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 an overlooked 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. The arguments we give 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.

Keywords: AcI constructions, raising to object, exceptional case marking, reconstruction, Barss's generalization, adverbial hierarchy, Amazon Mechanical Turk.

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 complement 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. However, with the advent of minimalism it was replaced by a variation of Postal's analysis. The embedded subject was argued to move to a functional specifier in the matrix clause 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, as in (1b) (see Johnson 1991, Lasnik and Saito 1991, Koizumi 1993 and Runner 1995, among others).

(1) a. John [$_{VP}$ believed [$_{S}$ Mary [to be the winner]].

b. John [believed$_1$ [Mary$_2$ [$_{VP}$ t_1 [$_{S}$ t_2 [to be the winner]]]]].

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). But 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 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 in (2).

(2) John [believes$_1$ [Mary$_2$ [$_{VP}$ sincerely [$_{VP}$ t_1 [$_{S}$ t_2 [$_{\Pi}$ to be the winner]]]]]].

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 [made$_1$ [Mary$_2$ [$_{VP}$ [t$_1$ out] [$_{S}$ t_2 [$_{\Pi}$ 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. But 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, but the embedded predicate (which we will label Π) that moves rightward across a right-adjoined adverb, as in (4a). Similarly, intervening particles may result from extraposition, as in (4b).

(4) a. John $[_{VP}$ $[_{VP}$ believes $[_{S}$ Mary $t_1]]$ sincerely$]$ $[_{\Pi}$ to be the winner$]_1$.

b. John $[_{VP}$ made $[_{S}$ Mary $t_2]$ out$]$ $[_{\Pi}$ to be a liar$]_2$.

Extraposition of verbal predicates is required independently to deal with examples like those in (5), at least if Wurmbrand (2002) is correct in arguing that obligatorily controlled complements are predicates rather than full clauses with a PRO subject (see also Chierchia 1984 and Mourounas 2016).

(5) a. John tried t_1 desperately $[_{\Pi}$ to escape the Dean's attention$]_1$.

b. Mary persuaded John t_1 quietly $[_{\Pi}$ not to go to the Dean's reception$]_1$.

The raising-to-object analysis and ECM-plus-extraposition analysis make various 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, higher adverbials will precede lower adverbials. This is because in (2) the relevant adverbials precede the nodes in the verbal spine that they are merged with. By contrast, the extraposition analysis predicts that when multiple adverbials intervene, they will come in ascending order, as they follow the nodes they are merged with.

Third, the extraposition analysis predicts that matrix clause intervention may affect extraction from the embedded predicate, as that predicate has moved to a higher position in the tree. The raising-to-object analysis makes no such prediction, as the embedded predicate remains in place, whether there are intervening adverbials or not.

Finally, the extraposition analysis predicts that intervening adverbs can follow intervening particles, while the raising-to-object analysis predicts the opposite order. As before, these predictions follow from the fact that the extraposition analysis requires an ascending structure between an embedded subject and a non-adjacent embedded predicate, while the raising-to-object analysis requires a descending structure in that region of the syntactic representation.

We will examine these predictions in sections 2 and 3, before turning in section 4 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 potentially 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 (6)). Finally, it may be that raising to object is optional *and* that English allows optional predicate extraposition (see (7)).

(6) a. John [believes$_1$ [Mary$_2$ <sincerely> [$_{VP}$ [$_{VP}$ t_1 [$_S$ t_2 <[$_\Pi$ to be the winner]>]] <sincerely>] <[$_\Pi$ to be the winner]>]].

b. John made Mary$_1$ <out> [$_S$ t_1 <[$_\Pi$ to be a liar]>] <out> <[$_\Pi$ to be a liar]>.

(7) a. John [believes$_1$ [<Mary> <sincerely> [$_{VP}$ [$_{VP}$ t_1 [$_S$ <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. The optional- and obligatory-raising-to-object analyses are indistinguishable in this regard, as both hypotheses attribute matrix clause intervention to movement of the embedded subject. The two mixed analyses in (6) and (7) 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 analyses: the obligatory-raising-to-object analysis, the ECM-plus-extraposition analysis, and the mixed analysis that combines obligatory raising to object with optional predicate

extraposition. (We will refer to these as the raising-to-object analysis, the extraposition analysis and the mixed analysis, respectively.)

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 relevant to us must rely on a comparison of sentences that are marginal in status. In order to overcome this difficulty, we adopt the following strategy.

Where we explore adverbial order, we mainly rely on experiments run on Amazon Mechanical Turk. Such experiments 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.

Where we explore scope (or scope-related phenomena), we resort to judgments from a panel of ten native speaker linguists. This is because we are not convinced that experiments using Amazon Mechanical Turk are a reliable way of uncovering scope preferences (owing to the difficulty of judging grammaticality given a reading forced by context).

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. We show that the data are in line with the extraposition analysis. The raising-to-object analysis is forced to adopt an auxiliary hypothesis. It must assume that reconstruction is blocked when an accusative A-chain rooted in an embedded clause crosses matrix material.

