) everyone will **visit** Mary that you **do**.
 b.* I expect that everyone will visit Mary that you do *<visit Mary>*.
 c. I expect that everyone will visit Mary that you do *<expect to visit Mary>*.
 Tiedeman (1995, (28))⁷
- (20) a. John **said** that you **were** on every committee that Bill **did**.
 b. *John said that you were on every committee that Bill did *<be on>*.
 c. John said that you were on every committee that Bill did *<say that you were on>*. Wilder (1997, (34a))

Thus, with these examples, the Embedded reading is ruled out, and the Matrix reading is forced. However, these are not the only

⁶ When the subject is an indefinite, he claims, *every* cannot take widest scope, as long as only a *de dicto* reading is made possible.

⁷ Tiedeman (1995) actually uses this example to argue that the relative clause has been rightward extraposed, and that if *that* operation is clause-bounded, then the relative clause must still be in the embedded clause. However, Fox (2002) revisits 'Tiedeman's puzzle' (shown by contrasting 0 with Tiedeman's (9b) shown here as (i)) and accounts for the grammaticality of 0 by appealing to rightward movement of *everyone* followed by late merger of the relative clause. See section 4 of Fox (2002) (specifically (37)) for details.

i. *I expect (that) everyone you do will visit Mary

sentences for which a Matrix reading surfaces. Further support for the availability of the Matrix reading of ACD sentences embedded in a finite clause comes from an experimental investigation by Syrett & Lidz (2011). Syrett & Lidz presented child and adult participants with sentences such as (21) and (22) in discourse contexts favoring *either* an Embedded (a) or Matrix (b) reading, while rendering the other reading false. In (21), ACD is embedded in a non-finite clause, while in (22), it is embedded in a finite clause.

- (21) Miss Piggy **wanted** to **drive** every car that Kermit **did**.
 a. Embedded VP: ⟨drive⟩
 b. Matrix VP: ⟨want to drive⟩
- (22) Clifford **said** that Goofy **read** every book that Scooby **did**.
 a. Embedded VP: ⟨read⟩
 b. Matrix VP: ⟨say that Goofy read⟩

Their motivation for obtaining judgments from both adults and children was that if they found that children overgenerated the set of interpretations relative to adults, then this would pose a challenge for learnability, since the set of interpretations available to children would be a superset of adults' (Berwick 1985; Gold 1967; Manzini & Wexler 1987; Pinker 1989). What kind of evidence could children possibly encounter to lead them to filter out a Matrix reading of ACD sentences – sentences which are certainly not frequent in the input – and learn that there is an arbitrary clause-boundedness constraint on QR? It would be rather hard to construct such a developmental story.

Syrett & Lidz found that *both* age groups accessed the Embedded and Matrix readings of sentences like (a) and the Embedded reading sentences like (b), as expected. Interestingly, a number of children and some adults *also* accessed the Matrix reading of sentences like (b), providing clear justifications for either accepting the sentence in a Matrix context or rejecting it in an Embedded context. Thus, the authors were led to entertain the possibility that there is not a grammatically-encoded clause-boundedness constraint on QR, and that the results suggest that what prevents most adults from accessing the Matrix reading is a byproduct of processing these complex sentences.

Current research

Judgments on a range of sentences in which QR is implicated appear to reveal that a QNP can raise out of a finite clause,

indicating that we might be able to abandon the clause-boundedness constraint on QR, or at a minimum relax it in certain cases, particularly in ACD. Until now, however, the evidence has been suggestive and sporadic. The experiments reported in this paper were designed to systematically probe the clause-boundedness constraint on QR in ACD sentences. Because ACD has been argued to provide unambiguous evidence for covert movement (at least, in a generative framework), any evidence obtained from this set of experiments that a quantificational phrase has raised from a finite clause may be taken as evidence that QR is not clause-bounded *a priori*. This evidence comes to us in the form of judged acceptability of Matrix reading of sentences in which ACD is embedded in a finite clause, as in (22) above.

Previous experimental work by Syrett & Lidz (2011) provided a hint that at least some adults find the Matrix reading acceptable. However, if we are indeed to do away with the clause-boundedness constraint, we need more convincing empirical evidence that the Matrix reading is acceptable than a handful of adults and four-year-olds allowing this reading. We therefore turned our attention to manipulating the discourse contexts in which the target sentences are presented, as well as certain linguistic features of the target sentences themselves, in order to make the Matrix reading both felicitous and more easily processed. These manipulations are described in detail in the Methodology section that follows.

