

Extraction asymmetries show that type A coordination is adjunction

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ABSTRACT

Ross (1967) already observed that the coordinate structure constraint can be violated in certain semantically asymmetric structures. In this paper we consider one of these structures, namely type A coordination, in detail (the terminology is from Lakoff 1986; an example is *Here's the whisky I went to the store and bought.*) We present experimental evidence showing that the pattern of argument and adjunct extraction from type A coordinate structures matches the pattern of argument and adjunct extraction from structures containing purpose clauses in all crucial respects. This near-perfect parallel behavior suggests that, like purpose clauses, the second conjunct in a type A coordination is an adjunct (see also Brown 2017). We explore the consequences of this finding for both interpretive and syntactic analyses of asymmetric coordination.*

Keywords: coordination, adjunction, coordinate structure constraint, type A coordination

1. INTRODUCTION

The aim of this paper is to explore the empirical profile and theoretical implications of one type of counterexample to the coordinate structure constraint (CSC). The CSC can be formulated as below (see Ross 1967:161 and Grosu 1973; for a literature overview, see De Vries 2017).

(1) *Coordinate Structure Constraint*

- a. The Conjunct Constraint: Conjuncts cannot be moved.
- b. The Element Constraint: Movement out of a coordinate structure is possible only if the moved category binds a trace in each conjunct.

According to the CSC, extraction from conjuncts must take place in an across-the-board (ATB) fashion. Thus, 2a is acceptable, but 2b and 2c (from Ross 1967:160) are not.

- (2) a. The madrigals which₁ Henry [[sings t_1] and [listens to t_1]] are mostly Venetian.
- b. *The lute which₁ Henry [[plays t_1] and [sings madrigals]] is warped.
- c. *The madrigals which₁ Henry [[plays the lute] and [sings t_1]] sound lousy.

Ross (1967: 168) already observed that there are apparent counterexamples to the CSC. In 3, which instantiates the structure we will explore, non-ATB relativization is unobjectionable.

- (3) Here's the whisky which₁ I [[went to the store] and [bought t_1]].

Ross further points out, citing George Lakoff, that non-ATB extraction requires a specific asymmetric interpretation of the coordinate structure (see also Lakoff 1986). In the case at hand, the first conjunct must describe an event that facilitates the event described by the second conjunct. This fact can be brought out in various ways. For example, reordering of the conjuncts leads to unacceptability (see 4a), while such reordering is unproblematic in regular coordinate structures (see 4b).

- (4) a. *Here's the whisky which₁ I [[bought t_1] and [went to the store]].

- b. The madrigals which₁ Henry [[listens to t_1] and [sings t_1]] are mostly Venetian.

There are two ways of analyzing this constellation of facts. First, examples like 3 could involve standard coordination, as long as the CSC is revised to permit non-ATB extraction under specific interpretive conditions (or is replaced by other constraints to this effect). We will refer to analyses of this type as *interpretive accounts* (because interpretation directly governs extraction). Second, the obligatory asymmetric interpretation of examples like 3 could be indicative of a syntactic structure which is distinct from standard coordination and which permits non-ATB extraction. If so, extraction is still sensitive to interpretation, but only indirectly (interpretation licenses a syntactic structure that in turn allows extraction). We will refer to accounts of this type as *syntactic accounts* (since it is the syntax that regulates extraction).

Both positions have been defended. An interpretive account was adopted in Lakoff 1986 (see also Deane 1991, Na & Huck 1992, Kehler 2002, Chaves 2012, and Kubota & Lee 2015). Ross (1967: 170) opted for a syntactic account (see also De Vos 2009, Weisser 2015, and Bošković 2020). He argued that in examples like 3 the second conjunct starts out as a purpose clause and is only transformed into a conjunct in the mapping to surface structure. Given that English permits extraction from purpose clauses, as shown in 5, the proposed underlying structure explains the acceptability of 3.

- (5) Here's the whisky which₁ I [[went to the store] [to buy t_1]].

Of course, Ross's assumptions are not compatible with current syntactic theory. However, the core of his proposal can be maintained if we assume, with Brown 2017, that the second part of an asymmetric coordination is not a *conjunct*, but an *adjunct*. This is in the spirit of Ross's proposal, given that purpose clauses, too, are commonly analyzed as adjuncts. English permits extraction from (certain) adjuncts (see Truswell 2011 for discussion and references) and so the acceptability of 3 and 5 can be argued to have the same source. Note that this account must be supplemented by a theory of coordinators that explains why they can show up outside coordinate structures. We cannot explore this nontrivial issue here.

We will present evidence that the apparent right conjunct in examples like 3 is indeed an

adjunct. Our argument is based on extraction asymmetries. According to the literature, extraction from adjuncts in English has a specific empirical profile. First, adjuncts that permit extraction are *selective islands*. This means that they marginally permit extraction of arguments and disallow extraction of adjuncts altogether.¹ Second, extraction from adjuncts is sensitive to the nature of the predicate in whose projection the adjunct appears. The nature of the effect is a matter of debate, but several authors have suggested that extraction is facilitated if the relevant verb is unaccusative and inhibited if it is transitive. We will show that these properties indeed hold, not only of extraction from purpose clauses, but also of extraction from the second conjunct in a structure like 3 (see also Postal 1998, which argues a similar point, though not based on experimental evidence). By contrast, we will see that the *first* conjunct in a structure like 3 permits extraction of both arguments and adjuncts and thus behaves like a matrix VP.

The evidence comes from eight web-based experiments. Three core experiments (experiments IA, IIA and IVA) and a follow-up study (experiment III) explore extraction from asymmetric coordination. Three additional experiments explore extraction from structures containing purpose clauses, the adjuncts semantically closest to the apparent second conjunct in structures like 3 (experiments IB, IIB, and IVB). Each item in these additional experiments forms a minimal pair with its counterpart in the core experiments. This allows us to demonstrate that asymmetric coordination and structures containing purpose clauses are correlated in the restrictions that they impose on extraction. Finally, we show that asymmetries in extraction from the first and second conjunct of a type A coordination cannot be ascribed to the fact that the latter span a larger distance (experiment V).

Our findings thus indicate that the right conjunct in structures like 3 is an adjunct. This conclusion permits a syntactic account of CSC exceptions. The core of any such account is that regular coordination and CSC exceptions have different structures, with only the former subject to the CSC. If in examples like 3 the apparent second conjunct is an adjunct, then the conjuncts in examples like 2a must entertain a different structural relationship. There are various analyses of regular coordination that fit the bill, both symmetric (i.e. conjuncts have the same status; Ross 1967, Gazdar 1981, Kaplan & Maxwell 1988, Cormack & Smith 2005, Przepiórkowski & Patejuk 2021, and Neeleman et al. 2022) and asymmetric (i.e. conjuncts differ in status; Munn 1987, Kayne 1994, Zoerner 1995, Johannessen 1998, and De Vries 2005).

Our findings do, however, cast doubt on alternative syntactic accounts. While Déchaine (1993) and Weisser (2015) also claim that asymmetric coordination involves adjunction, they argue that it is the *first*, rather than the *second* conjunct that is an adjunct. This means that their predictions for the islandhood of the left and right conjuncts are the reverse of what our experiments show (namely that the first conjunct is transparent for extraction, while the second is a selective island). Yet other syntactic accounts are put forward by De Vos (2009) and Bošković (2020), who contend that asymmetric coordination involves coordination, but of a type syntactically distinct from the standard. These accounts, too, predict that extraction from the first conjunct is harder than extraction from the second conjunct.

The interpretive accounts of CSC exceptions mentioned above are not compatible with our findings either. Like the syntactic accounts just discussed, they incorrectly predict that extraction from the first conjunct in structures like 3 is impossible. In addition, they do not predict that the second conjunct behaves like a selective island (in opposition to the first conjunct). Finally, they do not predict that extraction from the second conjunct is easier when the verb in the first conjunct is unaccusative.