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. The raising-to-object analysis implies that such a construal requires reconstruction, and

therefore it should 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 variations on the raising-to-object analysis can avoid the problems sketched above, and demonstrate that this is not the case.

2.1 Barss's Generalization

As is well known, reconstruction in A-chains is much more limited than reconstruction in A'-chains. For example, universals tend not to reconstruct in A-chains, while reconstruction of universals in A'-chains is unproblematic (see Lasnik 1999). This is not to say that there is no reconstruction in A-chains, though. The existential quantifier *some young lady* in (8), for example, can be interpreted in the scope of the universal quantifier *every senator* (see May 1979, Hornstein 1995, Lebeaux 1998, and Fox 1999).

(8) [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 be the result either of long-distance quantifier raising of the universal or of reconstruction of the existential. However, (9a) and (9b) are unambiguous. In (9a), the binding relation with the reciprocal forces *some young lady* to take surface scope. In (9b), the existential is not raised from the embedded clause and can therefore also not reconstruct into it. In view of these data, the ambiguity in (8) must be due to reconstruction of the existential rather than raising of the universal.

(9) a. [Some young lady]$_1$ [seems to herself$_1$ [t_1 to be likely t_1 to dance with every senator]]. ($\exists > \forall$; $*\forall > \exists$)

b. Mary$_1$ [seems to some young lady [t_1 to be likely t_1 to dance with every senator]]. ($\exists > \forall$; $*\forall > \exists$)

The key observation for our present purposes is that scope reconstruction of the existential becomes unavailable once the constituent containing its trace undergoes *wh*-movement, as in (10).

(10) [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 (10) are unambiguous goes back to Barss 1986. Sauerland and Elbourne (2002) refer to it as Barss's Generalization and formulate it as in (11), where 'total reconstruction' is intended to include reconstruction for scope.

(11) *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 negation. The example in (12a) 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 (12b).

(12) 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 (13b) shows that the relevant configuration is unproblematic if the stranded A-moved constituent is not dependent on a licenser in the fronted constituent.

(13) 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 in (14a) removes traces within it from the c-command domain of the embedded subject. 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 (see (14b).

(14) a. DP [[$_{VP}$ V [$_{S}$ DP$_1$ t_2] X] [$_{\Pi}$ … t_1 …]$_2$]

b. DP [V$_1$ [DP$_2$ [$_{VP}$ <X> t_1 <X> [$_{S}$ t_2 [$_{\Pi}$ … t_2 …]]]]]

We will now explore these predictions.

2.2 Adverbial Intervention and Scope Reconstruction

Consider the representations the extraposition analysis assigns to examples like (15).

(15) 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.

In (15a), 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):

(16) DP [Adv [$_{VP}$ V [$_{S}$ QP$_{\exists}$ [$_{\Pi}$ … $t_{\exists}$ … QP$_{\forall}$ …]]]] (○: ∃>∀; ∀>∃)

In (15b), 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. As a consequence, the example is predicted to be unambiguous: wide scope for the universal is no longer available:

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

One comment is in order before we turn to the predictions of the raising-to-object analysis. As (18a) shows, extraposition across post-verbal adverbials is obligatory or at least strongly preferred. 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 (18a). Note that the effect is not limited to AcI complements. In control structures, too, matrix construal of a post-verbal modifier favors extraposition (see (18b)).

(18) 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 (15a) and (15b). In (15a), 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:

(19) DP [Adv [V_1 [$QP_\exists$ [$_{VP}$ t_1 [$_S$ $t_\exists$ [$_\Pi$ … $t_\exists$ … $QP_\forall$ …]]]]]] (○: ∃>∀; ∀>∃)

Note that the mere fact that the existential raises into the matrix clause cannot be sufficient to block reconstructions, or else (8) would not allow wide scope for the universal either.

The example in (15b) has the same basic structure as (15a). 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:

(20) DP [V_1 [$QP_\exists$ [Adv [$_{VP}$ t_1 [$_S$ $t_\exists$ [$_\Pi$ … $t_\exists$ … $QP_\forall$ …]]]]]] (○: ∃>∀; ∀>∃)

Note that adverbials do not in general block reconstruction; witness the fact that the ambiguity of (8) is preserved in (21).

(21) [Some young lady]$_1$ [certainly [seems [t_1 to be likely t_1 to dance with every senator]]]. (∃>∀; ∀>∃)

We asked ten linguists to judge the examples in (15), making sure in conversation that the relevant readings of these complicated examples were clear. All members of the panel are speakers of American English, and all have been trained to give scope

judgments and grammaticality judgments. The data are as predicted by the extraposition analysis. All panel members found the example in (15a) 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 (15b), 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:

(22)

(15a)			(15b)		
*	∃>∀	∀>∃	*	∃>∀	∀>∃
0	10	10	2	8	1

Scope judgments for (15a,b) (10 native speaker linguists).

2.3 Particle Intervention and Scope Reconstruction

Intervention of particles gives rise to much the same predictions. Consider the examples in (23).

(23) 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.