Experiments

Methodology and Stimuli

The paradigm used for investigation was the Truth Value Judgment Task (Crain & McKee 1985; Crain & Thornton 1998). In this version of the task, one experimenter told a series of stories displayed on animated slides *via* Powerpoint. At the end of each story a puppet⁸ delivered a target sentence. For the test items, this target sentence featured ACD embedded in a finite clause including the verb *say*, as in (22) above. The participant's task was to evaluate whether the sentence was true or false given the context,

⁸ For child participants, this was a hand-held puppet played by a second experimenter. For undergraduates, images of Kermit the Frog appeared on-screen, and the same experimenter who narrated the stories delivered Kermit's statements.

and choose to accept or reject the statement. Adult participants completed a paper-based response sheet, and were asked to provide a justification for every 'yes'/'no' answer they circled. Children provided a verbal answer, and/or rewarded the puppet with a toy cupcake for a correct response or made him drink toy milk when he delivered an incorrect response.

In an example test scenario, the scene opens with Jessie the cowgirl, Woody the cowboy, and Buzz Lightyear challenging each other to some fun games. They are friendly, but competitive. Today, they have decided to do some frog jumping. There are two sets of frogs: small ones for beginners and big ones that are more challenging, and therefore for more advanced jumpers. Buzz doesn't feel like jumping, so he decides to go off and do something else, and will return later and ask who jumped over which frogs. As soon as Buzz has left, Jessie decides to start jumping. She jumps over the small frogs easily. Then it is Woody's turn. He prepares to jump, but then realizes he doesn't know if he wants to jump over the small ones or the bigger ones. The scene fades to black as he decides, and participants do not actually see which ones Woody jumps over. Buzz returns and asks for the frog jumping report. Jess wants to impress him, so instead of telling him that she jumped over the small frogs – the ones she *actually* jumped over – she tells him she jumped over the big ones – the ones she did *not* jump over. Buzz asks Woody for his report. Woody pauses to consider what to say. It is here that the two experimental conditions diverge.

In the condition favoring the Embedded reading, Woody says aloud, 'I'm tempted to tell Buzz that I jumped over the big frogs, but I don't want to make Jessie look bad. I know . . .' He turns to Buzz and says, 'Buzz, I'm afraid I'm not as good a jumper as Jessie. She may have jumped over the big frogs, but I jumped over the small ones. I guess I need more practice.' In the condition favoring the Matrix reading, Woody says aloud, 'I'm tempted to tell Buzz that I jumped over the small frogs to make Jessie look good. But then again, I don't want to look like a poor jumper compared to Jessie!' He turns to Buzz and says, 'Buzz, I'm also a very good jumper – probably just as good as Jessie! I also jumped over the big frogs!' At the end of the story, after Woody finishes his report, the puppet says, 'That was a great story, and I know what Woody said! *Woody said he jumped over every frog that Jessie did.* Am I right?' This difference between the two conditions is illustrated in Figure 1.

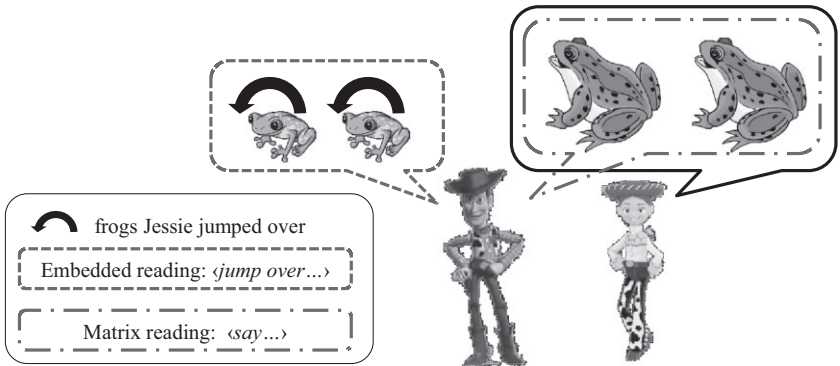


Figure 1 Representation of experimental condition supporting Embedded and Matrix readings for the target sentence *Woody said he jumped over every frog that Jessie did*

There are a number of important aspects of the experimental scenarios. First, the act (and verb) of reporting is highlighted. What matters is not so much the *jumping*, but rather what the characters *reported* to Buzz in the end. Relatedly, instead of saying ‘I know what happened!’ as the puppet often does in a TVJT, the puppet instead responded, ‘I know what Woody said!’ In this way, we tip the scales in favor of the Matrix reading being more easily processed. We also provided visual cues reinforcing the act of saying: whereas an arrow, highlighting, or check marked the objects that were jumped over, read, found, etc., a color coded speech bubble appeared above the character delivering the utterance. In this way, participants were provided with a record of all of the events in the scenario, including the speech acts. (This was one benefit of presenting the stimuli via a computer.)