There is a potential fix for these problems, however. The core of any interpretive account is that CSC exceptions and regular coordination are identical in structure, with the interpretive system responsible for whether the CSC applies or not. Hence, if in structures like 3 the second conjunct is an adjunct, then this must be true of regular coordination as well. Interestingly, this is exactly the analysis of coordination given in Munn 1993 (see also Bošković & Franks 2000, Hartmann 2000, and Zhang 2010). Indeed, an approach to CSC exceptions along these lines is advocated by Altshuler and Truswell (2022), who base themselves partly on data from an earlier version of this paper.

Thus, our experimental findings narrow down analytical possibilities in both syntactic and interpretive approaches to CSC violations. Moreover, they imply that there may be a way to force a choice between the two. If Munn's (1993) analysis of regular coordination turns out to be incorrect, CSC violations are best explained syntactically. If Munn's analysis is correct, however, the interpretive account to CSC violations may well be true.

Before we give an outline of the paper, we must point out two important limitations of this study. To begin with, Lakoff (1986) shows that non-ATB extraction is possible when an

apparent coordinate structure expresses a course of events that fits into one of the three semantic frames described in 6 and exemplified by 3, 7a and 7b, respectively (the example in 7b is taken from Na & Huck 1992; see Deane 1991 and Kehler 2002 for similar categorizations of asymmetric coordination).

- (6) A coordinate structure allows non-ATB extraction iff it denotes a sequence of events which fits normal conventionalized expectations (TYPE A), runs counter to conventionalized expectations (TYPE B), is causative in nature (TYPE C).
- (7) a. [How much]₁ can you [[drink *t*₁] and [not end up hung-over]]?
 b. [Which shoes]₁ did Terry [[run in *t*₁] and [hurt her knee]]?

For practical purposes, we can only discuss a single type of asymmetric coordination. We therefore explore type A coordination, leaving type B and type C for future research.

We also put aside instances of so-called contiguous coordination. Contiguous coordination is found in examples like *he sat and drank whisky*. It differs from type A coordination in that it does not necessarily have the sequence-of-events reading typical of type A coordination (in the example at hand the sitting and the drinking coincide). Rather, contiguous coordination marks aspectual readings that depend on properties of the verb in the left conjunct. These include progressive-like and inceptive-like aspects. Contiguous coordination does not create selective islands in the way that type A coordination does, which suggests to us that it is likely to involve a different kind of structure (see Carden & Pesetsky 1977, De Vos 2005, 2007, Wiklund 2007, and Brown 2017). Note that 3 is not an instance of contiguous coordination – Wiklund (2007) shows that such an analysis is excluded when the left conjunct contains a goal PP (here: *to the store*).

The paper is organized as follows. Section 2 gives background information necessary for the evaluation of the argument we develop. It contains a brief overview of the literature on type A coordination and on island constraints. With this in place, we develop our analysis in more detail and make explicit what predictions it makes as regards extraction.

The experiments presented in sections 3-5 are designed to test these predictions. Section

3 reports on two experiments that each have a two-by-two factorial design – one explores type A coordination and the other structures containing purpose clauses. The factors we test for are the locus of extraction (left verbal domain *vs* right verbal domain) and the nature of the verb in the left verbal domain (motion verb *vs* nonmotion transitive). We then explore to what extent there is a correlation between extraction from type A coordination and extraction from sentences containing a purpose clause.

Section 4 looks in more detail at the influence of the leftmost verb. We report on two experiments in which we manipulate this verb and consider the effect on extraction from purpose clauses and from the right conjunct in type A coordination. The verb factor has three values (motion *vs* change-of-posture *vs* transitive). The results show a good, though not perfect, correlation. However, a follow-up study with a small correction in the design of the type A items reestablishes full parallel behavior of the two structures under consideration.

Section 5 considers asymmetries between argument and adjunct extraction in type A coordination and structures hosting a purpose clause. The experiments have a two-by-two design, with one factor the domain of extraction (left *vs* right domain) and the other factor the nature of the extracted category (argument *vs* adjunct). The results show that in both type A coordination and structures hosting purpose clauses there is an asymmetry between argument and adjunct extraction from the right domain (with adjunct extraction very considerably worse). At the same time, there is no significant difference between argument and adjunct extraction from the left domain. These findings suggest that the right domain is an adjunct in both structures. The data cannot simply reflect length of movement (with adjunct extraction more strongly affected than argument extraction). Our final experiment shows that while both argument and adjunct extraction are judged as less acceptable when length increases, there is no asymmetry between the two types of movement in the absence of an island boundary.

In sum, there is a near-perfect parallelism between extraction from type A coordination and structures hosting purpose clauses. The implications of this are explored in section 6.

2. BACKGROUND AND PREDICTIONS

2.1 THREE ARGUMENTS AGAINST THE ADJUNCTION ACCOUNT

Schmerling (1972) gives a persuasive argument against Ross's hypothesis that type A coordinations are derived from purpose clauses. She observes that the interpretation of type A coordinations is stronger than that of purpose clauses. The contrast is illustrated in 8 (adapted from Schmerling). The event described by the purpose clause in 8a does not have to take place, but the one described by the right conjunct in 8b does, leading to a contradiction.

- (8) a. I went to the store to buy some whiskey, but I bought Ripple instead.
 b. *I went to the store and bought some whiskey, but I bought Ripple instead.

This is a strong argument against a derivational relationship between purpose clauses and type A coordination. However, it is also a relatively narrow argument, as it does not rule out that the apparent second conjunct in a type A coordination is in fact an adjunct. There is, after all, no need to assume that type A coordination has its source in an independently existing type of modification.²

Lakoff (1986) develops an argument with a broader thrust. He notes that there can be more than two conjuncts in asymmetric coordinate structures, as shown in 9 (adapted from the original to ensure that the argument structure of the various predicates is unambiguous).

- (9) This is [the cake]₁ that Harry [went to the store], [bought *t*₁], [loaded *t*₁ in his car], [came home], and [put *t*₁ in the fridge].

The example is remarkable in that it shows extraction from the second, third and fifth conjuncts, but not from the first or fourth. Lakoff argues that it is the asymmetric interpretation of examples like 9 that allows CSC-violating extraction. In contrast, the pattern of extraction in 9 may seem problematic if we adopt the standard version of the coordinate structure constraint in 1 and a syntactic approach to asymmetric coordination. It is neither compatible with an analysis of 9 in which the five conjuncts form a single coordinate structure, nor with an analysis in which the four noninitial conjuncts are treated as adjuncts. The former analysis would require full across-

the-board extraction, the latter would not allow extraction from multiple conjuncts.

However, as already pointed out in Weisser 2015, the extraction pattern in 9 can be understood if we analyze the example as a coordination with three terms: [*went to the store, bought*], [*loaded in his car*] and [*came home and put in the fridge*]. The first and third of these conjuncts are themselves built through asymmetric coordination (i.e. adjunction): in the first conjunct [*bought*] is adjoined to [*went to the store*], while in the third conjunct [*put in the fridge*] is adjoined to [*came home*]. We give the full structure in 10, where conjuncts appear below each other while adjuncts appear in line with the category they are adjoined to. As will be clear, the structure in 10 does not violate the CSC.