We 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 is not dependent on any particular one. For concreteness' sake, we assume that particles form a complex predicate with the verb (Larson 1989, Booij 1990, Johnson 1991, Roeper and Keyser 1992, and Neeleman 1993). If so, the verb-particle-object order can be base-generated, as in (24a). This order surfaces if the particle does not project. The alternative verb-object particle order is triggered if the particle does project. Janke and Neeleman (2012) argue for a constraint requiring that no maximal projection intervenes 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, with the verb moving across it, as in (24b).

(24) a. DP [[V Prt] DP]

b. DP [V_1 [DP [t_1 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 (24), a complex predicate consisting of a verb and an unprojected particle can select an AcI complement, as in (25a). 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 (25b). On this analysis, the surface order in (23b) would be the result of extraposition of the embedded predicate, as in (25c).

(25) a. DP [[V Prt] [$_S$ DP Π]]

b. DP [V_1 [[$_S$ DP Π] [t_1 PrtP]]

c. DP [[V_1 [[$_S$ DP t_2] [t_1 PrtP]] $Π_2$]

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 (26a) 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 (26b) (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 have to do with the distribution of prosodic weight, but another option is that, like obligatory extraposition in the presence of postverbal modifiers, it results from the parser's preference for low attachment. This militates against attachment of the particle in the main clause, a difficulty avoided in other available orders.

(26) 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 (23). In (23a), the existential c-commands its trace, and so can reconstruct into a position that permits interaction with the universal (see (27a)). In (23b), however, the embedded predicate has been extraposed, which implies that the existential can no longer undergo

reconstruction, and therefore predicts that it cannot be interpreted in the scope of the universal (see (27b)).

(27) a. DP [$_{VP}$ [V Prt] [$_{S}$ QP$_{\exists}$ [$_{\Pi}$ … $t_{\exists}$ … QP$_{\forall}$ …]]] (○: ∃>∀; ∀>∃)

b. DP [[$_{VP}$ V$_1$ [$_{S}$ QP$_{\exists}$ t_2] [t$_1$ Prt]] [$_{\Pi}$ … $t_{\exists}$ … QP$_{\forall}$ …]$_2$] (○: ∃>∀; *∀>∃)

The raising to object analysis predicts that reconstruction is possible in both (23a) and (23b). This is because the only difference between these orders is the length of the A-chain headed by the existential; c-command between chain links is present in both representations in (28).

(28) a. DP [[V Prt]$_1$ [QP$_{\exists}$ [$_{VP}$ t_1 [$_{S}$ $t_{\exists}$ [$_{\Pi}$ … $t_{\exists}$ … QP$_{\forall}$ …]]]]] (○: ∃>∀; ∀>∃)

b. DP [V$_1$ [QP$_{\exists}$ [$_{VP}$ [t_1 Prt] [$_{S}$ $t_{\exists}$ [$_{\Pi}$ … $t_{\exists}$ … QP$_{\forall}$ …]]]]] (○: ∃>∀; ∀>∃)

Again, the data are as predicted by the extraposition analysis. Our panel of native speaker linguists unanimously accepted (23a) and (23b) as grammatical. All members found (23a) ambiguous, but nine out of ten members rejected a low reading of the existential in (23b):

(29)

(23a)			(23b)		
*	∃>∀	∀>∃	*	∃>∀	∀>∃
0	10	10	0	10	1

Scope judgments for (23a,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, as such elements can be licensed through reconstruction to a position in the scope of negation (see (12)). A relevant minimal pair involving adverbial intervention is given in (30).

(30) 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 (31), which do not contain a negative polarity item.

(31) 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 (30a), (31a) and (31b) are grammatical, and that (30b) is not. This is because reconstruction of the existential is blocked in (30b), yet necessary in order to license the negative polarity item. The examples in (31) do not require reconstruction, while (30a) requires and allows it.

(32) a. DP [Adv [$_{VP}$ V [$_{S}$ [$_{DP}$ … (○:✓NPI) …]$_1$ [$_{\Pi}$ … NEG … t_1 …]]]]

b. DP [[[$_{VP}$ V [$_{S}$ [$_{DP}$ … (○:*NPI) …]$_1$ t_2]] Adv] [$_{\Pi}$ … NEG t_1 … t_1 …]$_2$]

The raising-to-object analysis predicts that all examples in (30) and (31) are grammatical. The crucial example in (30b) 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:

(33) a. DP [Adv [V$_1$ [[$_{DP}$ … (○:✓NPI) …]$_2$ [$_{VP}$ t_1 [$_{S}$ t_2 [$_{\Pi}$ … NEG … t_2 …]]]]]]

b. DP [V$_1$ [[$_{DP}$ … (○:✓NPI) …]$_2$ [Adv [$_{VP}$ t_1 [$_{S}$ t_2 [$_{\Pi}$ … NEG … t_2 …]]]]]]

The data are as predicted by the extraposition analysis:

(34)

(30a)		(30b)		(31a)		(31b)	
*	✓	*	✓	*	✓	*	✓
0	10	10	0	0	10	2	8

Acceptability judgments for (30) and (31) (10 native speaker linguists).

2.5 NPI Licensing and Particle Intervention

In much the same vein, the extraposition analysis predicts that, while (35a), (36a) and (36b) are grammatical, particle intervention should lead to ungrammaticality in (35b). This is because the A-chain in (35b) is broken by predicate extraposition (compare (37a) and (37b)).

