On Matrix Clause Intervention in AcI Constructions

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One of the strongest arguments for a raising-to-object analysis of English AcI constructions comes from the fact that adverbials and particles belonging to the matrix clause can intervene between the embedded subject and the embedded predicate. We re-evaluate this argument in the light of a neglected alternative analysis, namely that matrix clause intervention is the result of extraposition of the embedded predicate. We show that this analysis gives a better account of matrix clause intervention than raising to object. Our arguments are based on the scopal properties of the embedded subject, and on the order among multiple intervening elements. We also consider various mixed analyses that feature both raising to object and extraposition. These turn out to be conceptually awkward and empirically flawed.
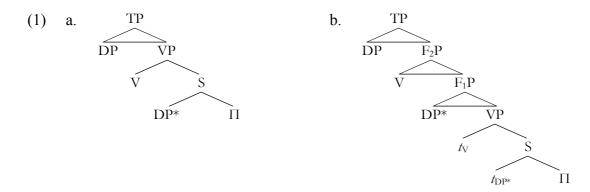
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1. Introduction

Generative syntax has seen a long dispute about the English *Accusativus-cum-Infinitivo* (AcI) construction. Postal (1974) argued that in examples like *John believed Mary to be the winner* the subject of the embedded clause, *Mary*, raises from its underlying position to an object position in the matrix clause, where it is assigned accusative case (see also Rosenbaum 1967, McCawley 1970 and Kiparsky and Kiparsky 1970). By contrast, Chomsky (1981) argued that the embedded subject remains in its base position at all levels of representation (see also Bresnan 1972 and Chomsky 1973). This was possible because the version of case theory developed in Chomsky 1981 allowed the verb to case-mark the embedded subject in situ (a relation known as *exceptional case marking*).

Chomsky's proposal, depicted in (1a), was adopted in most generative work from the early and mid 1980s (in this representation, DP* is the embedded subject, Π the embedded
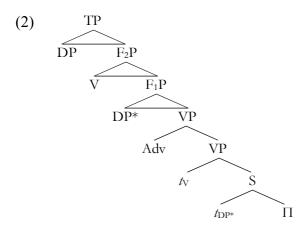
predicate and S the AcI complement). However, with the advent of Minimalism it was replaced by a variant of Postal's analysis. The embedded subject was argued to move to a functional specifier in the matrix clause (Spec-F_1P in (1b)) to receive accusative case. As this specifier position was taken to precede the verb's base position, it was further assumed that the verb raises to the head of a second functional projection (F_2P in (1b)) (see Johnson 1991, Lasnik and Saito 1991, Koizumi 1993, Runner 1995, 1998, and Lasnik 1999 among others).

(1) a.
```
            TP
          /    \
        DP      VP
              /    \
            V        S
                   /    \
                 DP*     Π
```
b.
```
            TP
          /    \
        DP      F₂P
              /     \
            V        F₁P
                   /     \
                 DP*      VP
                        /    \
                      t_V     S
                            /    \
                         t_DP*    Π
```

Among the arguments that favor the raising-to-object analysis, two stand out for us.

The first is theoretical. In the late 1980s, Chomsky argued for a central role in the grammar of specifier-head agreement (this work was published as chapter 2 of Chomsky 1995). Specifier-head agreement is incompatible with the notion of exceptional case marking, which requires case checking between a head and the specifier of its complement. Therefore, proponents of early minimalism had to reject the analysis in (1a).

The second argument is empirical. It is based on the observation, going back to Postal 1974, that adverbs and particles belonging to the matrix clause can intervene between the embedded subject and the rest of the complement clause. Adverbial intervention can be observed in an example like *John believed Mary sincerely to be the winner*, where *sincerely* modifies the matrix predicate. There seems to be no way to accommodate this adverb in the representation in (1a), but in (1b) it can simply be adjoined to the matrix VP, as shown in (2). (Here and below, we treat adverbials as adjuncts; this is not crucial for our argumentation.)

(2)

```
            TP
          /    \
        DP      F₂P
              /     \
            V        F₁P
                   /     \
                 DP*      VP
                        /    \
                      Adv     VP
                            /    \
                          t_V     S
                                /    \
                             t_DP*    Π
```

There are few particle-verb combinations that select AcI complements. The best-known (and possibly unique) case is *make out*, which indeed may wrap itself around the embedded subject. Again, this can be explained straightforwardly if the embedded subject raises into the matrix clause:
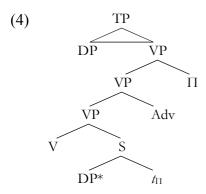
(3)   John [F1P made [F1P Mary [VP [tV out] [S tDP* [Π to be a liar]]]]].

The theoretical argument turned out to be transient. Chomsky (2000, 2001) advances the hypothesis that grammatical dependencies, including case assignment, are established through *Agree*, rather than spec-head agreement. Agree is an operation that connects a head to a phrase c-commanded by that head. This resuscitates the analysis in (1a), as Agree can connect the in-situ subject in (1a) with a matrix case assigner.

The aim of this paper is to re-evaluate the more tenacious empirical argument from matrix clause intervention. Re-evaluation is necessary because the argument overlooks an important analytical option. While the intervention of matrix material is suggestive of movement, it does not identify what category moves. Thus, it is possible that it is not the embedded subject that moves leftward across a left-adjoined adverb, as in (2), but the embedded predicate that moves rightward across a right-adjoined adverb, as in (4):[1]

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[1] To the best of our knowledge, the only mentions of this analysis are in footnotes in Pesetsky 1982:346-347 (where the idea is attributed to Guy Carden) and Neeleman 1994:267.

(4)

```
              TP
          ╱────────╲
        DP          VP
                 ╱──────╲
               VP        Π
            ╱──────╲
          VP        Adv
       ╱──────╲
      V        S
            ╱──────╲
          DP*       t_Π
```

Similarly, intervention of matrix particles may result from extraposition:

(5)   John [$_{VP}$ made [$_S$ Mary $t_Π$] out] [$_Π$ to be a liar].

Several considerations bear on the plausibility of this analysis. On the one hand, categories that appear similar to Π undergo extraposition in examples like (6). Whether this similarity goes beyond the surface is a matter of analysis. For example, Wurmbrand (2002) argues that obligatorily controlled complements are predicates rather than full clauses with a PRO subject (see also Chierchia 1984 and Mourounas 2016). If so, this would strengthen the connection between extraposition in (4)-(5) and (6).[2,3]

(6)   a.   John tried t_1 desperately [to escape the Dean's attention]$_1$.

       b.   Mary persuaded John t_1 quietly [not to go to the Dean's reception]$_1$.

On the other hand, extraposition of the embedded predicate across matrix material violates Ross's (1967) Right-Roof Constraint, according to which no element can move rightward out of the clause in which it originates. One approach to this issue would be to assume that Π is a bounding node for extraposition, alongside clausal nodes and DPs. If so, right roof violations like (7a,b) involve movement across two bounding nodes (Π and S in (7a), and DP and S in

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[2] A reviewer notes that if the embedded subject reconstructs, Π is no longer a predicate. However, we show in section 2 that reconstruction is incompatible with extraposition.

[3] A reviewer notes that Π is what one might call a derived predicate – it functions as such because it contains an A-trace. Note, however, that obligatorily controlled complements can be headed by unaccusative and passive verbs, which implies that they, too, can be derived predicates (in fact, the verbs used in (6), *escape* and *go*, are arguably unaccusative). This of course leads to further questions about the nature of A-traces, but we cannot go into these here (for discussion, see Williams 1986, 1994 and Neeleman and Van de Koot 2010).

(7b)), while extraposition of Π crosses a single bounding node (S in (4a)). A subjacency-style constraint might thus make the right cut (for related discussion, see Baltin 1981, 2006).[4]

(7) a. *I believed [$_S$ John [$_Π$ to be certain t_1]] with all my heart [that the Mets would lose]$_1$.

     b. *I believed [$_S$ [$_{DP}$ a man t_1] to be the winner] with all my heart [who I met in New York]$_1$.

Because of space limitations, we must put these matters to one side. Instead, we will concentrate on two phenomena for which the raising-to-object analysis and the ECM-plus-extraposition analysis make what seem to us clearly diverging predictions.

First, the extraposition analysis predicts that intervention of matrix clause material will give rise to certain scope freezing effects as a consequence of the fact that the extraposed predicate is removed from the embedded subject's c-command domain. The raising-to-object analysis makes no such prediction.

Second, the raising-to-object analysis predicts that if multiple matrix adverbials intervene between the embedded subject and the embedded predicate, they will come in *descending* order, with higher adverbials preceding lower adverbials. This is because the relevant adverbials precede the nodes in the verbal spine that they are merged with (compare (2)). By contrast, the extraposition analysis predicts that when multiple adverbials intervene, they will come in *ascending* order, with lower adverbials preceding higher adverbials. This is because the relevant adverbials follow the nodes they are merged with (compare (4)). (There are similar, slightly more complex predictions about the order between particles and adverbials.)

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[4] One thing that complicates matters is the observation in Overfelt (2015) that heavy NP shift can violate the Right-Roof Constraint when the matrix adjunct contains a parasitic gap (see also Larson 1989). This of course casts doubt on the validity of the constraint.

We will examine predictions about scope in section 2, and predictions about word order in section 3. In section 4 we turn to a more general evaluation of the prospects of raising to object.

We close this introductory section with a brief discussion of two factors that complicate matters. The first is theoretical. The space of possible analyses is not confined to the ones in (1). To begin with, it may be that raising to object is optional, at least in overt syntax, so that (1a) and (1b) coexist as surface structure representations. Furthermore, it may be that English has raising to object, but also allows predicate extraposition (see (8)). Finally, it may be that raising to object is optional *and* that English allows optional predicate extraposition (see (9)).

(8) a. John [$_{F2P}$ believes [$_{F1P}$ Mary [$_{VP}$ <sincerely> [$_{VP}$ t_V [$_S$ t_{DP} <[$_\Pi$ to be the winner]>]] <sincerely>] <[$_\Pi$ to be the winner]>]].

     b. John made Mary <out> [$_S$ t_{DP} <[$_\Pi$ to be a liar]>] <out> <[$_\Pi$ to be a liar]>.

(9) a. John [$_{F2P}$ believes [$_{F1P}$ <Mary> [$_{VP}$ <sincerely> [$_{VP}$ t_V [$_S$ <Mary> <[$_\Pi$ to be the winner]>] <sincerely>] <[$_\Pi$ to be the winner]>]].

     b. John made <Mary> <out> [$_S$ <Mary> <[$_\Pi$ to be a liar]>] <out> <[$_\Pi$ to be a liar]>.

The obligatory-raising-to-object analysis and the ECM-plus-extraposition analysis are maximally divergent in their predictions with respect to matrix clause intervention. Optional and obligatory raising to object are indistinguishable in this regard, as both attribute matrix clause intervention to movement of the embedded subject. The two mixed analyses in (8) and (9) are weaker in their predictions, as they allow two sources of matrix clause intervention. Again, whether or not raising to object is optional does not matter for the problem at hand. We will therefore largely (though not exclusively) restrict discussion to three approaches: (i) the obligatory-raising-to-object analysis, (ii) the ECM-plus-extraposition analysis, and (iii) analyses that combine obligatory raising to object with optional predicate extraposition. (We

will use the term 'mixed analyses' to refer to the last type of account; we refer to the former to as the raising-to-object analysis and the extraposition analysis.)

The second complicating factor is empirical. As it turns out, intervention of matrix adverbials in AcI constructions results in reduced acceptability for many native speakers. In addition, native speakers often disprefer adjacent adverbials. This means that various data points pertaining to predictions about word order must rely on a comparison of sentences that are marginal in status. In order to overcome this difficulty, we test such predictions through experiments run on Amazon Mechanical Turk. Experiments on this platform have been shown to be as rigorous as experiments run in a laboratory setting (Sprouse 2011). Aggregated grammaticality judgments from Amazon Mechanical Turk should therefore allow us to compare marginal sentences to other marginal sentences in a reliable way, revealing information that can help us decide between competing theories.