- (10) This is [the cake]₁ $\left[\begin{array}{l} \text{[went to the store], [bought } t_1] \\ \text{[loaded } t_1 \text{ in his car]} \\ \text{[came home] and [put } t_1 \text{ in the fridge].} \end{array} \right]$
that Harry

The first and third conjuncts in 10 meet two constraints that we think hold of type A coordination. First, as we will demonstrate in section 3, there is a preference for the left-hand part of a type A coordinate structure to be headed by an unaccusative predicate. This is true of the first and third conjuncts, as the motion predicates *went to the store* and *came home* are unaccusative. Second, in a type A coordination the left conjunct describes an event that facilitates the event described in the right conjunct. Such a construal is possible for the first and third conjuncts in 10, given that a parallel structure with purpose clauses is also acceptable:

- (11) This is [the cake]₁ $\left[\begin{array}{l} \text{[went to the store] [to buy } t_1] \\ \text{[loaded } t_1 \text{ in his car]} \\ \text{and [came home] [to put } t_1 \text{ in the fridge].} \end{array} \right]$
that Harry

In fact, given these two constraints, 10 is the only analysis of 9 compatible with the assumption that type A coordination involves adjunction. Interestingly, it is predicted that CSC violations will be detected in 9 if any of the gaps is filled. This effect is indeed found. The following acceptability markings reflect the aggregate judgment of 16 native speakers in a small

questionnaire study (participants were students who received and returned the questionnaire by email; they spoke British or North American English; average scores are given between parentheses; acceptability markings were determined in comparison with the baseline example in 12a).

- (12)a. This is the cake that Harry [went to the store, bought *t*], [loaded *t* in his car], [came home and put *t* in the fridge]. (3.44 out of 5)
- b. *This is the cake that Harry [went to the store, made his purchase], [loaded *t* in his car], [came home and put *t* in the fridge]. (1.81)
- c. ??This is the cake that Harry [went to the store, bought *t*], [loaded the box in his car], [came home and put *t* in the fridge]. (2.13)
- d. *This is the cake that Harry [went to the store, bought *t*], [loaded *t* in his car], [came home and put the box in the fridge]. (1.81)

Similar data were already reported by Kehler (2002), who noted that variants of Lakoff's example in which the final or prefinal gap is filled are considerably worse than the original (see also Bošković 2020: 176).³

There is a parallel between the examples with type A coordinations in 12 and the examples with purpose clauses in 13, albeit that in the latter case scores are slightly higher overall, possibly because the structure of the example is more easily recoverable (as before, acceptability markings are based on the aggregate judgments of 16 native speakers and determined in comparison with a baseline example, here 13a).

- (13)a. This is the cake that Harry [went to the store to buy *t*], [loaded *t* in his car], and [came home to put *t* in the fridge]. (4.4)
- b. *This is the cake that Harry [went to the store to make his purchase], [loaded *t* in his car], and [came home to put *t* in the fridge]. (2.12)
- c. ??This is the cake that Harry [went to the store to buy *t*], [loaded the box in his car], and [came home to put *t* in the fridge]. (2.68)

- d. ??This is the cake that Harry [went to the store to buy t], [loaded t in his car], and [came home to put the box in the fridge]. (2.56)

In sum, Lakoff's (1986) argument from examples like 9 is perhaps less strong than it appears at first sight. On the other hand, 9 contains only a single coordinator, while one might have expected it to surface with two additional coordinators, as in 14. While there is no doubt that 14 is acceptable, it remains to be explained why, on the adjunction analysis of type A coordination, two instances of (a)symmetric coordination in 9 can remain asyndetic (neither *bought* nor *came home* is preceded by a coordinator). We cannot address this issue here, but as it does not arise under Lakoff's interpretive account, it must be considered a potential problem for the syntactic account.

- (14) This is [the cake]₁ that Harry [[went to the store] and [bought t_1]], [loaded t_1 in his car], and [[came home] and [put t_1 in the fridge]].

The final argument against Ross's proposal comes from Kehler 2002. Kehler argues that asymmetric coordination does not satisfy a basic discriminating test for subordination. Unlike subordinate clauses, the second conjunct in an asymmetric coordinate structure cannot be fronted, as illustrated in 15 with a type A example.

- (15)a. John went to the store and bought some whisky.
 b. *And bought some whisky, John went to the store.

This, then, is a property that asymmetric coordinate structures share with regular coordination. However, the argument is not conclusive, as there are other adjuncts that resist fronting. For example, *so (that)* clauses can front on a purpose reading (see 16), but not on a result reading (see 17). An anonymous reviewer notes that in their English, fronting of *in that* clauses is also impossible (see 18), although there seems to be some speaker variation in this respect.

- (16)a. We will provide you with a laptop, so (that) you can make the most of your time here.
 b. So (that) you can make the most of your time here, we will provide you with a laptop.
- (17)a. You never collected your new laptop, so (that) you couldn't do your work.
 b. *So (that) you couldn't do your work, you never collected your new laptop.
- (18)a. This analysis is problematic, in that it relies on numerous stipulations.
 b. *In that it relies on numerous stipulations, this analysis is problematic.

Absent a theory of contrasts like those in 17 and 18, it cannot be decided with certainty whether 15b violates the Element Constraint or involves an unfrontable adjunct.

In sum, the case against an adjunction analysis of type A coordination is not clear-cut. In view of this, we now discuss how extraction data can be brought to bear on the issue.

2.2 EXTRACTION ASYMMETRIES

It has been known since Ross 1967 that movement is subject to island constraints. It is less acceptable to extract certain elements from certain constituents than it is to extract those same elements from other constituents. As an example, compare *wh*-extraction from the subject of a finite clause with *wh*-extraction from the object. Subjects inhibit this movement to a greater degree than objects (even though extraction from a subject requires a shorter movement), as shown in 19.

- (19)a. Who did you meet [a friend of t_{WH}] at the airport?
 b. *Who did [a friend of t_{WH}] meet you at the airport?

There is an ongoing debate on the nature of island constraints. The classical view is that islands are a syntactic phenomenon, that is, whether a category inhibits extraction depends on its internal structure and its syntactic attachment site (Ross 1967 and Chomsky 1973, 1977, 1986, 1995, a.o.). Alternative approaches treat islands as semantic phenomena (Erteschik-Shir 1973, Kuno 1987, Goldberg 2006, and Ambridge et al. 2014, a.o.) or processing phenomena (Deane 1991,

Kluender 1991, and Hofmeister & Sag 2010, a.o.). The hypothesis behind semantic approaches is that certain extractions are degraded because they give rise to a semantic anomaly, for instance because a question is asked about material that is presupposed or backgrounded. The hypothesis behind processing approaches is that unacceptable extractions are not in fact ungrammatical, but so demanding of the parser that they give the *impression* of ungrammaticality. The effect is due to a compounding of costs associated with the movement operation itself and with the parsing of the extraction site. While these costs can be overcome individually, in combination they overload people's processing resources (for a review of the debate between grammatical and processing accounts of islands, see Phillips 2013 and other relevant chapters in Sprouse & Hornstein 2013).

While the nature of island constraints is undoubtedly fundamental to the theory of syntax, it is not immediately relevant to our present concerns. The aim of the experiments we report on is to find out whether type A coordination behaves like an adjunction structure with respect to extraction. For our conclusion to be reliable, it is crucial that extraction from asymmetric coordination parallels extraction from adjunction structures. For this reason, we pair each experiment that probes type A coordination with a parallel experiment that probes extraction from structures hosting purpose clauses. However, the logic of our argument does not require that we pin down the origin of the generalizations that hold of extraction from adjuncts. For concreteness' sake, we will assume that the adjunct island phenomenon is at least partly syntactic in nature, but nothing of substance hinges on this.

The literature on extraction from adjuncts identifies several factors that determine the acceptability of extraction. Three are relevant here: (i) the height of attachment of the adjunct (VP-internal versus VP-external), (ii) the nature of the extracted category, and (iii) the nature of the verb that heads the host structure. We will discuss the first two now and turn to the third factor later, in section 2.3.

A core finding in the syntactic literature is that extraction from constituents that stand in a close structural relation to the verb is more acceptable than extraction from elements that are more distant. This insight is expressed in Huang's (1982) Condition on Extraction Domains and has been incorporated in a variety of subsequent proposals. We already illustrated the effect for subjects and objects in 19: objects are attached VP-internally and allow extraction, while subjects are attached VP-externally and inhibit extraction. A similar contrast has been claimed to exist in

the case of extraction from adjuncts in Chomsky 1986.