(35) a. Mary made out a doctor with any reputation not to be a nice person.

b. Mary made a doctor with any reputation out not to be a nice person.

(36) a. Mary made out a doctor from cardiology not to be a nice person.

b. Mary made a doctor from cardiology out not to be a nice person.

(37) a. DP [$_{VP}$ [V Prt] [$_{S}$ [$_{DP}$ … (○:✓NPI) …]$_1$ [$_{\Pi}$ … NEG … t_1 …]]]

b. DP [[$_{VP}$ V$_1$ [$_{S}$ [$_{DP}$ … (○: *NPI) …]$_2$ t_3] [t$_1$ Prt]] [$_{\Pi}$ … NEG … t_2 …]$_3$]

The raising-to-object analysis predicts that both (35a) and (35b) are grammatical, as both contain an unbroken A-chain:

(38) a. DP [[V Prt]$_1$ [[$_{DP}$ … (○:✓NPI) …]$_2$ [$_{VP}$ t_1 [$_{S}$ t_2 [$_{\Pi}$ … NEG … t_2 …]]]]]

b. DP [V$_1$ [[$_{DP}$ … (○:✓NPI) …]$_2$ [$_{VP}$ [t_1 Prt] [$_{S}$ t_2 [$_{\Pi}$ … NEG … t_2 …]]]]]

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

(39)

(35a)		(35b)		(36a)		(36b)	
*	✓	*	✓	*	✓	*	✓
0	10	10	0	0	10	0	10

Acceptability judgments for (34) and (36) (10 native speaker linguists).

We conclude that NPI licensing confirms the conclusion drawn at the end of section 2.3: reconstruction of existential quantifiers is blocked by matrix clause intervention, a finding that supports the extraposition analysis.

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 the auxiliary hypothesis 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 these landing sites A and B, respectively.

Movement to position A is obligatory, while movement to position B is optional. However, case adjacency forces the embedded subject to surface adjacent to the verb. The overall effect is that when no matrix material separates A and B, the embedded subject may surface in A (see (40)), but when matrix material is present, it must move onwards to B (see (41)).

(40) … V … ___ … DP_1 … [$_S$ … t_1 …
B A

(41) … V … DP_1 … X … t_1 … [$_S$ … 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.

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.

The viability of this auxiliary 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 (which it c-commands in the surface representation).

This prediction can be contrasted with what follows from the extraposition analysis. In the representation in (42), the embedded subject is c-commanded by the matrix adverbial, and it should therefore be possible to interpret it in its scope.

(42) DP [[[$_{VP}$ V [$_S$ DP t_1]] Adv] Π_1]

Thus, the extraposition analysis predicts that the examples in (43) are grammatical under the reading indicated, while the amended raising-to-object analysis predicts that these examples should not permit this reading:

(43) a. Mary expected pedestrians on at least five occasions to die at this dangerous intersection.
‘There were at least five occasions at which Mary expected that a pedestrian would die at this dangerous intersection.’ (*five occasions* > ∃)

b. Bill proved supposedly non-existent patterns twice to be merely infrequent.
‘There were two occasions at which Bill proved that a supposedly non-existent pattern was merely infrequent.’ (*twice* > ∃)

c. Carl assumed merely infrequent patterns on various occasions to be non-existent.
‘There were various occasions at which Carl assumed that a merely infrequent pattern was non-existent.’ (*various occasions* > ∃)

d. Marc believes delayed letters frequently to have been steamed open by the FBI.

‘There are frequent occasions at which Marc believes that a delayed letter has been steamed open by the FBI.’ (*frequently* > ∃)

As it turns out, native speakers have no difficulty in assigning the examples in (43) an interpretation in which the frequency adverbial takes scope over subject of the AcI complement. Our panel of native speaker linguists was unanimous in finding all four examples grammatical on the interpretation indicated:

(44)

(43a)		(43b)		(43c)		(43d)	
*	Adv > ∃	*	Adv > ∃	*	Adv > ∃	*	Adv > ∃
0	10	0	10	0	10	0	10

Acceptability judgments for (43) and availability of Adv > ∃ scope (10 native speaker linguists).

One may wonder why we use bare plurals in the test sentences in (43). The reason is that indefinites in English often assume a plural form when interpreted in the scope of a quantifier. This so-called dependent plural shows up in examples like *Unicycles have wheels* (from Chomsky 1975; see De Mey 1981 and Zweig 2009 for discussion and references). The effect is quite pronounced with frequency adverbials. As the judgments of our panel of native speaker linguists in (47) show, speakers find it much easier to interpret the object in (46) in the scope of *repeatedly* than they do in (45).

(45) a. I read a book about Chomsky repeatedly.

b. I repeatedly read a book about Chomsky.

(46) a. I read books about Chomsky repeatedly.

b. I repeatedly read books about Chomsky.

(47)

(45a)		(45b)		(46a)		(46b)	
✓	*	✓	*	✓	*	✓	*
6	4	2	8	10	0	10	0

Acceptability judgments for Adv > ∃ in (45) and (46) (10 native speaker linguists).