Second, the participants never saw Woody jump over any frogs. This not only helped to favor what he *said* instead of what he *did*, but also ensured that participants would not respond to the puppet’s statement by referring to which frogs Woody jumped over, and how these frogs align with those Jessie jumped over. Third, it has been observed that a Matrix reading of embedded ACD forces a *de re* reading (Kennedy 1997). Note that in these scenarios, that requirement was satisfied, since Jessie jumped over or said that she jumped over certain frogs in the scene, and it is these very frogs that Woody said that he jumped over. Fourth, there is a

moment where Woody pauses, and is indecisive. At that point, he could report that he jumped over either set of frogs. This aspect helps to satisfy the condition of Plausible Dissent, allowing a participant to make reference to the fact that he did not say he jumped over the 'other' set.

In addition to the contextual features, there are three points to make about the structure of the target sentences themselves. First, the test sentences were based on those from Syrett & Lidz (2011), as in (23); however, we attempted to facilitate the processing of the Matrix reading by weakening the clause boundary, while still maintaining the presence of a finite clause. (See Kluender (2004).) To accomplish this goal, we removed the optional complementizer (*that*), and replaced the referring expression in the subject position of the embedded clause with a pronoun, as in (24).

- (23) The genie said that the cowgirl jumped over every frog
that the old cowboy did.
- (24) Woody_i said he_i jumped over every frog that Jessie did.

Second, the prosody with which the target sentences were delivered featured a nuclear pitch accent and contrastive focus on the subjects of each clause, as in (25).

- (25) WOODY said he jumped over every frog that JESSIE did.

This was done not only because it seemed intuitively natural to the experimenters delivering the target sentences, but also because of theoretical arguments that certain focus conditions must hold between the antecedent and ellipsis – namely that there must be an appropriate contrast between the two and/or that the two need to be 'about' the same individuals (i.e., in this example, the frogs that were jumped over) (Heim 1997; Jakobson 2004; Rooth 2005). Moreover, Wilder (1995) has argued that, 'A wide scope reading can be facilitated by parallel accent on the subject of the VPE and the subject of the antecedent VP, with the subject of the complement clause in the antecedent deaccented . . . In fact, wide and narrow readings for the VPE can be disambiguated prosodically in this way' (pg. 145).

- (26) JOHN thought that the fire destroyed more books than BILL did. (wide only)
- (27) John thought that the [fire/FIRE] destroyed more books than BILL did. (narrow only)

Without committing to this view on prosodic disambiguation, we did control for pitch accenting, on the chance that doing so would boost the availability of the Matrix reading. Note, however that the structure of the test sentences (like (24)) is slightly different from the ones from Wilder in (26)–(27), and it is not clear that placing a nuclear pitch accent on both referring expressions would actually make the narrow scope reading *less* available.

Finally, the test sentences in Syrett & Lidz (2011) all included a quantificational phrase headed by *every*. Since the requirement that the elided VP must escape the antecedent via QR pertains to all ACD sentences, and not just those in which the object is headed by *every*, it is of interest to see how general the availability of Matrix readings is in a wider range of sentences. To this end, each experiment featured six target sentences in which ACD was embedded in a tensed clause.

Three test sentences included an object QNP headed by *every*, and the other three had an object headed by *the same*. Within each set of three sentences, pronominal reference for the subject in the embedded clause was varied to either be coreferential the matrix subject, as in (24), or to refer another salient discourse referent, as in (28).

(28) Louise_i said she_{k=Ruby} invited **the same** friends as Max did.

These six sentences were pseudorandomized with five control sentences of comparable cognitive load and similar linguistic structure. The controls included VPE in coordinated conjunction ($n = 2$), *-er than* comparatives ($n = 2$), and an equative ($n = 1$). A full list of experimental stimuli is included in Appendix A.