2. Matrix Clause Intervention and Reconstruction

The predictions we consider in this section have to do with reconstruction in A-chains. We are interested in two questions.

The first question, explored in sections 2.2-2.5, is whether matrix clause intervention affects reconstruction of existential quantifiers in AcI complements. The extraposition analysis predicts that it should have a blocking effect, while no such effect follows from the raising-to-object analysis (in the absence of further assumptions). We show that the data are in line with the extraposition analysis.

This empirical claim is not new. Lasnik (1999) already observes that reconstruction of a universally quantified AcI subject is blocked when a matrix particle intervenes (see (10)) – in fact, this observation was the main inspiration for the argument developed in this section.

(10) a. I made out every Mersenne number not to be a prime. $(\forall > \neg; \neg > \forall)$

  b. I made every Mersenne number out not to be a prime. $(\forall > \neg; *\neg > \forall)$

In order to account for data like (10), the raising-to-object analysis is forced to adopt an auxiliary hypothesis that guarantees that reconstruction is blocked when an accusative A-chain rooted in an embedded clause crosses matrix material. (We will discuss a specific proposal to this effect by Nevins and Anand 2003.)

The second question we are interested in is explored in section 2.6. It is whether intervening adverbs can take scope over subjects of AcI complements. The extraposition analysis predicts that this should be possible as a matter of course. On the raising-to-object analysis, such a construal arguably requires reconstruction. It should therefore not be available, given the auxiliary hypothesis that reconstruction is blocked in accusative A-chains that cross matrix material. The fact of the matter is that intervening adverbs *can* scope over AcI subjects. Thus, the raising-to-object analysis gives rise to a paradox avoided by the extraposition analysis.

Finally, in section 2.7, we explore whether mixed analyses (which combine raising to object and extraposition) can avoid the problems sketched above, and demonstrate that this is not the case.

2.1 Barss's Generalization

Although reconstruction in A-chains is more limited than reconstruction in A'-chains, it is attested. For example, the existential quantifier *some young lady* in (11) can be interpreted in the scope of the universal quantifier *every senator* (see May 1977, Hornstein 1995, Fox 1999, and Lebeaux 2009, among others).

(11) [Some young lady]$_1$ [seems (to Mary) [t_1 to be likely t_1 to dance with every senator]].

$$(\exists > \forall; \forall > \exists)$$

In principle, this interpretation could result either from reconstruction of the existential or from long-distance quantifier raising of the universal. There are several arguments that go against the latter option, however.

First, if the universal could undergo long quantifier raising, it should be able to take scope over *likely* in examples like (11). This is not the case, however (see also May 1977). Consider an example like *Mary is likely to dance with every senator*. Given a sufficiently large number of senators, $\forall > $ *likely* would imply that it is *unlikely* that Mary will dance with every senator (if every senator is 90% likely to dance with Mary and there are 25 senators at the party, the chance that *every* senator will dance with Mary is 0.9^{25}, which equals 7%). That seems the wrong outcome.

Second, various authors have observed that examples like (12) are unambiguous (see Aoun 1982, Hornstein 1995, Fox 1999 and Lebeaux 2009). This remains unaccounted for if inverse scope results from long quantifier raising, but follows from the reconstruction account, because the fact that *some young lady* enters into a binding relation in its surface position blocks quantifier lowering.

(12) [Some young lady]$_1$ [seems to herself$_1$/her$_1$ companion [t_1 to be likely t_1 to dance with

every senator]].   ($\exists > \forall$; *$\forall > \exists$)

Third, Lebeaux (2009) observes that in examples like (13) the existential cannot depend on the universal. Again, this is unexpected if inverse scope results from long quantifier raising but follows on the reconstruction account. As the existential in (13) is not raised from the embedded clause, it cannot reconstruct into it either.

(13) Mary$_1$ [seems to some young lady [t_1 to be likely t_1 to dance with every senator]].

($\exists > \forall$; *$\forall > \exists$)

In view of these data, the ambiguity in (10) must be due to reconstruction of the existential rather than raising of the universal.

The key observation for our present purposes is that scope reconstruction of the existential becomes unavailable once the AP containing its trace undergoes *wh*-movement, as in (14).

(14) [How likely t_1 to dance with every senator]$_2$ does [some young lady]$_1$ [seem [t_1 to be

t_2]]?   ($\exists > \forall$; * $\forall > \exists$)

The observation that structures like (14) are unambiguous goes back to Barss 1986. Sauerland and Elbourne (2002) refer to it as Barss's Generalization and formulate it as in (15), where 'total reconstruction' is intended to include reconstruction for scope.

(15) *Barss's Generalization*: Total reconstruction of an A-moved QP to a position X is

blocked when the QP does not c-command X in the overt form.

Sauerland and Elbourne (2002) give further examples that display the same pattern. One involves the licensing of a negative polarity item through reconstruction of a containing category to a position in the scope of a negative expression. The example in (16a) shows that A-movement allows such reconstruction. However, reconstruction is no longer possible if a constituent containing the trace of A-movement is fronted, as in (16b).
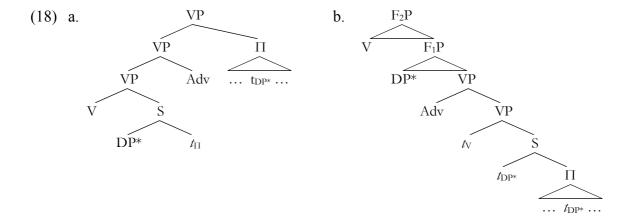
(16) a.   [A doctor with any reputation]$_1$ [was certain *(not) t_1 to be available] ...

b.   *... and [certain not to be t_1 available]$_2$ [[a doctor with any reputation]$_1$ [was t_2]].

The example in (17b) shows that the same configuration is well formed if the stranded A-moved constituent is not dependent on a licenser in the fronted constituent.

(17) a.   [A doctor from cardiology]$_1$ [was certain (not) t_1 to be available] ...

b.   ... and [certain not to be t_1 available]$_2$ [[a doctor from cardiology]$_1$ [was t_2]].

In short, when an A-chain is broken by movement of a constituent containing lower chain links, reconstruction to those chain links is impossible.

Main clause intervention creates such a broken A-chain on the extraposition analysis. The rightward movement of the embedded predicate removes traces within it from the c-command domain of the embedded subject (as shown in (18a) for intervention of a main clause adverbial; matrix subject omitted). Therefore, reconstruction of the embedded subject should be blocked. The raising-to-object analysis does not predict any such effect, as the presence of intervening main clause material has no effect on c-command relations between links in the A-chain headed by the embedded subject (as shown in (18b)).

(18) a.

```
                VP
           ┌────┴────┐
          VP          Π
       ┌───┴───┐    ┌──┴──┐
      VP       Adv  … t_DP* …
    ┌──┴──┐
    V      S
        ┌──┴──┐
       DP*    t_Π
```

b.

```
            F₂P
         ┌───┴───┐
         V       F₁P
              ┌───┴───┐
             DP*      VP
                   ┌───┴───┐
                  Adv      VP
                        ┌───┴───┐
                       t_V      S
                             ┌───┴───┐
                            t_DP*    Π
                                  ┌──┴──┐
                                  … t_DP* …
```

We will now explore these predictions.

2.2 Adverbial Intervention and Scope Reconstruction

Consider the representations the extraposition analysis assigns to examples like (19).[5]

(19) a.   John sincerely believed some young lady to be likely to dance with every

senator.

b.   John believed some young lady sincerely to be likely to dance with every

senator.

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[5] Throughout the paper, we avoid use of *strongly* when we consider adverbial intervention. This is because *strongly* appears to resist postverbal placement, both in AcI constructions and in simple transitive clauses (see Runner 1998:108ff).

In (19a), the embedded subject and predicate remain in situ, and the adverb *sincerely* is adjoined in a position preceding VP. Given that in the surface representation the existential c-commands its trace, reconstruction is possible, and so the example is predicted to be ambiguous (we use the crystal ball symbol '○' to indicate predicted, rather than actual judgments):

(20)   DP [$_{VP}$ Adv [$_{VP}$ V [$_S$ QP*$_\exists$ [$_\Pi$ $t_\exists$ … QP$_\forall$]]]]   (○: $\exists > \forall$; $\forall > \exists$)

In (19b), the embedded predicate has moved rightward across *sincerely*, which leads to a configuration in which the existential no longer c-commands its trace, with the consequence that reconstruction is impossible. Therefore the example is predicted to be unambiguous: narrow scope for the existential is no longer available:

(21)   DP [$_{VP}$ [$_{VP}$ [$_{VP}$ V [$_S$ QP*$_\exists$ t_Π]] Adv] [$_\Pi$ $t_\exists$ … QP$_\forall$]]   (○: $\exists > \forall$; *$\forall > \exists$)

One comment is in order before we turn to the predictions of the raising-to-object analysis. As (22a) shows, extraposition across postverbal adverbials is (strongly) preferred over non-extraposition.[6] It would be awkward to have to stipulate this. Although we do not have a full account to offer, we suggest that the preference for extraposition is not due to a grammatical constraint, but rather a consequence of the parser's preference for low attachment of modifiers (see Kimball 1973, Frazier 1978, Frazier and Clifton 1996, Gibson 1991, Phillips and Gibson 1997, and Grillo et al. 2015). This preference militates against a matrix construal of adverbials that follow an embedded clause. The resulting parsing difficulties, in combination with the existence of unproblematic competing orders, is probably enough to explain the contrast in (22a). Note that the effect is not limited to AcI complements. In

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[6] Non-extraposition is unlikely to be ungrammatical, though, in view of the results in (70) from experiment 3 in section 3.1 below. In this experiment, examples with a matrix adverbial following an AcI complement attract an average score of 4.72 out of 7.

control structures, too, matrix construal of a post-verbal modifier favors extraposition (see (22b)).

(22) a. John <sincerely> believed some young lady <?sincerely> [to be likely to dance with every senator] <??sincerely>.

b. Mary <quietly> persuaded John <quietly> [not to go to the Dean's reception] <??quietly>.

In contrast to the extraposition analysis, the raising-to-object analysis predicts that reconstruction should be possible in both (19a) and (19b). In (19a), the embedded subject raises to a position in the main clause, while *sincerely* is adjoined to a position to the left of the main verb's surface position. Given that the existential c-commands both its traces, reconstruction should be unproblematic:

(23) DP [$_{F2P}$ Adv [$_{F2P}$ V [$_{F1P}$ QP*$_\exists$ [$_{VP}$ t_V [$_S$ $t_\exists$ [$_\Pi$ $t_\exists$ … QP$_\forall$]]]]]]   (○: ∃>∀ ; ∀>∃)

Note that the mere fact that the existential raises into the matrix clause cannot be sufficient to block reconstruction, or else (11) would not allow wide scope for the universal either.

The example in (19b) has the same basic structure as (19a). The variation in the position of the adverb is a result of the adverb being adjoined in a lower position, just above the verb's base position. This, however, does not affect the c-command relation between the existential and its traces, and hence should not affect the possibility of scopal reconstruction either:

(24) DP [$_{F2P}$ V$_1$ [$_{F1P}$ QP*$_\exists$ [$_{VP}$ Adv [$_{VP}$ t_1 [$_S$ $t_\exists$ [$_\Pi$ $t_\exists$ … QP$_\forall$]]]]]]   (○: ∃>∀ ; ∀>∃)

Note that adverbials do not in general block reconstructions; witness the fact that the ambiguity of (11) is preserved in (25).

(25) [Some young lady]$_1$ [certainly [seems [t_1 to be likely t_1 to dance with every senator]]].