However, the ability of the embedded subject to scope under a matrix clause adverbial is not restricted to bare plural DPs. We also asked our panel of native speaker linguists to judge the examples in (48), where the embedded subjects are introduced

by *some*. As before, the examples were uniformly judged to be grammatical on the relevant reading (see (49)).

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

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

c. Carl assumed some merely infrequent patterns on various occasions to be non-existent.

d. Marc believes delayed letters frequently to have been steamed open by the FBI.

(49)

(48a)		(48b)		(48c)		(48d)	
*	Adv > ∃	*	Adv > ∃	*	Adv > ∃	*	Adv > ∃
0	10	0	10	0	10	0	10

Acceptability judgments for (48) and availability of Adv > ∃ scope (10 native speaker linguists).

These results make it impossible to maintain the auxiliary hypothesis required by the raising-to-object analysis (that is, the hypothesis that there is no reconstruction from position B). 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 (44), but must disallow such reconstruction to capture the data discussed in sections 2.2-2.5. This problem can be addressed through a further decomposition of raising to object. If there are two low positions, A and B, and one higher position that c-commands matrix adverbials, C, then the observed pattern of reconstruction can be captured by saying that reconstruction is possible from positions A and C, but not from position B (assuming, as before, that raising beyond the lowest position in the matrix clause is optional as long as case-adjacency is met).

(50) … V … DP_1 … X … t_1 … t_1 … [$_S$ … t_1 …
C B A

These technical contortions require strong independent evidence, especially in view of the fact that the extraposition analysis faces no comparable difficulties. The latter straightforwardly predicts the data in (44), as well as those discussed in sections 2.2-2.5.

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 (see (6) and (7)). 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:

(51) … V … DP_1 … X … [$_S$ t_1 <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:

(52) … V … <DP_1> … X … <DP_1> … [$_S$ t_1 <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, while maintaining that reconstruction from position B is impossible. All that is required is that Y in (52) 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 (52) 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 (50), 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, one would expect the one that is higher in the tree to precede the one that is lower in the tree; by contrast, if two elements intervene as a consequence of extraposition, one would expect the higher one to follow the lower one. In section 3.1 and 3.3, we will test these predictions using manner and time adverbials, while section 3.2 contains a short excursus on extraction. We will argue that the bulk of the data favors the extraposition analysis and a specific version of the mixed analysis over other accounts. A further, more limited set of data involving order among low adverbials is discussed in section 3.3. It proves problematic for the relevant version of the mixed analysis.

3.1 Manner and Time Adverbials

The premise of our first set of experiments is that time adverbials are attached higher than manner adverbials, at the very 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, and when a time and manner adverbial appear to the right of the verb's base position, the time adverbial follows the manner adverbial (see, among others, Quirk et al. 1985):

(53) [<Adv_T> … [<Adv_M> … V … <Adv_M>] … <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 (54a), or the two adverbials can straddle the embedded predicate, as in (54b), or they can both follow the embedded predicate, as in (54c).

(54) 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:

(55) *Extraposition analysis*

… [[[[$_{VP}$ V [$_{S}$ DP <Π>]] Adv_M] <Π>] Adv_T] <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. In other words, the time adverbial must precede the manner adverbial:

(56) *Raising-to-object analysis*

… V_1 DP_2 [<Adv_T> [<Adv_M> [$_{VP}$ t_1 [$_{S}$ t_2 Π]] <Adv_M>] <Adv_T>] …

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_1 [$_{S}$ t_2 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 (57) – the equal-height analysis. This analysis predicts variable order in the sandwiched and straddled conditions, and ascending order when both adverbs are sentence-final.

(57) *Mixed analysis (equal height)*

… V_1 DP_2 [<Adv_T> [[<Adv_M> [$_{VP}$ t_1 [$_{S}$ t_2 <Π>]] <Adv_M>] <Π>]
<Adv_T>] <Π> …

A second option is that extraposition can cross time adverbials, but raising to object cannot, as in (58) – the low-subject analysis. This analysis predicts that adverbial pairs come in ascending order in all three conditions.

(58) *Mixed analysis (Low Subject)*

… V_1 [[DP_2 [<Adv_L> [$_{VP}$ t_1 [$_{S}$ t_2 <Π>]] <Adv_L>] <Π>] <Adv_H>] <Π> …

A third option is that raising to object, but not extraposition, can cross time adverbials, as in (59) – the low-Π analysis. This analysis predicts that in the sandwiched and straddled conditions adverbial pairs will come in descending order, with ascending orders reserved for the rightmost condition:

(59) *Mixed analysis (Low Π)*

… V_1 DP_2 [<Adv_H> [[<Adv_L> [$_{VP}$ t_1 [$_S$ t_2 <Π>]] <Adv_L>] <Π>] <Adv_H>] …

The table in (60) summarizes the predictions of the five analyses that we are interested in.