Chomsky notes that the example in 20a is ambiguous. One interpretation is that they were so angry that they could not hold the meeting. This is the most obvious reading of *the organizers were too angry to hold the meeting*). The other interpretation is that they were so angry that *we* could not hold the meeting (for instance because holding the meeting was deemed unsafe). This is the most obvious reading of *the crowds were too angry to hold the meeting*. Chomsky suggests that this ambiguity has a structural source. The first reading requires that *to hold the meeting* forms a constituent with *too angry* and hence appears VP-internally. By contrast, *to hold the meeting* is attached VP-externally in the second reading. Strikingly, the example in 20b is unambiguous, allowing only the first of the two readings discussed above, as expected if extraction from the adjunct requires attachment within VP.

- (20)a. They were too angry to hold the meeting.
 b. [Which meeting]_i were they too angry to hold *t_i*?

The effect can also be demonstrated with adverbials attached low in the verbal extended projection. While the structural position of adverbials has been a topic of much discussion in generative grammar, it is widely accepted that at least some adverbials can appear VP-internally (even below the object; see Larson 1988, in which such adverbials are analyzed as complements). As demonstrated in Truswell 2011, extraction from adjuncts that can be merged low is typically more acceptable than extraction from adjuncts that are attached VP-externally. We illustrate this using the two modifiers in 21 and 22.⁴ It is generally accepted that locative PPs may appear VP-internally, but that PPs expressing a point of view may not. In line with this, extraction from locative PPs contrasts sharply with extraction from PPs expressing a point of view, as shown in 21c and 22c (the examples in 21b and 22b show that *wh*-movement of the PP adjunct as a whole produces semantically well-formed results in both types of example). The data are in line with Bruening 2018, who argues that high PPs cannot be extracted from, while low PPs can be, at least under some circumstances and for some speakers (the cut-off point is VoiceP, which largely corresponds to VP in our representations).

- (21)a. We should [meet the students in Caroline's room].
 b. [In whose room]₁ should we meet the students t_1 ?
 c. ?[Whose room]₁ should we meet the students [in t_1]?

- (22)a. We should [meet the students] in Caroline's opinion.
 b. [In whose opinion]₁ should we meet the students t_1 ?
 c. *[Whose opinion]₁ should we meet the students [in t_1]?

Attachment height is clearly not the only factor that determines the acceptability of extraction from adjuncts; Truswell discusses the role of event semantics in some detail, as well as the connection between event semantics and attachment height. We cannot review this here but will briefly return to the matter in section 3.3.

The second factor that affects extraction from adjuncts has to do with the nature of the displaced category. As a rule, extraction from adjuncts (even if attached VP-internally) is less acceptable than extraction from internal arguments. The effect is subtle for extraction of arguments, but quite sharp for extraction of adverbials. Thus, while internal arguments allow extraction of both arguments and adverbials, (VP-internal) adjuncts block extraction of adverbials and only marginally allow extraction of arguments. This pattern has been discussed by several authors (see Lasnik and Saito 1984, 1992, Chomsky 1986, Cinque 1990, Borgonovo 1994, Postal 1998, Szabolcsi 2006, and Truswell 2011). We illustrate it in 23 and 24. In 23, the infinitival clause is a control complement; in 24 it is a purpose clause. The extracted DPs in 23b and 24b are arguments, while the extracted PPs in 23c and 24c are adverbials.⁵

- (23)a. She wanted [to measure the distance between A and B with a high level of accuracy].
 b. [What distance]₁ did she want [to measure t_1 with a high level of accuracy]?
 c. [With what level of accuracy]₁ did she want [to measure the distance between A and B t_1]?

- (24)a. She went out [to measure the distance between A and B with a high level of accuracy].
 b. ?[What distance]₁ did she go out [to measure t_1 with a high level of accuracy]?

- c. *[With what level of accuracy]₁ did she go out [to measure the distance between A and B _{t₁}]?

It is because of data like these that (VP-internal) adjuncts in English are characterized as *selective* islands. There is an extensive literature on selective islands and the highly complex matter of what distinguishes extractable and unextractable categories. We cannot explore this matter here but refer to Szabolcsi 2006 and Abrusán 2014 for discussion and references).

2.3 THE ADJUNCTION ACCOUNT AND ITS PREDICTIONS

In view of the above, the hypothesis that type A coordination involves adjunction requires that the second conjunct in an example like 3 be analyzed as a VP-internal adjunct. An unresolved question is what the exact definition of VP-internal is. We will assume that categories adjoined to VP or higher count as VP-external, and that transparent adjuncts must therefore be attached lower than VP (this echoes the notion in May 1985 and Chomsky 1986 that a category α does not dominate a category β unless all of α 's segments dominate β). We therefore assign the structure in 25a to the example in 3. However, we acknowledge that one could alternatively assume that attachment *to* VP is low enough for an adjunct to be transparent, in which case 3 could be analyzed as in 25b. (The latter is the structure advocated in Altshuler & Truswell 2022.) We will come back to this issue in section 3.3.

(25) <INSERT TREES 25,a,b HERE>

Three predictions follow from an analysis of type A coordination as low adjunction. These concern the domain of extraction, the extracted category, and the predicate in the left conjunct.

First, given that the apparent right conjunct is analyzed as an adjunct in 25, it is predicted to marginally permit extraction of arguments and to block extraction of modifiers.

Second, given that the apparent left conjunct is analyzed as the main predicate, it is predicted to freely permit extraction of both arguments and modifiers. Thus, we expect to find an interaction between the *extraction domain* (left versus right conjunct) and the *extracted category* (argument versus modifier).

Third, a prediction is made regarding the predicate that heads the left conjunct in a type A coordination. Notice that on the adjunction analysis, the right conjunct in a type A coordination must be classified as subject-oriented. In 25, for example, the external θ -role of *buy* is assigned to (or controlled by) the subject of the main predicate *went to the store*, on a par with external θ -role of the subject-oriented depictive *drunk* in *I went to the store drunk* or the purpose phrase in *I went to the store to get whisky*. This is of interest because it has been claimed in the literature that extraction from a subject-oriented depictive improves if the matrix verb is unaccusative, as opposed to transitive (see Borgonovo 1994, Cormack & Breheny 1994, Borgonovo & Neeleman 2000, and Fábregas & Jiménez-Fernández 2016). Thus, a contrast has been reported to exist between examples like 26b and examples like 26d.⁶

- (26) a. John₁ killed Bill [thinking about Mary]₁.
 b. *Who did John₁ kill Bill [thinking about]₁?
 c. Bill₁ died t₁ [thinking about Mary]₁.
 d. ?Who did Bill₁ die t₁ [thinking about]₁?

In view of this, the adjunction account of type A coordination predicts that the nature of the predicate in the left conjunct will affect the acceptability of extraction from the right conjunct to the same extent as the nature of the main predicate affects extraction from a subject-oriented adjunct. We formulate this prediction quite carefully, as the effect in 26 is subtle and cannot be relied upon unless it is also found to exist in uncontroversial adjunction structures.

There are good reasons to investigate whether the choice of predicate matters. It is generally acknowledged that type A coordinations are felicitous with a motion verb in the left conjunct (see Ross 1967, Schmerling 1972, Lakoff 1986, Deane 1991, De Vos 2005, and Weisser 2015, among others). Motion verbs, especially if accompanied by a directional modifier (as in *went to the store*) are unaccusative, as argued by Hoekstra (1984) and Levin and Rappaport Hovav (1995), among many others. It is controversial, however, whether the left conjunct of a type A coordination can be headed by a transitive verb. Schmerling (1972) and Weisser (2015) suggest that this is possible, but De Vos (2005) suggest that transitivity inhibits extraction. Thus, there is at least a possibility that the verb effect reported for extraction from

adjuncts extends to type A coordination.