(∃>∀ ; ∀>∃)

We asked ten native-speaker linguists to judge the examples in (19). All members of the panel are speakers of American English, and all have been trained at PhD level to give scope judgments and grammaticality judgments. The task was therefore unexceptional for them. Nonetheless, the difference between the wide-scope and the narrow-scope construal of the existential was explained to them and disambiguating scenarios were offered where this seemed helpful. In addition, panel members were given the opportunity to ask for clarification on any matter pertaining to the task.

The data are as predicted by the extraposition analysis. All panel members found the example in (19a) grammatical, and all allowed the existential to scope over, as well as under the universal, showing that existential subjects of AcI complements optionally undergo reconstruction in A-chains. As for (19b), two panel members found this example ungrammatical. All of the eight remaining members of the panel allowed the existential to scope over the universal, but only one allowed the existential to reconstruct:

(26)	(19a)			(19b)		
	$*$	$\exists > \forall$	$\forall > \exists$	$*$	$\exists > \forall$	$\forall > \exists$
	0	10	10	2	8	1

Scope and grammaticality judgments for (19a,b) (10 native-speaker linguists).

In order to make sure that these judgments are not dependent on specific lexical items, we asked the panel to judge four additional pairs of examples with the same syntax as those in (19), but with different matrix verbs and different adverbials:[7]

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[7] In section 2.1 we showed that a universal cannot undergo long QR in examples like *Mary is likely to dance with every senator*. It is not entirely clear what factor blocks this operation: the raising predicate *likely*, the boundary of its clausal complement, or the combination of the two. For this reason, the examples used here are constructed in parallel to those in section 2, that is, with AcI complements that contain a raising predicate. However, it should be noted that the pattern reported in the main text is also found with simplex AcI complements. Thus, while our panel judges (ia,c) to be ambiguous (10/10), the examples in (ib,d) are judged to give rise to unambiguous wide scope of the existential (8/10) (one speaker allowed inverse scope in (ib); one speaker found (ib) ungrammatical; two speakers found (id) ungrammatical.

(i) a. Mary quite easily proved some politician to have been involved in every 1990s scandal.
     b. Mary proved some politician quite easily to have been involved in every 1990s scandal.
     c. Tara incorrectly expected some doctor to visit every patient by noon.
     d. Tara expected some doctor incorrectly to visit every patient by noon.

(27) a. The spokeswoman reluctantly confirmed some battlecruiser to appear to have

bombarded every coastal town.

b. The spokeswoman confirmed some battlecruiser reluctantly to appear to have

bombarded every coastal town.

(28) a. The engineer quite easily proved some metal part to be certain to fail in every

T-39 aircraft.

b. The engineer proved some metal part quite easily to be certain to fail in every

T-39 aircraft.

(29) a. Jeremy privately admitted some politician to be likely to be involved in every

current scandal.

b. Jeremy admitted some politician privately to be likely to be involved in every

current scandal.

(30) a. Tara incorrectly assumed some doctor to be likely to visit every patient by noon.

b. Tara assumed some doctor incorrectly to be likely to visit every patient by noon.

In order to facilitate their judgments, the panel were provided with paraphrases of the readings under consideration, as well as truth-value distinguishing scenarios. The results were as expected. Intervention of matrix adverbials turned out to be incompatible with inverse scope:[8]

Both the extraposition analysis and the raising-to-object analysis must therefore assume that quantifier raising of universals out of AcI complements is ruled out, either generally or when matrix material intervenes. This may strengthen the argument pursued here, but for reasons of space we will put this issue to one side.
[8] A reviewer reports that for them a narrow scope reading of the indefinite AcI subject is available in *He believed a new iPhone incorrectly to be likely to be invented soon.* For us, this example is grammatical only if *incorrectly* is read parenthetically (unsurprisingly, as parenthetical adverbials are generally quite free in their scope). This judgment is confirmed by our panel of native-speaker linguists: nine out of ten panel members found the example ungrammatical.

(31)

	(27a)			(27b)	
*	∃>∀	∀>∃	*	∃>∀	∀>∃
0	10	9	1	9	0
	(28a)			(28b)	
*	∃>∀	∀>∃	*	∃>∀	∀>∃
0	10	10	1	9	0
	(29a)			(29b)	
*	∃>∀	∀>∃	*	∃>∀	∀>∃
1	9	9	1	9	0
	(30a)			(30b)	
*	∃>∀	∀>∃	*	∃>∀	∀>∃
0	10	10	1	10	0

Scope and grammaticality judgments for (27)-(30) (10 native-speaker linguists).

2.3 Particle Intervention and Scope Reconstruction

We now turn to intervention of particles associated with the matrix verb, which gives rise to much the same predictions as intervention of matrix adverbials. Consider the examples in (32).

(32) a. John made out some young lady to be likely to dance with every senator.

b. John made some young lady out to be likely to dance with every senator.
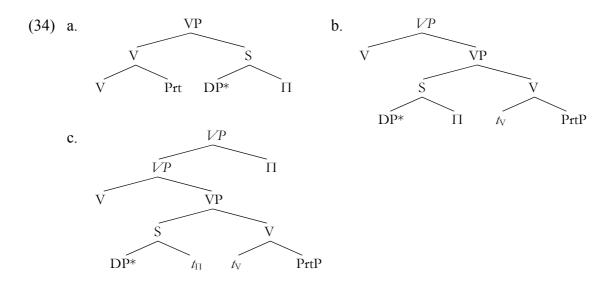
Let us first sketch the extraposition analysis of these sentences. Of course, details depend on what account of particle constructions we adopt. There are many to choose from, but fortunately the argument we develop here does not depend on any particular one. For concreteness' sake, we follow the proposal in Janke and Neeleman 2012. This account assumes (i) that particles form a complex predicate with the verb (see also Larson 1989, Booij 1990, Johnson 1991, Roeper and Keyser 1992, and Neeleman 1994), and (ii) that they project optionally. If a particle does not project, the verb-particle-object order can be base-generated, as in (33a). If the particle does project, the alternative verb-object-particle order is triggered. This is because of a version of case adjacency adopted by Janke and Neeleman, which requires that no maximal projection intervene between an accusative DPs and its case

licenser. Violation of this constraint is avoided through construction of a VP shell: the object is merged to the left of the verbal complex, and the verb moves across it, as in (33b) (where *VP* is the VP-shell).

(33) a. DP [vp [v V Prt] DP]   b. DP [*VP* V [vp DP [v *t*v PrtP]]]

This analysis predicts that only in the discontinuous order can the particle be modified by *right*, thus capturing the well-known contrast between *John picked* [(*right*) *up*] *the bags* and *John picked the bags* [(*right*) *up*].

Parallel to (33a), a complex predicate consisting of a verb and an unprojected particle can select an AcI complement, as in (34a). Alternatively, the particle projects and a VP shell is constructed, with the AcI clause generated to the left of the verbal complex and verb movement triggered by case adjacency, as in (34b). On this analysis, the surface order in (32b) would be the result of extraposition of the embedded predicate, as in (34c).

(34) a.
```
            VP
          /    \
        V        S
      /  \      /  \
    V    Prt  DP*   Π
```
b.
```
        VP
      /    \
    V        VP
           /    \
          S       V
        /  \     /  \
      DP*   Π   tV   PrtP
```
c.
```
            VP
          /    \
        VP       Π
      /    \
    V       VP
          /    \
         S        V
       /  \      /  \
     DP*  tΠ    tV   PrtP
```

This captures the contrast between *Mary made* [(*right*) *out*] *John to be a liar* and *Mary made John* [(*right*) *out*] *to be a liar*.

Extraposition across particles is obligatory, as (35a) shows. As before, we do not fully understand why this should be so, but note that this preference for extraposition is not limited to AcI complements. It has been observed that relative clause extraposition, too, is strongly

favored if the DP hosting the relative is followed by a particle, as in (35b) (the example is adapted from Kroch 1979; see also Kayne 1985 and Farrell 2005). It is not entirely clear what lies behind this effect. It may partly have to do with the distribution of prosodic weight, but in addition it may be that extraposition is favoured by the parser's general preference for low attachment (as in the case of postverbal matrix adverbials; see section 2.2). This preference militates against the required matrix attachment of the particle in the absence of extraposition, a difficulty that is avoided when extraposition takes place.

(35) a. John made <out> some young lady <out> to be likely to dance with every senator <*out>.

      b. I picked <up> the bundle <up> that I had carelessly dropped on the floor <??up>.

We now turn to the predicted readings of the examples in (32). In (32a), the existential c-commands its trace, and so can reconstruct into a position that permits interaction with the universal (see (36a)). In (32b), however, the embedded predicate has been extraposed, which implies that the existential can no longer undergo reconstruction, and so cannot be interpreted in the scope of the universal (see (36b)).

(36) a. DP [$_{VP}$ [$_v$ V Prt] [$_S$ QP$_∃$ [$_Π$ $t_∃$ … QP$_∀$]]]   (○: ∃>∀; ∀>∃)

      b. DP [$_{VP}$ [$_{VP}$ V [$_S$ QP$_∃$ $t_Π$] [t_V Prt]] [$_Π$ $t_∃$ … QP$_∀$]]   (○: ∃>∀; *∀>∃)

The raising-to-object analysis predicts that reconstruction is possible in both (32a) and (32b). This is because in both these examples c-command between links in the A-chain is preserved (see (37)). (For concreteness' sake, we assume that the position of the particle results from pied-piping/stranding under verb raising; nothing hinges on this.)

(37) a. DP [$_{F2P}$ [$_v$ V Prt] [$_{F1P}$ QP$_∃$ [$_{VP}$ t_V [$_S$ $t_∃$ [$_Π$ $t_∃$ … QP$_∀$]]]]]   (○: ∃>∀; ∀>∃)

      b. DP [$_{F2P}$ V [$_{F1P}$ QP$_∃$ [$_{VP}$ [$_v$ t_V Prt] [$_S$ $t_∃$ [$_Π$ $t_∃$ … QP$_∀$]]]]]   (○: ∃>∀; ∀>∃)

Again, the data are as predicted by the extraposition analysis. Our panel of native-speaker linguists unanimously accepted (32a) and (32b) as grammatical. All members found (32a) ambiguous, but nine out of ten members rejected a low reading of the existential in (32b):

(38)

	(32a)			(32b)	
*	$\exists > \forall$	$\forall > \exists$	*	$\exists > \forall$	$\forall > \exists$
0	10	10	0	10	1

Scope judgments for (32a,b) (10 native-speaker linguists).

To sum up our findings so far, matrix clause intervention blocks reconstruction of existentials, which is otherwise available in A-chains. This is predicted by the extraposition analysis, which removes the trace of the existential from its c-command domain and therefore blocks reconstruction (in line with Barss's generalization). The data do not follow in any obvious way from the raising-to-object analysis.

2.4 NPI Licensing and Adverbial Intervention

As mentioned above, Sauerland and Elbourne (2002) show that scopal interaction with a universal is not the only way to test for reconstruction of existentials. A second possibility is to consider the licensing of a negative polarity item contained in the existential QP, given that such elements can be licensed through reconstruction to a position in the scope of negation (see (16)). A relevant minimal pair involving adverbial intervention is given in (39).

(39) a. Mary sincerely believed a doctor with any reputation not to be available.

b. Mary believed a doctor with any reputation sincerely not to be available.

These examples should be compared with those in (40), which do not contain negative polarity items.

(40) a. Mary sincerely believed a doctor from cardiology not to be available.

b. Mary believed a doctor from cardiology sincerely not to be available.

The extraposition analysis predicts that (39a), (40a) and (40b) are grammatical, and that (39b) is not (see (41)). This is because reconstruction of the existential is blocked in (39b), yet necessary in order to license the negative polarity item. The examples in (40) do not require reconstruction, while (39a) requires and allows it.