(60)

	Ext	RtO	Mixed		
			EqHgt	LoSu	LoΠ
Adv-Adv-Π	ascending	descending	variable	ascending	descending
Adv-Π-Adv	ascending	variable	variable	ascending	descending
Π-Adv-Adv	ascending	ascending	ascending	ascending	ascending

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, there is a genuine question as to whether they can be tested 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 (54). First, as mentioned in the introduction, speakers tend to dislike any adverbial intervention, which reduces the acceptability of (54a) and (54b). Second, as mentioned in section 2.2, speakers have an aversion against matrix adverbials that follow an embedded clause, which reduces the acceptability of (54b) and (54c). Third, many speakers find sentences with multiple adjacent adverbs degraded (see Payne 2018), which affects (54a) and (54c). 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. For this reason, we will abandon standard practice, and instead rely on an experiment run on Amazon Mechanical Turk.

We tested the order of matrix adverbials in three conditions, schematized in (61). Representative examples are given in (62).

(61) 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*

(62) 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 (62), and so sixty test items overall. Each set was built using a different AcI verb, and embedded predicates were chosen so that a matrix construal of the various time and manner adverbials was impossible, or at least implausible. Thus, 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.

We recruited eighty subjects, all native speakers of English with IP addresses in the United States. They judged the various test sentences on a seven-point Likert scale. The order of test sentences was randomized and the test included both grammatical and ungrammatical fillers, as well as questions to check that subjects were paying attention to the task.

The results are summarized in (63). They show that the preferred order of adverbials is not affected by the position of the embedded predicate. In all three conditions, there is a clear preference for manner adverbials preceding time adverbials. (Significance was calculated using two-tailed t-tests, with $p < .05$ as the threshold.)

(63)

Adv –Adv–Π		Adv–Π–Adv		Π–Adv –Adv	
M–T	T–M	M–T	T–M	M–T	T–M
3.298	2.915	3.447	2.894	3.447	2.872
(1.32)	(1.12)	(1.24)	(1.39)	(1.40)	(1.19)
p=0.01		p=0.001		p=0.001	

Word order preferences for time and manner adverbials in AcI constructions (n=80).

For each score the standard deviation is given between parentheses.

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/or the straddled condition there should not be a preference for manner adverbials to precede time adverbials. We repeat the table in (60), with incorrect predictions highlighted.

(64)

	Ext	RtO	Mixed		
			EqHgt	LoSu	LoΠ
Adv-Adv-Π	ascending	**descending**	**variable**	ascending	**descending**
Adv-Π-Adv	ascending	**variable**	**variable**	ascending	**descending**
Π-Adv-Adv	ascending	ascending	ascending	ascending	ascending

The table in (60) repeated, with incorrect predictions in bold.

3.2 Excursus: Extraction

The conclusion that all but the extraposition and low-subject analyses face difficulties in capturing the distribution of time and manner adverbials is corroborated by the pattern of admissible and inadmissible extraction from the embedded predicate. Current movement theory is not sufficiently explicit to generate predictions about extraction on the basis of a given theory of AcI constructions. However, as we will show, the extraction data have a straightforward interpretation on the extraposition and low-subject analyses, but not on the raising-to-object analysis or the remaining mixed accounts.

We recruited forty subjects to test *wh*-extraction out of the embedded predicate. We constructed five sets of examples in which the embedded predicate was separated from the embedded subject by a matrix time or manner adverbial. Each set contained two baseline examples without extraction, two examples featuring argument extraction and two examples featuring adjunct extraction, as in (65) below. In total, there were thirty test sentences. Otherwise, the experimental set up was as described above.

(65) a. John believed Mary sincerely to have written many books slowly.
b. Which book did John believe Mary sincerely to have written slowly?
c. How slowly did John believe Mary sincerely to have written this book?
d. John believed Mary yesterday to have written many books slowly.
e. Which book did John believe Mary yesterday to have written slowly?
f. How slowly did John believe Mary yesterday to have written this book?

The results are given in (66) and (67).

(66)

Adv_{manner}–Π			Adv_{time}–Π			
No extraction	Argument extraction	Adjunct extraction	No extraction	Argument extraction	Adjunct extraction	
4.33 (1.4)	4.00 (0.72)	3.49 (0.85)	4.46 (0.73)	3.56 (0.73)	3.01 (1.13)	
	n.s.	p<0.05		p<0.001	p<0.001	(1)
	p<0.05			p<0.05		(2)

Extraction from embedded predicate, with significance levels for comparison with no extraction base line (1), and for argument versus adjunct extraction (2) (n=40). For each score the standard deviation is given between parentheses.

(67)

No Ext minus Arg Ext		No Ext minus Adj Ext		No Ext minus Ext	
Manner	Time	Manner	Time	Manner	Time
0.33	0.9	0.84	1.45	0.585	1.175
p<0.01		p<0.05		p<0.01	

Relative effects of intervention by manner and time adverbials on extraction from embedded predicate (n=40).

The table in (66) shows that there is no significant difference in acceptability between absence of extraction and argument extraction in the presence of an intervening manner adverbial, while there is a significant difference between argument extraction and adjunct extraction. In the presence of an intervening time adverbial, argument extraction is significantly worse than absence of extraction, while adjunct extraction leads to a further significant reduction in acceptability.