Experimental work by Brown (2017) bears on this issue. She reports on two experiments showing (i) that the transitivity of the predicate in the matrix VP inhibits extraction from gerundive secondary predicates and (ii) that transitivity of the predicate in the left conjunct inhibits extraction from the right conjunct in two-termed ‘pseudocoordination’ (a term Brown uses to refer to a range of asymmetrically interpreted coordinate structures that includes, but goes well beyond, type A coordination). Thus, Brown’s findings suggest that the predicate effect may well be real. However, additional testing is necessary, as Brown did not look at type A coordination specifically, did not consider extraction from the ‘left domain’ (i.e. the matrix VP or the left conjunct), and used only test items in which arguments were extracted.

Of course, if the predicate effect is real, there is a question of what explains it. We will discuss this matter after having reported relevant experimental results.

The three predictions outlined above (the extraction domain effect, the extracted category effect, and the predicate effect) can at least partially be contrasted with the predictions of alternative accounts. The most striking contrast concerns the extraction domain. Many existing analyses of type A coordination are designed to allow extraction from the right conjunct of a type A coordinate structure but rule out or render marked extraction from the left conjunct (see the interpretive accounts in Deane 1991, Na & Huck 1992, and Kehler 2002, and the syntactic accounts in De Vos 2005; 2009, Weisser 2015, and Bošković 2020). There is variation in how this is achieved. Weisser, for example, claims that the *left* conjunct is merged as an adjunct, while the *right* conjunct is the matrix VP (the exact opposite of the hypothesis under consideration). Interpretive accounts typically claim that the left conjunct is semantically backgrounded and will therefore resist extraction (although it has been acknowledged that extraction from the left conjunct is possible in certain contexts; see Schmerling 1972, Grosu 1973, Deane 1991, Al Khalaf 2015, and Brown 2017).

We will show in the next three sections that the data are in line with our predictions.

3. THE PREDICATE EFFECT AND THE EXTRACTION DOMAIN EFFECT

3.1 INFORMATION RELEVANT TO ALL EXPERIMENTS

In this section and sections 4 and 5, we report on a series of web-based experiments whose results support an analysis of type A coordination as adjunction. We begin by giving some information relevant to all eight experiments.

For each experiment, we recruited eighty self-reporting native speakers of English through *Prolific* (<https://www.prolific.co/>). Participants were eighteen years old or over and were paid for their participation. They could not sign up for more than one experiment.

All experiments involved acceptability judgement tasks created and conducted using *Gorilla* (<https://gorilla.sc>). Before participating in a study, participants were asked to read a set of instructions. Items were subsequently presented one-by-one, each below a context sentence. A short time after an item appeared on screen, a seven-point Likert scale was displayed below it. Participants were asked to indicate the acceptability of each item by clicking one of the points on the Likert scale. A score of seven corresponded to full acceptability and a score of one corresponded to complete unacceptability. Participants were required to rate all items.

To eliminate potential scale biases, we transformed the raw acceptability scores of each participant into z-scores (Schütze and Sprouse 2014). We then ran a linear mixed-effects model on these z-transformed data by using the *lme4* package (Bates et al. 2015) in R (R Core Team 2020). Models at least included random intercepts for both subject and item. We also included by-subject random slopes for all fixed effects as well as their interaction (Baayen 2008 and Kush et al. 2019), unless the model failed to converge, in which case we removed the by-subject random slope for the interaction.

The *lmerTest* package (Kuznetsova et al. 2017) was used to calculate *t*-statistics and *p*-values based on Satterthwaite's approximation. Post-hoc pairwise comparisons were conducted using the *emmeans* package (Lenth 2020).

Six of our experiments were coupled: each item in the experiment exploring extraction from type A coordination formed a minimal pair with its counterpart in the experiment on extraction from structures containing purpose clauses. We ran a correlation analysis on the results of these coupled experiments, comparing mean acceptability scores per item. The aim was to determine whether, for a given minimal pair, the acceptability of extraction from a structure containing a

purpose clause was a good predictor of the acceptability of extraction from type A coordination.

All figures below were drawn by using the ggplot 2 package (Wickham 2016).

3.2 EXPERIMENTS IA AND IB

The central claim of our paper is that in type A coordination extraction from the second conjunct is possible because this conjunct is in fact a low adjunct (that is, an adjunct attached within VP). Experiment IA tests two predictions that follow from this hypothesis. First, if the right conjunct is an adjunct, it must be a subject-oriented adjunct. As mentioned in section 2.3, it has been claimed that extraction from such adjuncts is facilitated by the matrix verb being unaccusative (as opposed to transitive). If so, *argument extraction from the right conjunct should be sensitive to the nature of the verb in the left conjunct* (PREDICTION 1). Second, if the right conjunct is a low adjunct, then the left conjunct is the matrix VP minus the right conjunct. A matrix VP is transparent for extraction, while low adjuncts are selective islands and hence not fully transparent. It thus follows that *argument extraction from the left conjunct should be better than argument extraction from the right conjunct* (PREDICTION 2).

Of course, these predictions presuppose that the predicate effect and the extraction domain effect are real in uncontroversial adjunction structures. Experiment IB therefore tests parallel predictions pertaining to structures that contain (subject-oriented) purpose clauses (the adjuncts semantically closest to the second conjunct in type A coordination). First, extraction from a purpose clause should be rated higher if the matrix verb is unaccusative (as opposed to transitive). Hence, *argument extraction from a purpose clause should be sensitive to the nature of the matrix verb* (PREDICTION 1'). Second, even if the matrix verb is unaccusative, a purpose clause remains a selective island and consequently not fully transparent. Therefore, *argument extraction from the matrix VP should be better than argument extraction from a purpose clause* (PREDICTION 2').

There is also a prediction that spans both experiments, namely that *there should be a highly positive correlation between the results of experiments IA and IB* (PREDICTION 3). This prediction follows from the hypothesis that the second conjunct in type A coordination is an adjunct, just like the purpose clauses in experiment IB.

Experiment IA had a 2×2 factorial design in which we manipulated two factors: VERB CLASS

(motion verb vs. transitive verb) and GAP POSITION (left conjunct vs. right conjunct). Similarly, experiment IB had a 2×2 factorial design, with VERB CLASS (motion verb vs. transitive verb) and GAP POSITION (matrix clause vs. adjunct) as the factors manipulated. Manipulation of GAP POSITION allowed us to test predictions 2 and 2', while manipulation of VERB CLASS allowed us to test predictions 1 and 1'. Given that the two experiments had a similar set up, we could run a correlation analysis that compared their results. This allowed us to test prediction 3.

In the motion verb condition, we used complex predicates that express directed motion (such as *travel to Denver*). As mentioned, such predicates are unaccusative. In the transitive verb condition, we used transitive verbs with an object understood as instrumental for the event described by the second conjunct in experiment IA and the purpose clause in experiment IB (as in *put on his favorite gloves and / in order to fight the heavyweight champion*). One reason for this choice is that VPs composed in this way have been claimed, for instance by Schmerling (1972), to license type A coordination and thus to allow extraction from a right conjunct.

Given their factorial design, the two experiments had four conditions each. A set of sample test items is given below (the sample items in 27 and 28 are taken from experiment IA, while those in 29 and 30 are taken from experiment IB; L/R = extraction from Left/Right conjunct; M/T = Motion/Transitive predicate; Mx/Adj = extraction from Matrix VP/Adjunct VP). We used non-D-linked *wh*-phrases, as these are often taken to be more sensitive to island boundaries and therefore potentially more informative.⁷ All items were checked by native speakers for naturalness. During the experiments, the bracketed sentences were given as context to make sure that participants construed the test items as intended (we used purpose clauses in the contexts for experiment IA because these have an interpretation comparable to the one that licenses extraction in type A coordination).