(41) a. DP [$_{VP}$ Adv [$_{VP}$ V [$_S$ [$_{DP*}$ … X …] [$_\Pi$ ¬ … t_{DP*} …]]]]]   (○:✓X=NPI)

     b. DP [$_{VP}$ [$_{VP}$ [$_{VP}$ V [$_S$ [$_{DP*}$ … X …] t_Π]] Adv] [$_\Pi$ ¬ … t_{DP*} …]]   (○:*X=NPI)

The raising-to-object analysis predicts that all examples in (39) and (40) are grammatical. The crucial example in (39b) does require reconstruction in order to license the negative polarity item, but this is not a problem as the A-chain headed by the existential is unbroken:

(42) a. DP [$_{F2P}$ Adv [$_{F2P}$ V [$_{F1P}$ [$_{DP*}$ … X …]$_2$ [$_{VP}$ t_V [$_S$ t_{DP*} [$_\Pi$ ¬ … t_{DP*} …]]]]]]]

     (○:✓X= NPI)

     b. DP [$_{F2P}$ V [$_{F1P}$ [$_{DP*}$ … X …] [$_{VP}$ Adv [$_{VP}$ t_V [$_S$ t_{DP*} [$_\Pi$ ¬ … t_{DP*} …]]]]]]]

     (○:✓X= NPI)

The data are as predicted by the extraposition analysis:

(43)

(39a)		(39b)		(40a)		(40b)	
*	✓	*	✓	*	✓	*	✓
0	10	10	0	0	10	2	8

Acceptability judgments for (39) and (40) (10 native-speaker linguists).

Since unlicensed negative polarity items lead to ungrammaticality, it should be relatively straightforward to replicate these findings through an experiment on Amazon Mechanical Turk (**experiment 1**). We therefore created a test consisting of twenty items, five for each of the structures exemplified in (39) and (40). The matrix verb in all test sentences belonged to the *believe* class (see Pesetsky 1991). We recruited eighty subjects, all native speakers of English with IP addresses in the United States. The experiment had a Latin Square design, so each subject saw four test sentences (one for each condition). Test sentences were judged on

a seven-point Likert scale. The test included both grammatical and ungrammatical fillers, as well as questions to check that subjects were paying attention to the task. The order of test sentences and fillers was randomized for each subject so as to prevent any ordering effects.[9]

The resulting mean scores are given in (44).

(44)	Adv-V-NPI-Π	V-NPI-Adv-Π	Adv-V-DP-Π	V-DP-Adv-Π
	4.56 (1.7)	2.84 (1.32)	4.51 (1.79)	4.34 (1.71)

Experiment 1: Mean acceptability ratings for adverbial placement in AcI constructions with embedded subjects that do/do not contain an NPI (SDs given between parentheses, *n*=80).

A two-factor ANOVA (adverbial position×presence/absence of a negative polarity item) shows that there is a significant main effect of the presence of a negative polarity item ($F1_{(1,79)}=15.66$; $p<0.001$; $F2_{(1,4)}=75.47$, $p<0.001$), as well as a significant main effect of adverbial position ($F1_{(1,79)}=26.89$, $p<0.0001$; $F2_{(1,4)}=129.81$, $p<0.001$). Crucially, there is also a significant interaction between adverbial position and the presence of a negative polarity item ($F1_{(1,79)}=17.9$, $p<0.001$; $F2_{(1,4)}=98.11$, $p<0.0001$). This interaction is, of course, what the extraposition analysis predicts.

We can determine the nature of the interaction through a post-hoc paired t-test (with $p<0.05$ as the threshold). As expected, intervention of a matrix adverbial significantly reduces acceptability scores if the embedded subject contains a negative polarity item ($p<0.0001$) but has no significant effect if it does not ($p=0.53$).

The experimental data thus confirm the judgements given by our panel of native-speaker linguists, and vice versa.

---

[9] The six experiments reported in this paper replicate the findings of earlier experiments that had a different set-up (see Neeleman and Payne 2018). In those earlier experiments, all subjects judged all test sentences, which were constructed using a broader class of AcI verbs. No contrasts that were significant in our earlier experiments are insignificant in the experiments reported here, or vice versa. This, we would suggest, underlines the robustness of our findings.

2.5 NPI Licensing and Particle Intervention

Given Barss's generalization, the extraposition analysis also predicts that, while (45a), (46a) and (46b) are grammatical, particle intervention should lead to ungrammaticality in (45b). This is because the A-chain in (45b) is broken by predicate extraposition (compare (47a) and (47b)).

(45) a. Reynold made out a good solution to any of these problems to still be lacking.

b. Reynold made a good solution to any of these problems out to still be lacking.

(46) a. Reynold made out a good solution to Zeno's paradox to still be lacking.

b. Reynold made a good solution to Zeno's paradox out to still be lacking.

(47) a. DP [$_{VP}$ [$_V$ V Prt] [$_S$ [$_{DP*}$ … X …]$_1$ [$_\Pi$ ¬ … t_1 …]]]   (○: ✓ X= NPI)

b. DP [$_{VP}$ [$_{VP}$ V [$_{VP}$ [$_S$ [$_{DP*}$ … X …] t_Π] [$_V$ t_V PrtP]]] [$_\Pi$ ¬ … t_{DP*} …]]   (○:*X=NPI)

The raising-to-object analysis predicts that both (45a) and (45b) are grammatical, as both contain an unbroken A-chain:

(48) a. DP [$_{F2P}$ [$_V$ V Prt] [$_{F1P}$ [$_{DP*}$ … X …] [$_{VP}$ t_V [$_S$ t_{DP*} [$_\Pi$ ¬ … t_{DP*} …]]]]]]   (○: ✓ X= NPI)

b. DP [$_{F2P}$ V [$_{F1P}$ [$_{DP*}$ … X …] [$_{VP}$ [$_V$ t_V Prt] [$_S$ t_{DP*} [$_\Pi$ ¬ … t_{DP*} …]]]]]]   (○: ✓ X= NPI)

As before, the judgments from our panel of native-speaker linguists are in line with the predictions of the extraposition analysis: [10]

(49)

(45a)		(45b)		(46a)		(46b)	
*	✓	*	✓	*	✓	*	✓
1	9	9	1	1	9	1	9

Acceptability judgments for (45) and (46) (10 native-speaker linguists).

---

[10] The examples in (45) and (46) had to be constructed with *make out* as the AcI verb and embedded predicates known to license negative polarity items under reconstruction (see Uribe-Etxebarria 1995). These restrictions resulted in examples that seem not completely idiomatic to some speakers. However, the reported contrasts in acceptability are robust. Even the one panel member that rejected all examples as ungrammatical, found (45b) worse than the other examples.

These judgments are confirmed by an experiment run on Amazon Mechanical Turk (**experiment 2**). The set-up was identical to experiment 1. There were twenty test items modelled on the examples in (45a,b) and (46a,b) (five items for each type of example). These were scored on a seven-point Likert scale. The test had a Latin Square design, with items randomized per subject, along with fillers, and interspersed with questions to check for attention.

The resulting mean scores are given in (50).

(50)	V-Prt-NPI-Π	V-NPI-Prt-Π	V-Prt-DP-Π	V-DP-Prt-Π
	4.03 (1.75)	2.76 (0.73)	4.63 (1.82)	4.63 (1.48)

Experiment 2: Mean acceptability ratings for particle placement in AcI constructions with embedded subjects that do/do not contain an NPI (SDs given between parentheses, *n*=80).

A two-factor ANOVA (particle placement×presence/absence of a negative polarity item) shows significant main effects of particle placement ($F1(1,79)=13.99$, $p<0.001$; $F2(1,4)=14.73$, $p<0.01$) and presence of a negative polarity item ($F1(1,79)=52.23$, $p<0.0001$; $F2(1,4)=58.24$, $p<0.001$). In addition, it shows the predicted significant interaction between particle placement and the presence of a negative polarity item ($F1(1, 79) = 13.99$, $p<.001$; $F2(1,4)=14.73$, $p<0.01$).

A post-hoc paired t-test reveals the nature of the interaction. As expected, intervention of a matrix particle significantly affects acceptability if the embedded subject contains a negative polarity item ($p<0.0001$), while in the absence of a negative polarity item there is no significant preference ($p=1$).

In sum, the data discussed in this section confirm the conclusion drawn in section 2.3: reconstruction of existential quantifiers is blocked by matrix clause intervention, a finding that supports the extraposition analysis.[11]

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[11] Gary Thoms (2017), reporting on joint work with George Walkden, argues that Barss's generalization does not hold when the remnant movement and the remnant-creating movement differ in direction. This would be true of the examples discussed in sections 2.2-2.5 (which do of course show lack of reconstruction). Thoms

2.6 The Scope of Intervening Adverbials

The damage done to the raising-to-object analysis can be summarized as follows. In order to capture the data, it must be amended with an auxiliary hypothesis to the effect that an accusative A-chain that crosses matrix material does not permit reconstruction.

One way to enhance the plausibility of this auxiliary hypothesis is by decomposing raising to object into two movements. A first movement takes the embedded subject to a landing site located below all matrix material, and a subsequent movement takes it to a landing site above relevant matrix material. We will label the lower landing site A and the higher landing site B.

Movement to position A is obligatory, while movement to position B is optional. Thus, in the absence of relevant matrix material, the embedded subject could surface in A or B (see (51)), but when it precedes matrix material, it occupies B (see (52)).

(51)   … V … <DP*> … <DP*> … [s … t_1 …
                 B   A

(52)   … V … DP* … X … t_{DP*} … [s … t_1 …
              B   A

The reconstruction data can now be captured by saying that reconstruction from position A is possible, but reconstruction from position B is not.[12]

---

partly bases his argument on predicate inversion, as in (i). This example permits the indefinite subject to be dependent on the universal in the fronted predicate. In our view, (i) is not a clear counterexample to Barss's generalization, given that it could well be that the extraposed subject c-commands the surface position of the fronted predicate. If so, the rule in (15) permits reconstruction.

(i)   I was told that [[sitting at every table] should be [a bottle of wine chosen especially for you by the sommelier]].

A second case involved extraposition of raising predicates. In (iia), for example, *kick the habit* is an idiom that relies on reconstruction for interpretation.

(ii)   Describe [all the habits] to me [that you want to kick].

We are unsure of the analysis of relative clause extraposition. However, Fox and Nissenbaum (1999) argue, following Williams (1974), that when an adjunct β is extraposed from a "source NP" α, the scope of α is at least as high as the attachment site of β (the extraposition site). This suggests that (15) may be satisfied after all.

[12] There is an obvious variant of this scheme in which A is not a low position in the matrix clause, but a high position in the AcI complement, so that raising into the matrix clause is optional.

An account along these lines has in fact been suggested in Nevins and Anand 2003 (as an explanation of the data in (10)). Nevins and Anand's central claim is that movements driven purely by EPP satisfaction do not reconstruct (their PEPPER; Pure EPP Eliminates Reconstruction). If movement to position A in (51/52) is case-driven, while movement to B is EPP-driven, PEPPER captures the pattern of reconstruction established in sections 2.2-2.5.

Whether PEPPER holds is an open question – it is incompatible with the generally accepted ambiguity of examples like (11), as the intermediate landing site in (11) is a pure EPP position and should therefore block reconstruction of the existential.

Be that as it may, the proposed analysis of AcI constructions is problematic in its own right. Accusative case in English is licensed under adjacency. Therefore, one would expect B rather than A to be a case position. (Note that examples like *John believed sincerely Mary to be the winner and *John made right out Mary to be a liar are ungrammatical.) But if the functions of positions A and B are swapped, the account does not work anymore. Reconstruction would be blocked across the board if movement to position A is EPP-driven.

The viability of the double-movement hypothesis can be tested by looking at the scope of matrix adverbials. As reconstruction is deemed to be impossible from position B, an embedded subject preceding a matrix adverbial should not be able to appear in the scope of that adverbial (on the assumption that the scope of adverbials consists of the category they are adjoined to, see below).