In Experiment 1, participants were assigned to one of two conditions: one in which the experimental contexts favored the Embedded reading, and one in which they favored the Matrix reading. Experiment 2 was designed as a follow-up to Experiment 1, and only features contexts favoring the Matrix reading. Differences between the two experiments are described in detail in the presentation of Experiment 2. Participants were run in one of two experimental orders. No ordering difference was observed. The experiment took between 20 and 30 minutes.

Experiment 1

Participants

52 adults and 48 children (4;4–5;8, M 4;11) participated. They were divided evenly across the two experimental conditions. Children were recruited from local preschools and were monolingual speakers, with parents speaking another language in the home less than 20% of the time. Adults were undergraduate students in Linguistics or Cognitive Science (all self-reported native speakers of English), and received extra credit in their courses for participating.

Results

The results are presented in Figure 2. Since the results presented as not just acceptance rates, they deserve some explanation.

For children, the results reflect the raw percentage of 'yes' and 'no' responses in each condition. (A 'yes' is taken as accessing the reading favored in that condition, and a 'no' as accessing the other available reading that was not favored by the contexts.) For adults, the percentage presented actually reflects the percentage of that reading that was accessed. This was determined in the following way. Adults' written justifications corresponding to each 'yes'/'no' response were transcribed for coding. Three trained experimenters (each of whom was familiar with the stimuli, the stories, and the target linguistic construction) independently coded each answer. Coders evaluated the justification paired with the 'yes'/'no' response to determine whether an Embedded or a Matrix reading had been accessed. In cases where the coding was not unanimous or the coders were uncertain, a fourth coder was brought in to attempt to make a determination. This did not happen often, and the method of coding was conservative. If there was any doubt about the reading accessed by the participant the response was coded as 'n/a'. In the Embedded condition, 26 of the 160 responses (or 16.25%) were classified as 'n/a'; in the Matrix condition, 28 of the 152 responses (or 18.4%) were classified as 'n/a'. The remaining responses that were classifiable then figured in to the percentage of Embedded/Matrix readings in each condition. It is these responses that are captured in Figure 2.

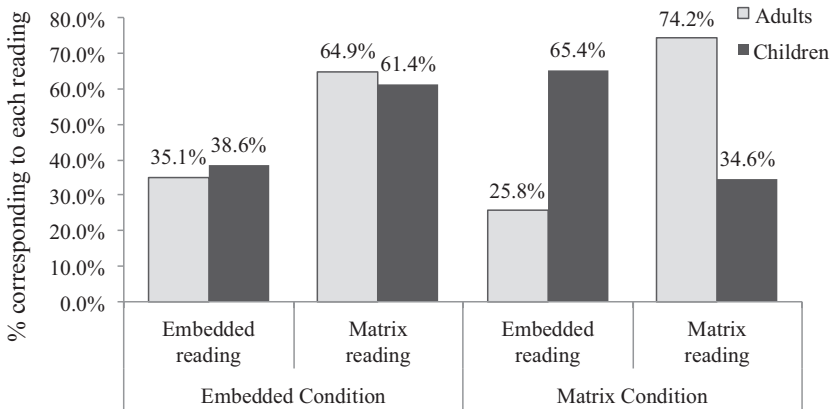


Figure 2 Percentage of reading accessed for each age group in each experimental condition

Within each condition, the Embedded and Matrix readings are separated in order to demonstrate whether or not the percentage of readings accessed by participants reflected the reading favored in the condition to which they were assigned. Thus, the bars for each age group within a condition sum to 100%. We take a non-zero amount of Matrix readings in each condition to be a significant finding, given the previous claims about the supposed lack of available Matrix reading for the target sentences, due to the questionable status of QR out of a finite clause. Thus the contrast between conditions – while striking – is not as crucial a finding as is the non-negligible percentage of Matrix readings by children and adults.

Immediately apparent from Figure 2 is that both age groups were actually more inclined to answer ‘no’ than ‘yes’ in the Embedded condition, accessing the Matrix reading more often than the Embedded one. This pattern is reflected in the low percentage of ‘yes’ responses and coded Embedded readings observed in the Embedded condition. This low percentage may be the result of the speech acts and matrix proposition being highlighted in the discourse context, as well as the prosodic delivery favoring the Matrix reading. One does not expect, though, that such features will tempt participants into accessing a reading that is barred by a grammatical clause-bounded constraint. Children persisted in this pattern in the Matrix condition, saying ‘no’ more

often than ‘yes’ in the Matrix condition.⁹ Adults, however, patterned in the direction expected in this condition – that is, if the Matrix reading were indeed made available in the grammar. Over 74% of their responses reflected a Matrix reading. That they found the Matrix reading readily accessible and supported by the contexts is reflected in their justifications, provided in Appendix B (for both experiments).