(27)[Ali travelled to Kinshasa in order to fight the heavyweight champion.]

- | | |
|--|---------|
| a. What city did Ali travel to and fight the heavyweight champion? | (L M) |
| b. What boxer did Ali travel to Kinshasa and fight? | (R M) |

- (28) [Ali put on his favourite gloves in order to fight the heavyweight champion.]
- a. What gloves did Ali put on and fight the heavyweight champion? (L | T)
 - b. What boxer did Ali put on his favourite gloves and fight? (R | T)
- (29) [Ali travelled to Kinshasa in order to fight the heavyweight champion.]
- a. What city did Ali travel to in order to fight the heavyweight champion? (Mx | M)
 - b. What boxer did Ali travel to Kinshasa in order to fight? (Adj | M)
- (30) [Ali put on his favourite gloves in order to fight the heavyweight champion.]
- a. What gloves did Ali put on in order to fight the heavyweight champion? (Mx | T)
 - b. What boxer did Ali put on his favourite gloves in order to fight? (Adj | T)

For each experiment, we created twelve sets of test items, and so there were forty-eight test items in total (twelve sets \times four conditions). The experiments had a Latin square design. Test items were distributed across four lists. Each list contained forty items in total: four practice items, twelve test items, and twenty-four fillers. The practice items were intended to familiarize the participants with the set-up of the experiment. They preceded the other items, but they were not identified as practice items. The remaining thirty-six items were pseudorandomized per participant, with the twelve test items interspersed with the twenty-four fillers. Half of the fillers were examples of acceptable *wh*-extraction, whereas the other half were examples of unacceptable *wh*-extraction out of various types of islands (e.g. complex NPs, subjects, and *wh*-clauses; see Ross 1967).

A linear mixed effect model was fitted to the results of experiment IA, with VERB CLASS, GAP POSITION, and their interaction as fixed effect predictors. This model revealed a significant main effect of VERB CLASS (Estimate = 0.80, SE = 0.06, $t = 12.64$, $p < .001$), reflecting the fact that in comparison with transitive verbs, motion verbs facilitated extraction from both the right conjunct (Estimate = 0.35, SE = 0.06, $t = 5.48$, $p < .001$) and the left conjunct (Estimate = 0.80, SE = 0.06, $t = 12.64$, $p < .001$).

We also observed a significant main effect of GAP POSITION (Estimate = -0.61 , SE = 0.06, $t = -9.15$, $p < .001$): for both verb classes extraction from the right conjunct was rated lower than

extraction from the left conjunct. Pair-wise comparisons show that this contrast was much sharper in the motion verb condition (Estimate = 0.61, SE = 0.06, $t = 9.15$, $p < .001$) than in the transitive verb condition (Estimate = 0.15, SE = 0.06, $t = 2.32$, $p < .05$). This resulted in a significant interaction between GAP POSITION and VERB CLASS (Estimate = 0.45, SE = 0.09, $t = 5.07$, $p < .001$).

<INSERT FIGURE 1 ABOUT HERE>

A linear mixed effect model was also fitted to the results of experiment IB, again with VERB CLASS, GAP POSITION, and their interaction as fixed effect predictors. As in experiment IA, we observed a significant main effect of VERB CLASS (Estimate = 0.62, SE = 0.07, $t = 8.56$, $p < .001$), a significant main effect of GAP POSITION (Estimate = -0.99, SE = 0.06, $t = -14.41$, $p < .001$), and a significant interaction between VERB CLASS and GAP POSITION (Estimate = 0.30, SE = 0.09, $t = 3.119$, $p < .01$).

<INSERT FIGURE 2 ABOUT HERE>

The effect of VERB CLASS reflects the fact that in comparison with transitive verbs, motion verbs aided extraction from both the purpose clause (Estimate = 0.31, SE = 0.06, $t = 4.87$, $p < .001$) and the matrix clause (Estimate = 0.62, SE = 0.07, $t = 8.56$, $p < .001$). The effect of GAP POSITION was significant since for both verb classes extraction from the purpose clause scored lower than extraction from the matrix clause. Pairwise comparison revealed that this contrast was larger in the motion verb condition (Estimate = 0.99, SE = 0.06, $t = 14.41$, $p < .001$) than in the transitive verb condition (Estimate = 0.68, SE = 0.08, $t = 8.25$, $p < .001$).

This resulted in a significant interaction between the two factors. However, the effect was smaller than that observed in Experiment IA. This is because the difference in experiment IB between extraction from a matrix clause and extraction from a purpose clause was much sharper in the transitive verb condition than the difference in Experiment IA between extraction from the left conjunct and the right conjunct.

Given that experiments IA and IB yielded similar results, it is not surprising that

acceptability of extraction from type A coordinate structures in experiment IA and from their purpose clause counterparts in experiment IB show a highly positive correlation ($\tau = 0.5549645$). About 60 % of the variance in the acceptability of type A coordination items can be accounted for on the basis of the acceptability of related purpose clause items ($r^2 = 0.6041$). This positive correlation is highly significant ($t = 8.378$, $df = 46$, $p < .001$).

<INSERT FIGURE 3 ABOUT HERE>

3.3 DISCUSSION

BASIC PREDICTIONS.

The hypothesis that the right conjunct in type A coordination is in fact an adjunct predicts a parallel between extraction from type A coordinate structures and extraction from purpose clauses. Experiments IA and IB confirm this parallel.

First, based on claims in the literature, we predicted that in type A coordination *argument extraction from the right conjunct should be sensitive to the nature of the verb in the left conjunct* (prediction 1). Similarly, *argument extraction from a purpose clause should be sensitive to the nature of the matrix verb* (prediction 1'). Both predictions are borne out. In experiment IA, extraction from the right conjunct was easier when the left conjunct was headed by a motion verb than when it was headed by a transitive verb; in experiment IB, the same effect could be observed regarding extraction from purpose clauses.

Second, we predicted that in type A coordination *argument extraction from the left conjunct should be better than argument extraction from the right conjunct* (prediction 2). In the same vein, *argument extraction from the matrix VP should be better than argument extraction from a purpose clause* (prediction 2'). Again, both predictions are borne out. In experiment IA argument extraction from the right conjunct scored worse than argument extraction from the left conjunct; in experiment IB, argument extraction from the matrix VP scored higher than argument extraction from a purpose clause.

Third, we predicted that *there should be a strong positive correlation between the results of experiments IA and IB* (prediction 3). In line with this prediction, highly significant positive

correlations were indeed observed between the results of Experiment IA and IB.

In sum, all predictions tested in experiments IA and IB were confirmed.

THEORETICAL INTERPRETATION.

Now that we have presented some of the evidence for the predicate effect in both type A coordination and structures containing purpose clauses, let us consider why such an effect should exist. We propose that the explanation lies in the attachment site of subject-oriented, as opposed to object-oriented, secondary predicates. Since Williams 1980, it has been assumed that subject-oriented secondary predicates are attached higher than object-oriented ones (see also Rothstein 1983, Demonte 1987, McNulty 1988, Nakajima 1990, Bowers 2001, and Janke & Neeleman 2012, a.o.). One observation supporting this conclusion is that object-oriented secondary predicates preferentially precede subject-oriented ones, as shown by the following examples from Carrier & Randall 1992 (coindexing is used to indicate the relation between a depictive and the associated DP).

- (31) a. John₁ sketched [the model]₂ [nude]₂ [drunk as a skunk]₂.
 b. John₁ sketched [the model]₂ [nude]₂ [drunk as a skunk]₁.
 c. John₁ sketched [the model]₂ [nude]₁ [drunk as a skunk]₁.
 d. *John₁ sketched [the model]₂ [nude]₁ [drunk as a skunk]₂.