This prediction can be contrasted with what follows from the extraposition analysis. In the representation in (53), the embedded subject is c-commanded by the matrix adverbial, and it should therefore be straightforward to interpret it in its scope.

(53) DP [$_{VP}$ [$_{VP}$ [$_{VP}$ V [$_S$ DP* t_Π]] Adv] Π_1]

Thus, the extraposition analysis predicts that the examples in (54) are grammatical under the reading indicated, while the amended raising-to-object analysis predicts that these examples should not permit this reading:[13]

(54) a. Mary expected (some) pedestrians on at least five occasions to die at this

dangerous intersection.   (*five occasions* > ∃)

b. Bill proved (some) supposedly non-existent patterns twice to be merely infrequent.

(*twice* > ∃)

c. Carl assumed (some) merely infrequent patterns on various occasions to be

non-existent.   (*various occasions* > ∃)

d. Marc believes (some) delayed letters frequently to have been steamed open by the

FBI.   (*frequently* > ∃)

As it turns out, native speakers have no difficulty in assigning the examples in (54) an interpretation in which the frequency adverbial takes scope over the AcI subject. Our panel of native-speaker linguists was unanimous in finding all four examples grammatical on the interpretation indicated (whether the embedded subject was a bare plural DP or introduced by *some*):

(55)

(54a)		(54b)		(54c)		(54d)	
*	Adv >∃	*	Adv >∃	*	Adv >∃	*	Adv >∃
0	10	0	10	0	10	0	10

Acceptability judgments for (54) and availability of Adv >∃ scope (10 native-speaker linguists).

As mentioned, the above argument presupposes that the embedded subject cannot be scopally dependent on the adverbial as a consequence of the latter taking scope over a larger category than the one it is attached to. Such wide scope could be the result of the adverbial undergoing

---

[13] The reason we use plural indefinites in the test sentences in (54) is that indefinites in English often assume a plural form when interpreted in the scope of a quantifier (the so-called dependent plural; see Chomsky 1975, De Mey 1981 and Zweig 2009). The effect is quite pronounced with frequency adverbials.

quantifier raising to a position outside γ in (56), or of β not being a bounding node for scope assignment (because it is a segment of a multi-segmented category; see May 1985 and Chomsky 1986).

(56)　$[_\gamma$ DP*$_\exists$ $[_\beta$ Adv $[_\alpha$ …]]]

The main problem with this is that in comparable configurations adverbials cannot take wide scope. Consider preverbal sequences of adverbials ($[_\gamma$ Adv$_1$ $[_\beta$ Adv$_2$ $[_\alpha$ …]]]). It is well known that in such sequences the first adverbial systematically takes scope over the second (see (57)). This fact suggests, of course, that the scope of adverbials must coincide with the category they are attached to (as explicitly argued in Williams 1994).

(57)　a.　John has $[_{VP}$ repeatedly $[_{VP}$ twice $[_{VP}$ knocked on the door]]].　　(*rep.*> 2; *2 > *rep.*)

　　　b.　John has $[_{VP}$ twice $[_{VP}$ repeatedly $[_{VP}$ knocked on the door]]].　　(**rep.*> 2; 2 > *rep.*)

Similarly, frequency adverbials cannot extend their scope beyond negation:

(58)　a.　John has $[_{VP}$ frequently $[_{VP}$ not $[_{VP}$ visited his aunt]]].　　(*freq.* > ¬; *¬ > *freq.*)

　　　b.　John has $[_{VP}$ not $[_{VP}$ frequently $[_{VP}$ visited his aunt]]].　　(**freq.* > ¬; ¬ > *freq.*)

That (58b) cannot mean what (58a) means is apparent from the existence of contexts in which (58a) is true, but (58b) is not. For instance, suppose that John has promised to visit his aunt twice a week, but that over the past year he has come up with an excuse not to visit her once a week on average. Then (58a) is true, but (58b) is not (on the assumption that visiting someone once a week counts as frequent).[14]

---

[14] It is tempting to think that the existence of (57a) and (58a) blocks inverse scope in (57b) and (58b). This may be true but would not undermine the argument. In AcI constructions, too, there is an alternation that should block inverse scope, in at least some cases. For example, *Marc believes some delayed letters frequently to have been steamed open by the FBI* alternates with *Marc frequently believes some delayed letters to have been steamed open by the FBI*. On the raising-to-object analysis, the adverb occupies a higher position in the second example.

Taken together, the data discussed in this section make it difficult to maintain the auxiliary hypothesis required by the raising-to-object analysis (that is, the hypothesis that there is no reconstruction from position B in (51/52)). The raising-to-object analysis thus leads to a paradoxical state of affairs: it must allow reconstruction across intervening matrix material to capture the data in (55), but must disallow such reconstruction to capture the data discussed in sections 2.2-2.5.[15]

This problem can be addressed through a further decomposition of raising to object. Suppose that there are two low positions, A and B, and one higher position that c-commands matrix adverbials, C. Suppose, furthermore, that movement to position A is obligatory, while movement to positions B and C is optional. Then the observed pattern of reconstruction can be captured by saying that reconstruction is possible from position C to position B, and from position A to lower chain links, but blocked from position B:

(59)   … V … DP$_*$ … X … t_{DP*} … t_{DP*} … [$_S$ … t_{DP*} …
C$$B$$A

Such technical contortions require strong independent evidence, especially in view of the fact that the extraposition analysis faces no comparable difficulties. The latter directly predicts the data in (55), as well as those discussed in sections 2.2-2.5.

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[15] An anonymous reviewer suggests an interesting alternative way in which reconstruction from position B might be blocked. If thematic relations can be established after movement, one could conjecture that position B is a θ-position, so that *John believes Mary sincerely to be the winner* is analyzed on a par with *John sincerely believes of Mary that she is the winner*. Secondary θ-role assignment would then trap the AcI subject in its surface position (position B).

   Notice that this alternative does not explain the ability of intervening matrix adverbials to take scope over AcI subjects.

   As the reviewer points out, the analysis can further be tested by looking at the scope of the AcI subject with respect to the matrix verb. The examples in (i) differ in that (ia) is ambiguous, while (ib) requires the universal to take scope over the matrix verb. It means that each unicorn is such that Martin has a belief about that unicorn; it cannot mean that Martin has a belief that pertains to all unicorns (see Zimmermann 1993 for discussion and references).

(i)   a.   Martin believes that each unicorn has pink hooves.   ($\forall$>*believe*; *believe*>$\forall$)
      b.   Martin believes of each unicorn that it has pink hooves.   ($\forall$>*believe*; **believe*>$\forall$)

If position B is a secondary θ-position, one would expect the same to be true of (iib). However, this is not correct. The ambiguity of (iia) is preserved in (iib). Thus, the AcI subject does not behave like a matrix object.

(ii) a.   Martin sincerely believes each unicorn to have pink hooves.   ($\forall$>*believe*; *believe*>$\forall$)
      b.   Martin believes each unicorn sincerely to have pink hooves.   ($\forall$>*believe*; *believe*>$\forall$)

28

2.7 Mixed Analyses

We close this section with a brief evaluation of mixed analyses, that is analyses that assume both raising to object and extraposition. A mixed analysis acknowledges two sources of matrix clause intervention. The subject of an AcI complement moves leftward into the matrix clause. In addition, the predicate optionally moves rightward across matrix clause material:

(60)   … V … DP* … X … [$_S$ t_{DP*} <Π>] … Y … <Π> …

Neither source of matrix clause intervention may give rise to reconstruction into the embedded predicate if the data in sections 2.2-2.5 are to be captured. This is no problem when matrix clause intervention results from extraposition, but when it results from raising to object the auxiliary hypothesis discussed in section 2.6 must be adopted. Thus, raising to object is decomposed into two operations: an obligatory movement to a low position A that permits reconstruction, and an optional movement to a higher position B from which reconstruction is not allowed:

(61)   … V … <DP*> … X … <DP*> … [$_S$ t_{DP*} <Π>] … Y … <Π> …
                   B   A

The main advantage of this analysis is that it avoids the paradox identified in the previous section. The availability of the extraposition derivation makes it possible to explain why intervening adverbs may take scope over the AcI subject, leaving unaffected the hypothesis that reconstruction from position B is impossible. All that is required is that Y in (61) can be attached higher in the matrix clause than position A.

The main disadvantage of this analysis is its unnecessarily convoluted nature. It is empirically equivalent to the extraposition analysis in the domain under investigation. However, while the extraposition analysis is theoretically lean, the mixed analysis in (61) must adopt all assumptions required by the extraposition analysis, as well as all assumptions required by the raising-to-object analysis. Like the analysis in (59), such a complicated

account is unacceptable in the absence of strong evidence from empirical domains other than the one discussed in this section.

3. Matrix Clause Intervention and Word Order

The various analyses of matrix clause intervention in AcI constructions also differ in the predictions they make about the order of intervening material. If two elements intervene as a consequence of raising to object, the one higher in the tree should precede the one lower in the tree; by contrast, if two elements intervene as a consequence of extraposition, the higher one should follow the lower one. In sections 3.1 and 3.2, we will test these predictions using manner adverbials, time adverbials and particles. The results are compatible with the extraposition analysis and a specific version of the mixed analysis, but incompatible with other accounts. In section 3.3, we report on a further experiment that allows us to decide between the relevant mixed analysis and the extraposition analysis based on the order of two low adverbials. The results favour the extraposition analysis.

3.1 Manner and Time Adverbials

The premise of our first word order experiment is that time adverbials are attached higher than manner adverbials, at least as a matter of preference (see Jackendoff 1972, Cinque 1999 and Ernst 2002). Abstracting away from contrast and focus, this implies that when a time and manner adverbial appear to the left of the verb's base position, the time adverbial precedes the manner adverbial (descending order), and when a time and manner adverbial appear to the right of the verb's base position, the time adverbial follows the manner adverbial (ascending order) (see Quirk et al. 1985):

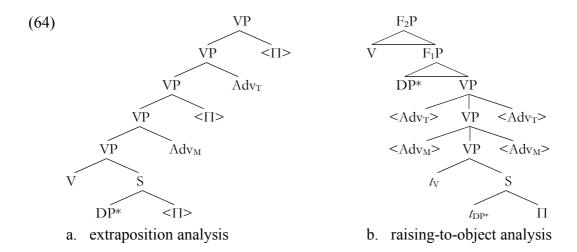(62) $[<Adv_T> \ldots [<Adv_M> \ldots V \ldots <Adv_M>] \ldots <Adv_T>]$

The predictions that the various analyses generate pertain to three circumstances: a pair of matrix adverbials can be sandwiched between the embedded subject and the embedded

predicate, as in (63a), or the two adverbials can straddle the embedded predicate, as in (63b), or they can both follow the embedded predicate, as in (63c).

(63) a. V DP* Adv_1 Adv_2 Π   *sandwiched condition*

    b. V DP* Adv_1 Π Adv_2 *straddled condition*

    c. V DP* Π Adv_1 Adv_2 *rightmost condition*

The predictions of the extraposition analysis are straightforward. As all matrix adverbs in the relevant part of the structure are right-adjoined, any pair of adverbials should come in ascending order, and therefore the time adverbial should follow the manner adverbial. This underlying order should surface whether the embedded predicate remains in situ or undergoes extraposition across one or both adverbials, as shown in (64a).