Recall that among the test sentences, there were three with *every* in object position, and three with *the same* heading the DP in object position. Furthermore, among each of these sets, there was one in which the subject of the embedded clause referring to a non-local discourse referent, and two where the matrix name and embedded subject pronoun were coreferential. We now ask whether there was a difference in the extent to which the Matrix reading was accessed across these sentences. In Table 1, we present only the responses from the adult group, where we can be absolutely certain from their ‘yes’/‘no’ responses and justifications of which reading they accessed.

Table 1. % of Matrix reading in each test sentence type

Non-local discourse referent	Experimental Condition	
	Embedded	Matrix
<i>every</i>	52.2	57.9
<i>the same</i>	66.7	95.0
Co-reference		
<i>every</i>	72.2, 68.0	47.6, 65.0
<i>the same</i>	65.0, 66.7	85.7, 91.3

The test sentence in which the object was headed by *every* and the embedded subject pronoun referred to an outside discourse referent (sentence (6) in Appendix A) consistently demonstrated a low percentage of Matrix readings. Even in the condition favoring the Matrix reading, this sentence, along with another *every* sentence, exhibited the lowest percentage compared to the

⁹ One might observe that children’s acceptance rate in each condition was relatively low, and find this surprising, given independent claims in the acquisition literature that children abide by a Principle of Charity. In fact, across the set of experiments I have conducted on children’s interpretation of ambiguous ACD sentences, children consistently exhibit *anything but* a Principle of Charity. That children can otherwise provide near-ceiling-level responses with ACD sentences in which only one reading is licensed is seen in Kiguchi & Thornton (2004) and Syrett & Lidz (2010).

other test sentences. The highest percentage was seen for sentences in which the object was headed by *the same*. Thus, it appears that there is indeed variability in the accessibility of the Matrix reading, and that those ACD sentences in which *every* must raise out of a finite clause are perhaps the most resistant to allowing this reading. Although the difference among sentence types within the Embedded condition is not significant ($H(3) = 1.45$, $p = .69$; *every* v. *the same*: $U_A = 2187$, $p = .80$), it is in the Matrix condition ($H(3) = 10.81$, $p = .01$), with the Matrix reading more likely with QNPs headed by *the same* than with *every* ($U_A = 1268$, $p = .001$).

The results show that it simply cannot be that the Matrix reading is made unavailable by the grammar. If it were the case that the quantificational object could not QR out of a finite clause, the Matrix reading would not surface as often as it did. It is extremely hard to reconcile the percentages observed Figure 2 and Table 1, and the justifications in Appendix B, with a position that maintains that the Matrix readings are unavailable because QR cannot escape a finite clause.

Discussion

The results presented in Experiment 1 provide empirical support that it is possible to access the Matrix reading of sentences in which ACD is embedded in a finite clause. However, they do so in a way that is novel against the backdrop of the previous research. The Matrix reading is not forced, because the verb choice or tense makes the Embedded reading ungrammatical or dispreferred, or because the Embedded reading would result in a reading that is not sensible (Wilder 1997). The Matrix reading is not competing with an Embedding reading that may be favored because it is easier to process or because of economy conditions on movement. Rather, in a set of contexts in which the Matrix reading is made salient – and perhaps favored over the Embedded reading – we found that participants quite easily accessed it. Four-year-olds thus do not seem to over-generate these readings relative to adults, and barriers to the processing of these sentences for adults can be broken down so that the reading becomes not only *available*, but *preferred*.

Experiment 2

Participants

20 undergraduates participated.

Methodology

Experiment 2 was designed as a follow-up to Experiment 1. Given the high percentage of Matrix readings observed in Experiment 2, we sought to replicate the findings from *just the Matrix condition* with a new group of participants. We also asked to what extent the presence of the embedded subject pronoun and the absence of the complementizer were responsible for the high percentage of Matrix readings. Therefore, in this experiment, the complementizer *that* was re-introduced to the test sentences, and in the two sentences where there was not coreference between the matrix and embedded subjects, the subject pronoun was replaced by a proper name. These two sentences appeared towards the beginning of the experiment, each after a control item.