Of course, the exact attachment sites depend on one's theory of clause structure. We assume (following Janke & Neeleman 2012) that while object-oriented secondary predicates are attached VP-internally, as in the shell structure in 32a, subject-oriented secondary predicates are (typically) adjoined to VP, as in 32b.

- (32) a. DP₁ V [_{VP} DP₂ [_{tV} XP₂]] (transitive construction; object-oriented predicate)
 b. DP₁ [_{VP} [_{VP} V DP₂] XP₁] (transitive construction; subject-oriented depictive)

Why should secondary predicates behave in this way? For concreteness' sake, we will formulate our answer in terms of Williams' (1980) theory of predication, although other implementations

are possible. Williams argues that a predicate must be c-commanded by the argument it is associated with. Hence, object-oriented secondary predicates must be attached VP-internally, in a position c-commanded by the object, while subject-oriented secondary predicates can in principle be attached either to VP or VP-internally – in both cases they are c-commanded by the subject. Why, then, are subject-oriented secondary predicates attached to VP? The answer lies in a second constraint on predication, which Williams dubs *c-subjacency*. We assume, adjusting Williams' formulation, that c-subjacency is violated if a maximal projection dominates a secondary predicate but not the associated argument. This militates against VP-internal attachment of a subject-oriented predicate.

Recall from section 2.2 that elements within VP allow extraction more easily than elements outside VP. Hence, one would expect that it is easier to extract from an object-oriented secondary predicate than it is from a secondary predicate associated with the subject of an unergative or transitive verb. The strength of the effect depends on the status of c-subjacency and the influence of attachment height.

We propose that c-subjacency expresses a preference, rather than an absolute requirement, so that subject-oriented secondary predicates can be attached VP-internally, but at the cost of reduced acceptability. We further propose that the influence of attachment height is absolute: only adjuncts attached within VP are transparent. The implication is that object-oriented secondary predicates allow argument extraction as a matter of course. By contrast, subject-oriented depictives do not allow extraction in their preferred attachment site but do if they are attached VP-internally. Because such low attachment is dispreferred, however, extraction from a subject-oriented predicate incurs a penalty that goes beyond the general markedness of extraction from a selective island. Consequently, extraction from subject-oriented depictives does not have the same status as extraction from strong islands (as it does not violate a strong island constraint), but it is predicted to be worse than extraction from object-oriented depictives and other low adjuncts (as it requires a violation of c-subjacency).

It has been claimed that extraction from subject-oriented secondary predicates is indeed worse than extraction from object-oriented secondary predicates (see e.g. Borgonovo & Neeleman 2000). Relevant judgments are subtle but have been confirmed experimentally in Brown 2017.⁸

What has not been explored, to the best of our knowledge, is whether extraction from subject-oriented secondary predicates requires VP-internal attachment. One way to test this is to make use of *do so* substitution. While a secondary predicate can normally be attached VP-internally, this is not the case when *so* replaces VP. Hence, any secondary predicates that survive *do so* substitution must be attached to VP or higher. This predicts that, while Bernadette's reply in 33a is (marginally) acceptable, the answer in 33b should be much worse. In 33a the secondary predicate can be attached VP-internally and hence it permits extraction (at the cost of a c-subjacency violation), while in 33b the secondary predicate cannot be attached VP-internally and hence is a strong island. This prediction appears correct, supporting our account, although further exploration of this issue remains necessary.⁹

- (33) [*Anthony*: John drove Mary crazy talking about etiquette, and Bill did so talking about something similarly trivial.]
- a. *Bernadette*: Oh. (?)What did Bill drive Mary crazy talking about?
- b. *Bernadette*: Oh. *What did Bill do so talking about?

Let us now turn to the predicate effect. Note that when the object and the subject have the same interpretation, as in unaccusative and reflexive constructions, it is possible for an apparently subject-oriented secondary predicate to in fact be object-oriented, and hence be attached VP-internally without violating c-subjacency. Consider the schemes in 34.

- (34)a. $DP_1 V [_{VP} t_1 [t_V XP_1]]$ (unaccusative construction, VP-internal predicate)
- b. $DP_1 V [_{VP} REFL_1 [t_V XP_1]]$ (reflexive construction, VP-internal predicate)

Here, the secondary predicate XP is attached within VP and formally associated with the object. However, since the object is a trace or a reflexive bound by the subject, the depictive is still subject-oriented in its interpretation. In other words, unaccusativity and reflexivity make it possible for a subject-oriented secondary predicate to be merged in a low position without penalty, rendering it as transparent for argument extraction as other low adjuncts.

We suggest that this lies behind the predicate effect observed in experiments IA and IB.

The purpose clauses in experiment IA are subject-oriented, as are the apparent right conjuncts in experiment IB. Hence, when the predicate is transitive, VP-internal attachment, which is necessary for extraction, comes at the cost of a c-subjacency violation. However, when the predicate is a motion verb, the purpose clauses in experiment IA and the apparent right conjuncts in experiment IB can be attached VP-internally without penalty, because motion verbs accompanied by a directional modifier project an unaccusative VP. Therefore, motion verbs facilitate, and transitive verbs impede, extraction in both experiments.

At this point, one may ask whether the pattern found with purpose clauses (and type A coordination) is predicted to extend to other adjuncts. Our account is based on the notion that adjuncts that are adjoined within VP allow extraction more easily than adjuncts attached to VP or higher. Which adjuncts can be attached where is presumably partly determined by their semantics. For example, manner adverbials are attached lower than time adverbials, so it is more likely that a language allow extraction from manner adverbials than that it allows extraction from time adverbials. However, it is not a given that all languages impose the same conditions on the attachment sites of the various classes of adverbials, so it is a matter of empirical research where the cut-off point lies in any given language, including English. What is excluded, however, is a language that allows extraction from high but not low adverbials.

The predicate effect is not predicted to be found with all types of adjuncts. Our proposal implies that it should only arise with secondary predicates (and perhaps other adverbs that have a subject-oriented or an object-oriented reading). By contrast, extraction from adverbs that describe properties of the event, rather than properties of its participants, should be insensitive to the transitivity of the main predicate.

AN UNEXPECTED PREDICATE EFFECT.

Interestingly, our results showed a broader predicate effect than expected. In both experiment IA and experiment IB, the unaccusativity of the predicate in the left domain affected extraction not only from the right domain, but also from the left domain itself. Thus, in type A coordination an unaccusative predicate in the first conjunct facilitated extraction from that conjunct (as compared to a transitive verb). Likewise, extraction from the main clause VP in experiment IB was easier if that VP was headed by an unaccusative predicate.

The effect may partly result from a systematic contrast in extraction sites. In both experiments, extraction from the left domain targeted the object of a verb when the predicate was transitive and the complement of a preposition when the predicate was unaccusative. It may well be that preposition stranding makes gap finding easier for the parser, so that scores end up higher in the unaccusative condition. (Note that this leaves unaffected the contrast observed in the right domain, where the extracted category was always the object of a verb).

This explanation cannot be the whole story, though. This is because the improvement observed in type A coordination was much larger than that observed in structures with purpose clauses. In other words, in the transitive verb condition, extraction from the left conjunct in Type A coordination was much more degraded than extraction from the matrix clause in purpose clause constructions (compare figures 1 and 2). Why should this be? Our conjecture is that the contrast originates in the fact that type A coordination competes in parsing with regular coordination, while there is no comparable competing parse in structures with purpose clauses. This competition leads to lower scores when extraction is from the left domain and the predicate in the first conjunct is transitive, as we will now explain.

In general, the CSC has the consequence that a deactivated filler must be reactivated when the parser encounters a coordinator (for evidence for this effect, see Wagers & Phillips 2009 and Kim et al. 2020). In an example like *Which movie did Zoilo describe t as a masterpiece and Ava characterize t as sentimental?*, the parser inserts a trace bound by the *wh*-filler after encountering *describe*. This then leads to deactivation of the filler. However, the filler must be reactivated once *and* is parsed, because in a regular coordinate structure a trace must also be inserted in the second conjunct.