(64)

a. extraposition analysis

```
              VP
           /      \
         VP       <Π>
        /   \
      VP    Adv_T
     /   \
    VP   <Π>
   /  \
  VP  Adv_M
 /  \
V    S
    /  \
  DP*  <Π>
```

b. raising-to-object analysis

```
              F₂P
            /      \
          V        F₁P
                 /      \
               DP*      VP
            /    |    \
      <Adv_T>  VP   <Adv_T>
            /   |   \
      <Adv_M>  VP  <Adv_M>
             /   \
           t_V    S
                /   \
             t_DP*   Π
```
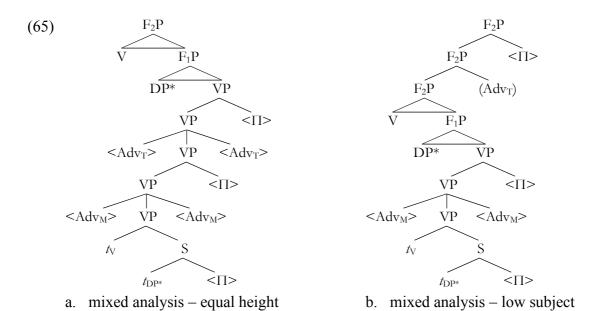
The predictions of the raising-to-object analysis are rather different. As leftward movement of embedded subject and matrix verb is taken to be the sole source of adverbial intervention, any matrix adverbials sandwiched between the embedded subject and the embedded predicate must be left-adjoined, and therefore appear in descending order. Therefore, in the sandwiched condition the time adverbial must precede the manner adverbial, as shown in (64b) above.

    A straddled pair of adverbials could come in either order. This is because the adverbials in question can mirror around a core constituent [$_{VP}$ t_V [$_S$ t_{DP*} Π]]. It is hence possible to right-

adjoin the time adverbial and to left-adjoin the manner adverbial, or conversely to left-adjoin the time adverbial and to right-adjoin the manner adverbial.

Finally, if both adverbials are clause-final, they must come in ascending order, that is, with the manner adverbial preceding.

There are three mixed analyses we should consider. These share the basic assumption that adverbial intervention has two sources: raising to object and extraposition of the embedded predicate. However, they differ in the height of the assumed landing sites for these movements. One option is that raising to object and extraposition can both cross time adverbials, as in (65a) – the equal-height analysis. This analysis predicts variable order in the sandwiched and straddled conditions, and ascending order when both adverbs are sentence-final.

(65)

a. mixed analysis – equal height

F_2P
  V F_1P
      DP*   VP
            VP $<\Pi>$
      $<Adv_T>$ VP $<Adv_T>$
            VP $<\Pi>$
      $<Adv_M>$ VP $<Adv_M>$
            t_V S
                  t_{DP*} $<\Pi>$

b. mixed analysis – low subject

F_2P
  F_2P $<\Pi>$
  F_2P (Adv_T)
  V F_1P
      DP*   VP
            VP $<\Pi>$
      $<Adv_M>$ VP $<Adv_M>$
            t_V S
                  t_{DP*} $<\Pi>$

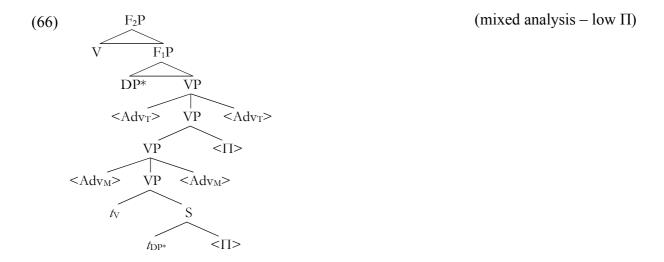A second option is that extraposition can cross time adverbials, but raising to object cannot, as in (65b) above – the low-subject analysis. This analysis predicts that adverbial pairs come in ascending order in all three conditions.

A third option is that raising to object, but not extraposition, can cross time adverbials, as in (66) – the low-Π analysis. This analysis predicts that in the sandwiched condition adverbial

pairs will come in descending order, that in the straddled condition order will be variable, and that in the rightmost condition only ascending order is permitted:

(66)   F₂P   (mixed analysis – low Π)

$$
\begin{array}{l}
\text{F}_2\text{P} \\
\quad \text{V} \quad \text{F}_1\text{P} \\
\qquad \text{DP*} \quad \text{VP} \\
\qquad\quad <\text{Adv}_\text{T}> \quad \text{VP} \quad <\text{Adv}_\text{T}> \\
\qquad\qquad \text{VP} \quad <\Pi> \\
\qquad\qquad <\text{Adv}_\text{M}> \quad \text{VP} \quad <\text{Adv}_\text{M}> \\
\qquad\qquad\quad t_\text{V} \quad \text{S} \\
\qquad\qquad\qquad t_\text{DP*} \quad <\Pi>
\end{array}
$$

The table in (67) summarizes the predictions of the analyses that we are interested in.

(67)

	Ext	RtO	Mixed		
			EqHgt	LoSu	LoΠ
Adv-Adv-Π	M-T	T-M	T-M/M-T	M-T	T-M
Adv-Π-Adv	M-T	T-M/M-T	T-M/M-T	M-T	T-M/M-T
Π-Adv-Adv	M-T	M-T	M-T	M-T	M-T

Predictions of the extraposition and raising-to-object analyses, as well as three mixed analyses, for pairs of time and manner adverbials in sandwiched, straddled and rightmost positions.

While these predictions are straightforward, it is not possible to test them using the standard method of consulting a relatively small number of native speakers. The reason for this lies in three factors that reduce acceptability across the word order patterns in (63). First, as mentioned in the introduction, speakers tend to dislike any adverbial intervention, which reduces the acceptability of (63a) and (63b). Second, as mentioned in section 2.2, speakers have an aversion against matrix adverbials that follow an embedded clause, which reduces the acceptability of (63b) and (63c). Third, many speakers find sentences with multiple adjacent adverbs degraded (see Payne 2018), which affects (63a) and (63c). The net result is that native speakers must express their preferences among contrasting adverbial orders on a highly compressed scale, which in turn implies that such preferences are experienced as too

subtle to be stated with any certainty. This, then, is one area where an experimental approach can take us further than informal data gathering.

We tested the order of matrix adverbials in three conditions, schematized in (68) (*experiment 3*). Representative examples are given in (69).

(68) a.   V DP Adv_M Adv_T Π   vs.   V DP Adv_T Adv_M Π   *sandwiched condition*

     b.   V DP Adv_M Π Adv_T vs.   V DP Adv_T Π Adv_M *straddled condition*

     c.   V DP Π Adv_M Adv_T vs.   V DP Π Adv_T Adv_M *rightmost condition*

(69) a.   John believed Mary sincerely yesterday to be six feet tall.

     b.   John believed Mary yesterday sincerely to be six feet tall.

     c.   John believed Mary sincerely to be six feet tall yesterday.

     d.   John believed Mary yesterday to be six feet tall sincerely.

     e.   John believed Mary to be six feet tall sincerely yesterday.

     f.   John believed Mary to be six feet tall yesterday sincerely.

There were ten sets of the type in (69), and so sixty test items overall. Each set was built using a different AcI verb belonging to the *believe* class (see Pesetsky 1991), with appropriate time and manner adverbials. Complements were constructed so that an embedded construal of these adverbials was impossible, or at least implausible. For example, it is strange to say that John believed that yesterday Mary was six feet tall, and it makes no sense to say that John believed that Mary sincerely was six feet tall.

The set-up was identical to experiments 1 and 2. We used Amazon Mechanical Turk to recruit eighty subjects, all native speakers of English with IP addresses in the United States. We used a Latin Square design, with subject judging items on a seven-point Likert scale. The order of test sentences and fillers was randomized for each subject and the test included questions to check that subjects were paying attention to the task.

The table in (70) gives the resulting mean scores.

(70)	Adv –Adv–Π		Adv–Π–Adv		Π–Adv –Adv	
	M–T	T–M	M–T	T–M	M–T	T–M
	4.24 (1.89)	2.85 (2.27)	4.68 (1.65)	2.89 (1.78)	4.75 (1.76)	3.10 (1.68)

Experiment 3: Word order preferences for time and manner adverbials in AcI constructions (Mean scores, SDs given between parentheses, *n*=80).

A two-factor ANOVA (adverbial order × sentence type) showed a significant main effect of adverbial order (F1(1,79)=89.84, p<0.0001; F2(1,9)=362.06, p<0.0001). The main effect of sentence type was not significant (F1(2,79)=1.7, p=0.18; F2(2,9)=7.22, p=0.002), and neither was the interaction of adverbial order and sentence type (F1(2,158)=0.48; p=0.62, F2(2,18)=1.83, p=0.17). This suggests that the preferred order of adverbials is not affected by the position of the embedded predicate.

This conclusion is corroborated by post-hoc two-tailed t-tests applied to the three conditions in (68). These reveal that in each condition manner adverbials preferentially precede time adverbials. Significance levels are p<0.001 for the sandwiched condition, p<0.001 for the straddled condition, and p<0.01 for the rightmost condition.

These findings are as predicted by the extraposition analysis and the low-subject analysis. They create difficulties for the raising-to-object analysis and the remaining mixed analyses, which incorrectly predict that in the sandwiched condition and the straddled condition there should not be a preference for manner adverbials to precede time adverbials. We repeat the table in (67), with incorrect predictions highlighted.

(71)	Ext	RtO	Mixed		
			EqHgt	LoSu	LoΠ
Adv-Adv-Π	M-T	**T-M**	**T-M/M-T**	M-T	**T-M**
Adv-Π-Adv	M-T	**T-M/M-T**	**T-M/M-T**	M-T	**T-M/M-T**
Π-Adv-Adv	M-T	M-T	M-T	M-T	M-T

The table in (67) repeated, with incorrect predictions in bold.

The argument developed above presupposes that there is not a *general* preference for manner adverbials to precede time adverbials. It is hence important to point out that, as a matter of

well-established fact, preverbal time adverbials precede preverbal manner adverbials. Thus, (72a) and (72b) are much better than (72c-e). This suggests that adverbial order is not constant, but varies with structure, as assumed here. (Experimental evidence supporting this point can be found in Payne 2018.)

(72) a. Yesterday John confidently predicted that it would be sunny.

      b. ?John yesterday confidently predicted that it would be sunny.

      c. *Confidently yesterday John predicted that it would be sunny.

      d. *Confidently John yesterday predicted that it would be sunny.

      e. *John confidently yesterday predicted that it would be sunny.

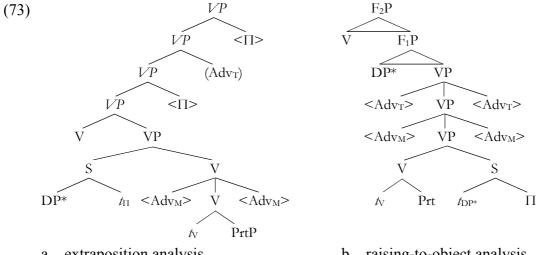*3.2 Sandwiched Particles and Adverbials*

The five analyses under consideration also make divergent predictions about word order when both a particle and an adverbial intervene. (The sandwiched condition is the only one of interest here, as particles do not surface in a position following the embedded predicate.) There are two cases to consider: intervention of a particle and a manner adverbial, and intervention of a particle and a time adverbial.

We begin with the predictions that follow from the extraposition analysis. We attributed separation of verb and particle to short verb movement driven by case, and we hypothesized that matrix clause intervention is the result of extraposition of the embedded predicate. This means that both manner adverbials and time adverbials can follow the particle. In addition, we expect that manner adverbials, but not time adverbials, can precede the particle. As indicated in (73a), there is an attachment site for adverbs sandwiched between the verb's trace and its clausal argument.[16] Manner adverbials can appear in this position, but it is too

---

[16] We assumed in section 2.3 that particles form a complex predicate with the verb and continue to do so here. This is largely a matter of convenience, as the predictions to be tested are much the same on other accounts of particle constructions.

low to host time adverbials (there are other attachment sites for manner adverbials higher in the tree, but this does not affect our argument).