Results

As in Experiment 1, we focused our attention on just those responses that unambiguously pointed to either an Embedded or Matrix reading, and therefore used the same coding method as described for Experiment 1. Participants in this experiment provided 120 justifications, 113 of which could be unambiguously classified as favoring either the Embedded or Matrix reading. 70.8% of these were determined to favor the Matrix reading, while the remaining 29.2% favored the Embedded reading.

As before, the percentage of Matrix readings was noticeably higher than what would be expected if this reading were made ungrammatical by a clause-boundedness constraint, and there was variability in the extent to which each reading was accessed across test items, as can be seen in Table 2. In fact, the percentages are fairly consistent with Experiment 1.

Table 2. % of Matrix reading in each test sentence type

Non-local discourse referent	Experiment 1	Experiment 2
<i>every</i>	57.9	36.8
<i>the same</i>	95.0	93.8
Co-reference		
<i>every</i>	47.6, 65.0	52.6, 75.0
<i>the same</i>	85.7, 91.3	84.2, 85.0

Interestingly, the lowest percentage of Matrix readings came from the item where *every* headed the object and there was a proper name in the embedded subject position. As in the Matrix condition of Experiment 1, there was a difference between sentence types ($H(3) = 11.75$, $p = .008$), and the Matrix reading was more likely with QNPs headed by *the same* than with *every* ($U_A = 2107$, $p = .003$). It cannot be definitively determined whether the linguistic features of the sentence or the item order was to blame, as this was the first test item in the experimental session. An indication that it might be the former comes from the fact that the highest percentage of Matrix readings came from the second test item, the sentence in which *the same* headed the object and a proper name was in the embedded subject position. This pattern is reminiscent of Experiment 1.

Discussion

The results of Experiment 2 bolster those of Experiment 1. Presented with contexts that facilitate accessing of the Matrix reading of the target sentences, participants accessed them at a rate that would be surprising if the grammar barred this reading entirely, because QNPs cannot QR out of a tensed clause. The fact that there continued to be variability in the extent to which participants accessed this reading across test sentence types indicates that it is important to evaluate a range of sentence types, for example, by manipulating the head of the QNP. Within this variability, participants were least likely to access the Matrix reading with QNPs headed by *every* and most likely to do so with *the same*. Although this pattern is consistent with the previously reported difficulty in obtaining readings that arise from *every* phrases raising out of tensed clauses, the fact that the Matrix reading is still accessed over 36% of the time in even the most restricted case and well over 50% of the time in other cases indicates that it must not be the grammar preventing movement past a tensed clause boundary.

Conclusions

The clause-boundedness constraint on Quantifier Raising has been assumed over the years, precisely because in certain sentences in which a quantificational phrase would have to raise out

of a finite clause in order to generate a target reading, that reading appears to be unavailable. Moreover, in the same linguistic contexts, *wh*-movement is available. However, a range of counterexamples, as well as recent experimental evidence, have called the blanket, grammatical status of this constraint into question.

The current research demonstrates that when given discourse contexts that strongly favor the Matrix reading, and linguistic features of the target sentences that facilitate the processing of it, participants robustly access this elusive Matrix reading – often more so than the Embedded reading. Appealing to a proposal by Cecchetto (2004) regarding movement through phases, I have shown that it is possible to maintain successive cyclic movement of the QNP out of the finite embedded clause, allowing the QNP to ultimately target a position outside of the matrix VP and therefore allow this VP to serve as an antecedent. In other related work, I have pushed this phenomenon further, to show that a QNP in finite-clause embedded ACD can take scope over an indefinite subject, to yield extra-wide scope, still assuming semantically-motivated, Phase-bounded, successive-cyclic movement through the structure (Syrett 2015). Thus, while there may be grammatical economy constraints on covert movement, finite clauses do not *a priori* serve as a barrier to covert movement of quantificational phrases. How far this generalization extends beyond instances of ACD, and which features of the discourse are relevant for allowing access to the readings that depend on QR out of a finite clause, are interesting questions left open for future research.

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Appendix A: Linguistic Stimuli

Control Sentences

- (1) Winnie the Pooh said he tried some of Owl's tea, and Piglet did, too.
- (2) Big Bird said that Bert played a trumpet and Grover did, too.
- (3) The lion said the elephant pushed the rock further than the zebra did.
- (4) Gordon said that Thomas hauled a bigger load than Percy did.
- (5) Franny said that the panda climbed as high as the koala did.