The table in (67) shows the relative effects of argument extraction and adjunct extraction in the context of intervening manner and time adverbials. As it turns out, both the reduction in acceptability brought about by argument extraction and the reduction in acceptability brought about by adjunct extraction are significantly greater in the presence of a time adverbial than in the presence of a manner adverbial. Unsurprisingly, this effect persists when the two types of extraction are combined.

These findings pose a problem for the raising-to-object analysis and the equal-height and low-Π analyses, because on these analyses the embedded predicate can be parsed as being in its base position even when a matrix adverbial intervenes between it and the embedded subject. Consequently, it remains unclear why manner and time adverbials should interact with extraction in the way that they do.

By contrast, the extraposition analysis and the low-subject analysis can capture the data fairly straightforwardly. It is enough to assume that there is a lower clausal domain that hosts manner adverbials and that mildly inhibits extraction from the embedded predicate, and a higher clausal domain that hosts time adverbials and that constrains extraction more forcefully. While details have to be worked out, this is in line with the kind of factors usually taken to regulate extraction.

3.3 Sandwiched Particles and Adverbials

The five analyses under consideration also make divergent predictions about word order when 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, and we hypothesized that matrix clause intervention is the result of extraposition of the embedded predicate:[1]

(68) *Extraposition analysis*

$$\text{DP } [[[V_1\ [[_S \text{ DP } t_2] \langle Adv_M \rangle\ [t_1 \text{ Prt}] \langle Adv_M \rangle] \langle \Pi_2 \rangle] \langle Adv_T \rangle] \langle \Pi_2 \rangle]$$

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 (68), there is a low attachment site for adverbs sandwiched between the verb's clausal argument and its trace. Manner adverbials can be accommodated in this position, but it is too low to host time adverbials.

The existence of this attachment site is admittedly somewhat controversial. However, examples like *Jonah put the gun carefully down on the desk* are relatively easy to find on Google. In addition, we will report on an additional experiment below that establishes the existence of a low, pre-particle adverbial site.

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

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

The raising-to-object assumes that movement of embedded subject and matrix verb is the only source of matrix clause intervention. As a consequence, both manner adverbials and time adverbials are expected to precede particles:

(69) *Raising-to-Object analysis*

DP [V_1 [DP_2 [Adv_T [Adv_M [$_{VP}$ [t_1 Prt] [$_S$ t_2 Π]]]].

The equal-height analysis is a mixed account that assumes both raising to object and extraposition of the embedded predicate. 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:

(70) *Mixed analysis (equal height)*

… V_1 DP_2 [<Adv_T> [[<Adv_M> [$_{VP}$ [t_1 Prt] [$_S$ t_2 <Π>]] <Adv_M>] <Π>] <Adv_T>] <Π> …

The low-subject analysis assumes that raising to object can cross manner, but not time adverbials, while extrapostion of the embedded predicate can cross both. Consequently, it predicts variable order for pairs of a particle and a manner adverbial, and ascending order for pairs of a particle and a time adverbial:

(71) *Mixed analysis (Low Subject)*

… V_1 [[DP_2 [<Adv_L> [$_{VP}$ [t_1 Prt] [$_S$ t_2 <Π>]] <Adv_L>] <Π>] <Adv_H>] <Π> …

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 manner adverbial, and variable order for pairs of a particle and a time adverbial:

(72) *Mixed analysis (Low Π)*

… V_1 DP_2 [<Adv_H> [[<Adv_L> [$_{VP}$ [t_1 Prt] [$_S$ t_2 <Π>]] <Adv_L>] <Π>] <Adv_H>] …

These predictions are summarized in the table below:

(73)

	Ext	RtO	Mixed		
			EqHgt	LoSu	LoΠ
Adv$_M$	variable	descending	variable	variable	variable
Adv$_T$	ascending	descending	variable	ascending	descending

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

We recruited 40 participants on Amazon Mechanical Turk to test the prediction in (73). 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 (74).

(74) 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 results are given in (75). In short, order between manner adverbials and particles is variable, but time adverbials preferentially appear in post-particle position.

(75)

Prt–Adv$_M$	Adv$_M$–Prt	Prt–Adv$_T$	Adv$_T$–Prt
3.8	3.3	3.5	2.1
(1.15)	(1.04)	(1.05)	(0.48)
n.s.		$p<0.001$	

Word order preferences for time and manner adverbials with respect to particles in AcI constructions (n=40). For each score the standard deviation is given between parentheses.

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 analysis:

(76)

	Ext	RtO	Mixed		
			EqHgt	LoSu	LoΠ
Adv$_M$	variable	**descending**	variable	variable	variable
Adv$_T$	ascending	**descending**	**variable**	ascending	**descending**

The table in (73) 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, which much the same set-up: forty participants, ten sets of four test sentences that differ 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 (77).

(77) 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 the post-particle adverbial to be more liberal than the pre-particle site.

The results confirm these predictions: the order between particles and manner adverbials is variable, but time adverbials must appear in the post-particle position.