(73)

VP
   VP   <Π>
     VP   (Adv$_T$)
      VP   <Π>
       V   VP
        S   V
  DP* $t_Π$ <Adv$_M$> V <Adv$_M$>
            t_V PrtP

F$_2$P
  V   F$_1$P
    DP*   VP
  <Adv$_T$> VP <Adv$_T$>
  <Adv$_M$> VP <Adv$_M$>
      V   S
  t_V Prt t_{DP*} Π
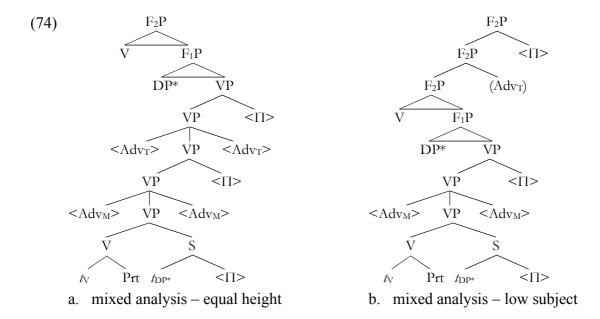
  a. extraposition analysis   b. raising-to-object analysis

The low attachment site assumed here is somewhat controversial. However, examples like *Jonah put the gun carefully down on the desk* are relatively easy to find on Google. We will report on a further experiment below that confirms the existence of a low, pre-particle adverbial site.

Thus, the extraposition analysis predicts variable order for particles and manner adverbials, and ascending order for particles and time adverbials.

The raising-to-object analysis assumes that movement of the embedded subject and the matrix verb is the only source of matrix clause intervention. Hence, both manner and time adverbials should precede particles, as shown in (73b) above.

The equal-height analysis is a mixed account that assumes both raising to object and extraposition of the embedded predicate. In particular, it assumes that both movements can cross time adverbials, and therefore variable order is predicted for pairs of particles and manner adverbials and for pairs of particles and time adverbials, as shown in (74a).

(74)

```
            F₂P                                              F₂P
        ┌────┴────┐                                      ┌────┴────┐
        V         F₁P                                   F₂P      <Π>
              ┌────┴────┐                            ┌───┴───┐
             DP*        VP                          F₂P     (Adv_T)
                    ┌────┴────┐                   ┌──┴──┐
                    VP       <Π>                  V     F₁P
               ┌─────┴─────┐                         ┌───┴───┐
          <Adv_T>   VP   <Adv_T>                    DP*      VP
                 ┌───┴───┐                               ┌────┴────┐
                 VP     <Π>                              VP       <Π>
            ┌─────┴─────┐                           ┌─────┴─────┐
       <Adv_M>   VP   <Adv_M>                  <Adv_M>   VP   <Adv_M>
              ┌───┴───┐                                ┌───┴───┐
              V       S                                V       S
           ┌──┴──┐ ┌──┴──┐                          ┌──┴──┐ ┌──┴──┐
          t_V   Prt t_DP*  <Π>                     t_V   Prt t_DP*  <Π>

   a.  mixed analysis – equal height            b.  mixed analysis – low subject
```

The low-subject analysis assumes that raising to object can cross manner, but not time adverbials, while extraposition of the embedded predicate can cross both. Consequently, it predicts variable order for particles and manner adverbials, and ascending order for particles and time adverbials, as shown in (74b) above.
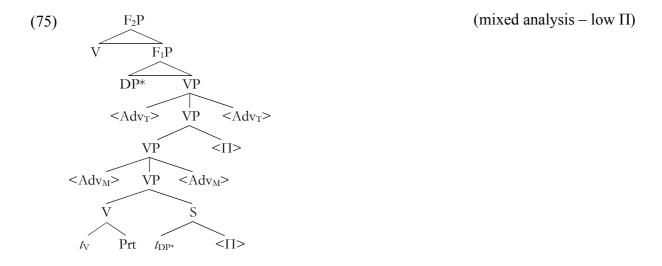
Finally, the low-Π analysis assumes that extrapostion of the embedded predicate can cross manner, but not time adverbials, while raising to object can cross both. It thus predicts descending order for pairs of a particle and a time adverbial, and variable order for pairs of a particle and a manner adverbial:

(75)   (mixed analysis – low Π)

```
            F₂P
        ┌────┴────┐
        V         F₁P
              ┌────┴────┐
             DP*        VP
                    ┌────┴────┐
               <Adv_T>  VP   <Adv_T>
                     ┌───┴───┐
                     VP     <Π>
                ┌─────┴─────┐
           <Adv_M>   VP   <Adv_M>
                  ┌───┴───┐
                  V       S
               ┌──┴──┐ ┌──┴──┐
              t_V   Prt t_DP*  <Π>
```

These predictions are summarized in the table below:

(76)

	Ext	RtO	Mixed		
			EqHgt	LoSu	LoΠ
Manner	Adv_M-Prt/ Prt-Adv_M	Adv_M-Prt	Adv_M-Prt/ Prt-Adv_M	Adv_M-Prt/ Prt-Adv_M	Adv_M-Prt/ Prt-Adv_M
Time	Prt-Adv_T	Adv_T-Prt	Adv_T-Prt/ Prt-Adv_T	Prt-Adv_T	Adv_T-Prt

Predictions of the extraposition and raising-to-object analyses, as well as three mixed analyses, for the order of time and manner adverbials with respect to particles.

We recruited 80 participants on Amazon Mechanical Turk to test the predictions in (76) (*experiment 4*). There were ten sets of four test sentences, each of which contained a manner or a time adverbial preceding or following a particle, as in (77). Otherwise, the set-up of the experiment was identical to experiments 1–3.

(77) a. John made Mary out incorrectly to be a liar.

b. John made Mary incorrectly out to be a liar.

c. John made Mary out yesterday to be a liar.

d. John made Mary yesterday out to be a liar.

The resulting mean scores are given in (78).

(78)

Prt–Adv_M	Adv_M–Prt	Prt–Adv_T	Adv_T–Prt
3.63 (2.03)	3.49 (2.08)	3.55 (2.09)	2.16 (1.84)

Experiment 4: Word order preferences for time and manner adverbials with respect to particles in AcI constructions (mean scores, SDs given between parentheses, *n*=80).

A two-factor ANOVA (adverbial type×particle-adverb order) reveals main effects of both adverbial type ($F1(1,79)=9.68$, $p<0.01$; $F2(1,9)=79.85$, $p<0.0001$) and particle-adverb order ($F1(1,79)=11.49$, $p<0.001$; $F2(1,9)=97.36$, $p<0.0001$). In addition, the predicted interaction between adverbial type and particle-adverb order was significant ($F1(1,79)=7.72$, $p<0.01$, $F2(1,9)=64.75$, $p<.0001$).

Post-hoc paired t-tests reveal the nature of the interaction. While there is no significant preference for the order of manner adverbials with respect to particles ($p=0.67$), time

adverbials preferentially appear in post-particle position (p<0.0001). This is as predicted by the extraposition and low-subject analyses. However, it goes against the predictions of the raising-to-object analysis and the remaining mixed analyses:

(79)

	Ext	RtO	Mixed		
			EqHgt	LoSu	LoΠ
Manner	Adv_M-Prt/ Prt-Adv_M	**Adv_M-Prt**	Adv_M-Prt/ Prt-Adv_M	Adv_M-Prt/ Prt-Adv_M	Adv_M-Prt/ Prt-Adv_M
Time	Prt-Adv_T	**Adv_T-Prt**	**Adv_T-Prt/ Prt-Adv_T**	Prt-Adv_T	**Adv_T-Prt**

The table in (76) repeated, with incorrect predictions in bold.

The predictions of the extraposition analysis are partly based on the assumption that there is a low pre-particle attachment site for adverbials. In order to test this assumption, we ran a further experiment on Amazon Mechanical Turk (***experiment 5***). The set-up was identical to that of experiment 4 (a Latin Square design with eighty participants and ten sets of four test sentences that differed in the order of manner and time adverbials with respect to particles). However, test sentences were dative constructions, rather than AcI constructions. A representative sample is given in (80).

(80) a. Matt passed the sharp tools foolishly down to Raven.

b. Matt passed the sharp tools down foolishly to Raven.

c. Matt passed the sharp tools yesterday down to Raven.

d. Matt passed the sharp tools down yesterday to Raven.

We choose dative constructions because our analysis predicts that their empirical profile should parallel the AcI construction with regard to adverbial placement: the presumed pre-particle adverbial attachment site is located below an internal argument and should therefore only be able to host low adverbials. By contrast, strings in which an adverbial surfaces between the particle and the PP complement are generated by PP extraposition. As

extraposition can cross time adverbials, we expect post-particle adverbial attachment to be more liberal than pre-particle attachment.

The results in (81) confirm these predictions:

(81)	Prt–Adv$_M$	Adv$_M$–Prt	Prt–Adv$_T$	Adv$_T$–Prt
	4.06 (2.06)	3.91 (2.16)	4.43 (2.15)	3.04 (1.76)

Experiment 5: Word order preferences for time and manner adverbials with respect to particles in dative constructions (mean scores, SDs given between parentheses, *n*=80).

A two-factor ANOVA (adverbial type $\times$ particle-adverb order) shows that there is no significant main effect of adverbial type ($F1(1,79)=1.27$, $p=0.26$; $F2(1,9)=1.94$, $p=0.17$). However, there is a significant main effect of particle-adverb order ($F1(1,79)=11.39$, $p<0.001$; $F2(1,9)=17.4$, $p<0.001$) and, as predicted, a significant interaction between adverbial type and particle-adverb order ($F1(1,79)=7.38$, $p<0.001$; $F2(1,9)=11.43$, $p<0.01$). Post-hoc t-tests confirm the nature of the interaction: the two orders of manner adverbials with respect to particles are not significantly different ($p=0.65$), but there is a clear preference to place time adverbials in post-particle position ($p<0.0001$).
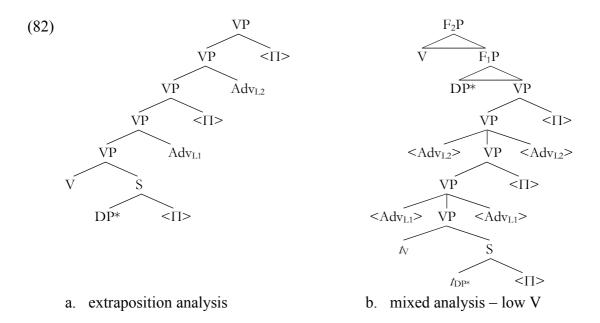
Our conclusion, then, is that the experiments reported in this section strengthen the case for extraposition of the embedded predicate. As before, the data support the extraposition analysis and the low-subject analysis over other accounts.

A final comment on the low-subject analysis is in order. It is worth noting that on this analysis almost all the empirical work with regard to adverbial order is done through extraposition. It is the permitted height of extraposition that explains why time adverbials systematically follow manner adverbials in the conditions explored in section 3.1, and it is the permitted height of extraposition that explains why time adverbials may follow but not precede particles. The only data point associated with raising to object is the occurrence of manner adverbials in a position between the embedded subject and the particle in examples like (77b). But this means that the raising-to-object part of the low-subject analysis is quite

limited in empirical content, a conclusion that echoes the worries about mixed analyses at the end of section 2.

3.3 Again continuously

We now explore whether adverbial order can help us decide between the extraposition and low-subject analyses on empirical grounds. Such a decision must be based on structures containing two low adverbials (low enough for the embedded subject to move across, assuming it does move). The predictions generated by the extraposition analysis remain constant. Irrespective of the position of the embedded predicate, the lower of the two adverbs (Adv_{L1}) must precede the higher one (Adv_{L2}) in the sandwiched, straddled and rightmost conditions, as shown in (82a).