Test Sentences (incorporating Experiment 1 and 2 versions)

- (6) Martha_i said (that) [he_{k=Goofy} / Goofy] read every book that Scooby did.
- (7) Woody_i said (that) he_i jumped over every frog that Jessie did.
- (8) Miss Piggy_i said (that) she_i drove every car that Fozzie did.
- (9) Louise_i said (that) [she_{k=Ruby} / Ruby] invited the same friends as Max did.
- (10) Jake_i said (that) he_i found the same treasure as Captain Hook did.
- (11) Dora_i said (that) she_i tasted the same ice cream flavors as Diego did.

Appendix B: Examples of Adult Justifications for each condition

(Participant number in parentheses to right)

Embedded Condition**'Yes' responses: Acceptances of Embedded Reading**

- (12) He said he jumped over the little frogs, which are the ones Jessie jumped over. No. 356
- (13) Woody said he jumped over the same frogs Jessie jumped over, but not the ones she said she jumped over. No. 402
- (14) Jessie jumped over the small frogs even though she told Buzz she jumped over the big ones. Woody said he jumped over the small frogs that Jessie actually jumped over. No. 309
- (15) She said Ruby invited Max's toys, which are the toys that Max actually invited. No. 356

'No' responses: Rejections of Embedded Reading in favor of Matrix Reading

- (16) She drove every car that Fozzie drove, not every car the Fozzie said he drove. No. 377
- (17) Fozzie said he drove the pink cars and Miss Piggy said she drove the blue ones. No. 369

- (18) Miss Piggy said she drove every car that Fozzie actually drove, but Fozzie said he drove the pink cars. No. 362
- (19) Martha said Goofy read the easier books, and Scooby lied and said he read the harder books. No. 376
- (20) Woody said that he was not as good a jumper as Jesse and he only jumped the small frogs. No. 359
- (21) Woody said that he jumped over the small frogs, Jessie told Buzz that she jumped over the big ones. No. 308
- (22) Diego said that he tried the more adventurous flavors and Dora said she tried the plain ones. No. 333
- (23) Dora said she tasted the plain flavors while Diego claimed to taste the 'adventurous' kind. No. 401
- (24) Martha said Goofy read the easier books, and Scooby lied and said he read the harder books. No. 322
- (25) Max said he invited Ruby's friends and Louise said that Ruby invited Max's friends. No. 363
- (26) She said she invited a different set of friends than Max invited. No. 408
- (27) Jake said he found the easy treasure, while Hook said he found the harder one. No. 355

Matrix Condition

'Yes' responses: Acceptances of Matrix Reading

- (28) Fozzie said he drove the pink cars and Miss Piggy said she drove the same cars as well. No. 379
- (29) Woody said he jumped over the big frogs, just as Jessie said. No. 388
- (30) Jessie said she jumped over the large frogs. Woody said he did the same. No. 412
- (31) Woody and Jessie both told Buzz they jumped over the big frogs. No. 415
- (32) They [Diego & Dora] both claimed to have tried the more adventurous flavors. No. 378
- (33) Dora said she tasted the same flavors as Diego said. No. 388

- (34) She said she tasted the adventurous ones and he said the same thing. No. 397
- (35) Scooby said he read the challenging ones and she [Martha] said Goofy read the same. No. 349
- (36) Martha assumed Goofy read the challenging books, and Scooby told Martha he read those challenging books. No. 415
- (37) Louise said Ruby invited her friends which Max said he did too. No. 412
- (38) Louise said that Ruby invited her friends and Max said he invited those same friends. No. 410
- (39) Yes, Jake did say he found the same treasure that Captain Hook said he found. No. 365
- (40) Yes Jake and Captain Hook said they found the harder treasure. No. 91

'No' responses: Rejections of Matrix Reading in favor of Embedded Reading

- (41) Miss Piggy says that she drove the 2 pink cars; although Fozzie claims to have driven the same 2 cars, he did not & instead drove the 2 blue cars. No. 74
- (42) Miss Piggy said one drove the pink cars, not every car the other character drove. No. 381
- (43) Fozzie drove the blue sports cars even though he told Gonzo he drove the pink cars. Miss Piggy said she drove the pink cars. No. 309
- (44) Jake said that he found the more hidden treasure while Captain Hook found the other simply hidden one. No. 77