(78)

Prt–Adv_M	Adv_M–Prt	Prt–Adv_T	Adv_T–Prt
4.1	3.8	4.8	3.1
(0.51)	(0.65)	(1.18)	(0.34)
n.s.		$p<0.001$	

Word order preferences for time and manner adverbials with respect to particles in dative constructions (n=40). For each score the standard deviation is given between parentheses.

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 and extraction from the embedded predicate 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, as shown in section 3.2, intervening time adverbials affect extraction more than intervening manner adverbials. So far, 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 (74b). But this means that the raising-to-object part of the low-subject analysis is limited in its independent empirical content, a conclusion that echoes the worries about mixed analyses at the end of section 2.

3.4 Again continuously

We now explore whether adverbial order can help us decide between the extraposition and low-subject analyses on empirical grounds. In order to do so, we must consider 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 must precede the higher one in the sandwiched, straddled and rightmost conditions (see (79a)). The predictions of the low-subject analysis shift, however, when compared to the experiment reported in section 3.1. While in the rightmost condition the higher adverbial must follow, order is predicted to be variable in the sandwiched and straddled conditions (see (79b)).

(79) a. *Extraposition analysis*

… [[[[$_{VP}$ V [$_{S}$ DP <Π>]] Adv_{L1}] <Π>] Adv_{L2}] <Π> …

b. *Mixed analysis* (*Low-subject*)

… V_1 [DP_2 [Adv_{L2} [Adv_{L1} [$_{VP}$ t_1 [$_{S}$ t_2 <Π>]] Adv_{L1}] Adv_{L2}] <Π>] …

We summarize these predictions below:

(80)

	Ext	LoSu
Adv-Adv-Π	ascending	variable
Adv-Π-Adv	ascending	variable
Π-Adv-Adv	ascending	ascending

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

The predictions in (80) 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* and a manner adverb like *continuously*. In general, *again* can be merged low, but cannot appear in the scope of *continuously*. Consequently, the extraposition analysis and the low-subject analysis make diverging predictions about the order of these two adverbs in the sandwiched and straddled positions.

Our test 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 (81), which were used to test the preferred order of *again* and *continuously* when both precede the matrix verb (the test sentence is underlined).

(81) a. During their first tour of duty, John continuously expected Bill to die, but this never happened. During their second tour of duty, <u>John again continuously expected Bill to die</u>.

b. During their first tour of duty, John continuously expected Bill to die, but this never happened. During their second tour of duty, <u>John continuously again expected Bill to die</u>.

We added this pre-verbal condition to the straddled, sandwiched and rightmost conditions, because it allows 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). The test was run with forty subjects, all native speakers of English with IP addresses in the United States.

The results are given in (82).

(82)

Adv–Adv–V–DP–Π		V–DP–Adv–Adv–Π	
again–continuously	*continuously–again*	*again–continuously*	*continuously–again*
6.0 (0.52)	3.4 (1.08)	2.4 (0.41)	2.8 (0.79)
p=0.001		p=0.05	
V–DP–Adv–Π–Adv		**V–DP–Π–Adv–Adv**	
again–continuously	*continuously–again*	*again–continuously*	*continuously–again*
2.3 (0.31)	2.8 (0.74))	3.6 (1.17)	4.2 (1.88)
p=0.05		p=0.05	

Word order preferences for *again* and *continuously* (n=40). For each score the standard deviation is given between parentheses.

The preverbal condition provides clear evidence that *again* must indeed be merged higher than *continuously*. Scores in the sandwiched, straddled and rightmost conditions are relatively low, due to the factors identified in section 3.1. However, they clearly show a preference for the ascending order *continuously–again*, irrespective of the position of the embedded predicate. 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.[2]

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 the near-obligatory nature of extraposition in certain contexts.

[2] Neeleman and Payne (2017) argued that *again* can directly modify *continuously*. This is not a factor here, as the test items do not favour the kind of reading that favours such direct modification.

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 (though not all) 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), but mainly by the fact that the account is conceptually bloated. It must address awkward issues that the raising-to-object analysis has to face – for example, it must introduce quite specific assumptions about reconstruction. In addition, it must address awkward issues that the extraposition analysis has to face – for example, it must account for the near-obligatoriness of extraposition in certain contexts.

In view of this, is it worth considering the prospects of raising to object? Many syntacticians may rate these as quite good given data like the following (quoted from Moulton and Runner 2017). On the standard assumption that principle-C effects, reciprocal binding and the licensing of negative polarity items rely on c-command, the contrasts in (83)-(85) suggest that the subject of the AcI complement has raised to the matrix clause.

(83) a. ?*John believes [$_{IP}$ him$_1$ to be a genius] even more than Bob$_1$'s mother does.

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

(84) a. ?The DA proved [$_{IP}$ [the defendants]$_1$ to be guilty] during [each other]$_1$'s trials.

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

(85) a. ?The DA proved [$_{IP}$ none of the defendants to be guilty] during any of the trials.

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

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 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 fact that the extraposition would have to rely on some subset of them in order to account for the data in (83)-(85) 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. But part of the problem posed by the above data is that AcI subject appear to c-command time adverbials (see in particular (84) and (85)). 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.

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.

2 February 2018

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