(82)

a. extraposition analysis

Tree (82a):
- VP
  - VP
    - VP
      - VP
        - VP
          - V
          - S
            - DP*
            - <Π>
        - Adv_{L1}
      - <Π>
    - Adv_{L2}
  - <Π>

b. mixed analysis – low V

Tree (82b):
- F_2P
  - V
  - F_1P
    - DP*
    - VP
      - VP
        - <Adv_{L2}>
        - VP
          - VP
            - <Adv_{L1}>
            - VP
              - t_V
              - S
                - t_{DP*}
                - <Π>
            - <Adv_{L1}>
          - <Π>
        - <Adv_{L2}>
      - <Π>

The predictions of the low-subject analysis shift, however, when compared to the predictions tested in the experiment on time and manner adverbials (experiment 3, section 3.1). This is because the embedded subject now raises across the attachment sites of both adverbials, rather than just the lower one. As a consequence, order is predicted to be variable in the sandwiched and straddled conditions, while in the rightmost condition the higher adverbial must follow, as shown in (82b) above.

These predictions can be tested if we can identify a pair of adverbs that can be merged low, and that nonetheless are subject to a strict order of merger. An obvious choice consists of *again* for Adv_{L2} and a manner adverb like *continuously* for Adv_{L1}. In general, *again* can be merged low, but it cannot appear in the scope of *continuously*. Consequently, for these adverbs the extraposition analysis and the low-subject analysis make the diverging predictions in (83):

(83)	Extraposition	Low Subject
V-DP-Adv-Adv-Π	*continuously–again*	*continuously–again/ again–continuously*
V-DP-Adv-Π-Adv	*continuously–again*	*continuously–again/ again–continuously*
V-DP-Π-Adv-Adv	*continuously–again*	*continuously–again*

Predicted orders of low adverbials in the sandwiched, straddled and rightmost conditions.

Our test (***experiment 6***) was designed as follows. Items consisted of a context, followed by a test sentence that participants were asked to judge on a seven-point Likert scale. The contexts ran largely parallel to the test sentences, in order to facilitate the use of *again*. In each pair of a test sentence and its context, the position of *continuously* was kept constant. In addition, test sentences contained *again* in a position preceding or following *continuously*. As an example, consider the two test items in (84), which were used to test the preferred order of *again* and *continuously* when both precede the matrix verb (the test sentence is underlined).

(84) a. During their first tour of duty, John continuously imagined Bill to die, but this never happened. During their second tour of duty, John again continuously imagined Bill to die.

b. During their first tour of duty, John continuously imagined Bill to die, but this never happened. During their second tour of duty, John continuously again imagined Bill to die.

We added this pre-verbal condition to the straddled, sandwiched and rightmost conditions, because it allowed us to make sure that *again* and *continuously* are indeed merged in a fixed order. There can be no doubt that English sentence structure descends towards the verb, and so *again* should precede *continuously* if merged higher.

We created five sets of test items, each carefully designed to force a matrix construal of *again* and *continuously*. Each set employed the same basic context and test sentence, with items distinguished by the order of *again* and *continuously* in the four conditions. Thus, there were forty test items in total (five sets times four conditions times two orders). As before, the test had a Latin Sqare design and was run with eighty subjects, all native speakers of English with IP addresses in the United States.

The resulting mean scores are as follows:

(85)

Adv–Adv–V–DP–Π		V–DP–Adv–Adv–Π	
again–continuously	*continuously–again*	*again–continuously*	*continuously–again*
5.57 (1.56)	4.21 (1.47)	3.10 (1.77)	3.52 (1.48)
V–DP–Adv–Π–Adv		V–DP–Π–Adv–Adv	
again–continuously	*continuously–again*	*again–continuously*	*continuously–again*
2.79 (1.43)	3.80 (1.58)	3.91 (1.68)	4.32 (1.26)

Experiment 6: Word order preferences for *again* and *continuously* (mean scores, SDs given between parentheses, *n*=80).

A two-factor ANOVA (adverbial order × sentence type) of all data shows a main effect of sentence type ($F1(3,79)=39.83$, $p<0.0001$; $F2(3,4)=77.55$, $p<0.0001$), presumably as a result of the fact that scores in the sandwiched, straddled and rightmost conditions are relatively low. There is no significant main effect of adverbial order ($F1(1,79)=1$, $p=0.317$; $F2(1,4)=1.89$, $p=.18$), but the interaction of adverbial order and sentence type is significant ($F1(3,237)=18.05$, $p<0.0001$; $F2(3,12)=35.02$, $p<0.0001$). These results are as

expected if adverbial order in the preverbal condition is indeed the opposite of adverbial order in the postverbal conditions.

When we exclude the preverbal condition, a two-factor Aɴᴏᴠᴀ shows a different pattern. As the extraposition analysis predicts, there is a significant main effect of adverb order ($F_1(1,79)=19.2$, $p<0.0001$; $F_2(1,4)=40.34$, $p<0.0001$), while the interaction between adverb order and sentence type was not significant ($F_1(2,158)=2.03$, $p=0.13$; $F_2(2,8)=4.12$, $p<0.05$). In addition, there was a significant main effect of sentence type ($F_1(2,79)=15.8$, $p<0.0001$; $F_2(2,4) = 31.59$, $p<0.0001$).

Post-hoc paired t-tests reveal further detail. To begin with, the preverbal condition provides clear evidence that *again* must indeed be merged higher than *continuously* ($p<0.0001$) The three postverbal conditions all show a preference for the ascending order *continuously–again*. (Significance levels are $p<0.05$ for the sandwiched condition, $p<0.0001$ for the straddled condition, and $p<0.05$ for the rightmost condition.) This is as predicted by the extraposition analysis but does not follow from the low-subject analysis. Therefore, the extraposition analysis is preferable, not just on conceptual, but on empirical grounds.[17,18]

4. Concluding Remarks: The Prospects of Raising to Object

The main conclusion of this paper is that predicates of AcI complements undergo extraposition.

The extraposition analysis (which assumes that the embedded subject remains in situ, while the embedded predicate moves) provides a straightforward account of the scope data discussed in section 2 and the word order patterns discussed in section 3. That does not mean that this analysis does not require further work. It does, in particular with regard to Right-

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[17] Neeleman and Payne (2017) argued that *again* can directly modify *continuously*. Although the test items do not have the kind of reading that favours such direct modification, this may explain why the contrast in acceptability was sharper in the straddled condition than in the sandwiched and rightmost conditions.

[18] Kyle Johnson (personal communication) suggests that raising to object may be unable to cross any adverbials, which would make it possible to reconcile a mixed analysis with the data discussed in this section. However, it is unclear how this ultra-low subject analysis could deal with the apparent grammaticality of examples like (77b), in which a manner adverbial and a particle separate an AcI subject from the embedded predicate.

Roof Constraint (see section 1) and the near-obligatory nature of extraposition in certain contexts (see sections 2.2 and 2.3). It is also still an open question what type of extraposition we are dealing with. For example, PP extraposition from DPs bleeds condition C (see (86) from Taraldsen 1981; see also Culicover and Rochemont 1997), but extraposition of PP complements does not (see (87)). In this respect, extraposition in AcI constructions is like extraposition of PP complements, and unlike extraposition of PPs from DPs (see (88)). Why this should be so is at present unclear.

(86) a.   *I gave him$_1$ [$_{DP}$ a picture [$_{PP}$ from John$_1$'s collection]] yesterday.

       b.   I gave him$_1$ [$_{DP}$ a picture t_2] yesterday [$_{PP}$ from John$_1$'s collection]$_2$.

(87) a.   *I accidentally introduced him$_1$ [$_{PP}$ to John$_1$'s mother] yesterday.

       b.   *I accidentally introduced him$_1$ t_2 yesterday [$_{PP}$ to John$_1$'s mother]$_2$.

(88) a.   *I sincerely believed [$_S$ her$_1$ [$_\Pi$ to be a friend of Kim$_1$'s mother]].

       b.   *I believed [$_S$ her$_1$ t_2] sincerely [$_\Pi$ to be a friend of Kim$_1$'s mother]$_2$.

The raising-to-object analysis (which assumes that all matrix clause intervention results from raising of the embedded subject) does not capture either the scope data or the word order data.

    The most successful mixed analysis assumes that extraposition can cross time adverbials, while raising to object cannot. This low-subject analysis captures most of the reported word order data and can be adapted to capture the scope data. The case for this analysis is partly undermined by residual empirical issues (see section 3.4) and partly by the fact that the account is conceptually bloated.

Given the data discussed in this paper, what are the prospects of raising to object? Many syntacticians may rate these as quite good given data like the following (see Lasnik and Saito 1991, Runner 1995, 1998, Lasnik 1999 and Runner and Moulton 2017).[19]

(89) a.   ?*John believes [$_S$ him$_1$ to be a genius] even more than Bob$_1$'s mother does.

      b.   John believes [$_{S'}$ that he$_1$ is a genius] even more than Bob$_1$'s mother does.

(90) a.   ?The DA proved [$_S$ [the defendants]$_1$ to be guilty] during [each other]$_1$'s trials.

      b.   ?*The DA proved [$_{S'}$ that [the defendants]$_1$ were guilty] [during each other]$_1$'s trials.

(91) a.   ?The DA proved [$_S$ none of the defendants to be guilty] during any of the trials.

      b.   ?*The DA proved [$_{S'}$ that none of the defendants were guilty] during any of the trials.

On the standard assumption that principle-C effects, reciprocal binding and the licensing of negative polarity items rely on c-command, the contrasts in (89)-(91) suggest that the subject of the AcI complement has raised to the matrix clause.

On the extraposition analysis, these data require characterizations of Principle C, reciprocal binding and NPI licensing not based on strict surface c-command, but on a looser structural notion, say scope, possibly in combination with precedence. Of course, such accounts have been proposed independently of the issue of raising to object (for relevant discussion, see Williams 1997, Hoeksema 2000, Barker 2012, Janke and Neeleman 2012, and Bruening 2014). It would take us too far afield to evaluate these proposals here. However, the

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[19] The example in (91a) is easier to judge in a scenario in which the DA attempted to prove that the defendants were guilty, but failed, as in (i). Such a scenario has no effect on the ungrammaticality of (91b).

(i)   The new DA was not very good at his job; his conviction rate over the past year was a measly 43%. So, when he had a new bunch of trials last month, he was determined to secure convictions in each of them. However, he failed miserably. In fact, (91a,b).

fact that the extraposition would have to rely on some subset of them in order to account for the data in (89)-(91) would, in the eyes of many, be a severe disadvantage of the account.

But take note! It is a crucial feature of the low-subject analysis that raising to object lands in a position *below* time adverbials. Part of the problem posed by the above data is that AcI subject appear to c-command time adverbials (see in particular (90) and (91)). Therefore, the low-subject analysis and the extraposition analysis face exactly the same issue: a lack of surface c-command where standard tests suggest it is present.

There is some evidence that the issue of c-command is a problem for *any* existing analysis of AcI constructions. Pettiward (1998) shows that not only AcI subjects, but also VP-internal quantifiers sometimes behave as if they c-command matrix clause adverbials. She argues, for example, that the contrast between (92a) and (92b) mirrors that between (91a) and (91b). (These judgments are confirmed by our panel of native-speaker linguists: ten out of ten panel members found (91a) grammatical and nine out of ten found (92a) grammatical, with the remaining panel member judging this example as marginal; ten out of ten found (91b) and (92b) ungrammatical. Examples were presented with an appropriate context; see footnote 19.)[20]

(92) a.   The DA proved [s the guilt to lie with none of the defendants] during any of the trials.

  b.   *The DA proved [s' that the guilt lay with none of the defendants] during any of the trials.

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[20] Experimental work in progress by Sprouse and Wurmbrand points in a different direction (see Wurmbrand 2018 for initial results). It appears that in an online forced choice experiment (91b) is *preferred* over (91a) (contra the judgment of our panel of native-speaker linguists). If so, negative quantifiers must be allowed to undergo quantifier raising – not only out of non-finite, but also out of finite complement clauses. This, of course, would also undermine the argument for raising to object based on data like (91), but in a different way.

This does change the picture. While many questions remain, it seems to us that the weight of evidence supports an analysis of AcI constructions that combines some form of exceptional case marking with extraposition of the embedded predicate.

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