It is likely that type A coordinate structures are often initially analyzed as regular coordinations. If so, the sequence of operations just described will be triggered when an element is extracted from the initial VP, inevitably leading to backtracking if it turns out that there is no plausible insertion site for a trace in the right conjunct.

A leading idea in the literature on parsing is that misanalyzed ambiguities lead to a process of repair of the initial parse (see Fujita 2021 for recent discussion and references). In such a model, diagnosis of the problem with the initial parse plays a central role (see Fodor & Inoue 1994 and subsequent work). We speculate that it is easier to determine what went wrong if

there is a nonisomorphic alternative to the incorrect initial parse (so that an attachment error can be identified). Note that adjunction of a constituent *to* VP is isomorphic to coordination of that constituent with VP, but attachment *within* VP is not.

It is here that the nature of the predicate in the first conjunct becomes relevant. If that predicate is unaccusative, a straightforward alternative attachment site is available for the second conjunct, namely as a VP-internal adjunct (see 34a). This makes diagnosis of the problem with the initial parse relatively simple: the apparent second conjunct is attached in the wrong position. By contrast, if the verb in the first conjunct is transitive, VP-internal attachment of the second conjunct violates c-subjacency and hence it is less easy for the parser to access this structurally distinct alternative analysis. If diagnosis indeed is easier when an attachment error can be identified, it follows that a more serious backtracking effect ensues with transitive predicates, leading to lower experimental scores.

4. MORE ON THE PREDICATE EFFECT

4.1 EXPERIMENTS IIA AND IIB

In the previous section, we identified the choice of verb in the *left* domain as one of the factors that influence the acceptability of extraction from the *right* domain in both type A coordination and in structures containing purpose clauses. Unaccusative main verbs generally facilitate extraction from adjuncts. In line with this, motion verbs accompanied by a directional modifier facilitate extraction in both kinds of structure.

However, motion verbs are not the only predicates that are unaccusative and naturally fit the interpretation of type A coordination. A second relevant verb class consists of posture verbs accompanied by a directional particle (e.g. *sit down* on its change-of-state interpretation). Such change-of-posture verbs are unaccusative (Levin & Rappaport Hovav 1995), and it has been claimed that they permit formation of type A coordinate structures (De Vos 2005, 2009 and Weisser 2015; see also Lakoff 1986 and Deane 1991). If so, posture verbs pattern with motion verbs, rather than with transitives, which we found in experiment IA inhibit extraction from type A coordinate structures.

We made use of this additional verb class in the design of experiments IIA and IIB. In

experiment IIA, we manipulated the class of verb in the left conjunct of a type A coordination and tested the acceptability of argument extraction from the right conjunct. Thus, VERB CLASS was a within-subject factor with three values (motion, posture, and transitive). Experiment IIB had a parallel design. We manipulated the class of verb in the main clause and tested the acceptability of argument extraction from a purpose clause introduced by *in order to*. Each test item in experiment IIA constituted a minimal pair with its counterpart in Experiment IIB. As in our earlier experiments, each test item was preceded by a short context. We give sample test items in 35 and 36.

(35) Experiment IIA

- a. [*John hurried to the airport in order to welcome the guest from Berlin.*]
What guest did John hurry to the airport and welcome? (motion)
- b. [*John stood up in order to welcome the guest from Berlin.*]
What guest did John stand up and welcome? (posture)
- c. [*John opened the car door in order to welcome the guest from Berlin.*]
What guest did John open the car door and welcome? (transitive)

(36) Experiment IIB

- a. [*John hurried to the airport in order to welcome the guest from Berlin.*]
What guest did John hurry to the airport in order to welcome? (motion)
- b. [*John stood up in order to welcome the guest from Berlin.*]
What guest did John stand up in order to welcome? (posture)
- c. [*John opened the car door in order to welcome the guest from Berlin.*]
What guest did John open the car door in order to welcome? (transitive)

In each experiment, there were thirty-six test items in total (12 sets × 3 conditions). These were distributed across three lists in a Latin Square fashion. In each list, the test items were combined with four practice items and twenty-four fillers (identical to those used in Experiment IA). All nonpractice items were pseudorandomized per participant.

We expected to find, in experiment IIA, that *motion verbs and posture verbs (as compared to transitives) facilitate extraction from the second conjunct in type A coordination* (PREDICTION 4). Similarly, in experiment IIB, we expected to find that *motion verbs and posture*

verbs (as compared to transitives) facilitate extraction from purpose clauses (PREDICTION 4'). Note that prediction 4 follows De Vos's (2005, 2009) claim that if the left conjunct is headed by a motion verb or a posture verb with a PP or a particle, scene-setting coordination (\approx type A coordination) yields selective island effects, unlike contiguous coordination. Finally, our analysis also predicts a highly positive correlation between extraction from adjuncts in experiment IIB and extraction from the second conjunct in type A coordination in experiment IIA (PREDICTION 5). The reason for this should be familiar: purpose clauses are the closest adverbial correlate to type A coordination and should therefore display similar island behavior.

The results were largely as expected. To begin with, the mean acceptability per item of extraction from purpose clauses in experiment IIB and extraction from the right conjunct in type A coordination in experiment IIA showed a strong positive correlation ($r = 0.821$). About 67% of the variance in the acceptability of extraction from Type A coordination can be accounted for based on the acceptability of extraction from purpose clauses ($r^2 = 0.6652$).

This correlation is highly significant ($t = 8.399$, $df = 34$, $p < .001$). Thus, the acceptability of extraction from a purpose clause is a good predictor of the acceptability of extraction from the second conjunct in a counterpart type A coordination.

<INSERT FIGURE 4 ABOUT HERE>

The strong positive correlation depicted in figure 4 would lead one to expect that extraction patterns from purpose clauses and type A coordination should mirror each other in detail. To see whether this is the case, we consider the results of experiments IIA and IIB in more detail, starting with the former.

A linear mixed effects model was fitted to the results of experiment IIA with VERB CLASS as a fixed effect predictor. The model revealed that extraction from the right conjunct of a Type A coordination was easier when the left conjunct was headed by a motion verb (Estimate = 0.32, SE = 0.06, $t = 4.78$, $p < .001$) or a posture verb (Estimate = 0.57, SE = 0.06, $t = 8.80$, $p < .001$), as opposed to a regular transitive verb.

<INSERT FIGURE 5 ABOUT HERE>

A post-hoc Tukey test revealed significant differences in all pair-wise comparisons ($p < .001$), which indicates that while both motion and posture verbs facilitated extraction, there was a significant difference between them: items with posture verbs were on average rated higher than items with motion verbs (Estimate = 0.25, SE = 0.05, $t = 4.33$, $p < .001$).

A linear mixed effects model was also fitted to the results of experiment IIB with VERB CLASS as a fixed effect predictor. The model revealed that extraction from purpose clauses was easier when the matrix VP was headed by a motion verb (Estimate = 0.32, SE = 0.07, $t = 4.35$, $p < .001$) or a posture verb (Estimate = 0.38, SE = 0.06, $t = 6.16$, $p < .001$), rather than a regular transitive verb.

<INSERT FIGURE 6 ABOUT HERE>

A post-hoc Tukey test displayed that there were significant differences between (i) motion verbs and nonmotion transitives ($p < .001$) and (ii) posture verbs and nonmotion transitives ($p < .001$). However, there was no significant difference between motion verbs and posture verbs (Estimate = -0.05 , SE = 0.06, $t = -0.86$, $p > .6$).

Both these verb classes facilitated extraction from adjuncts to the same degree, whereas nonmotion transitives did not.

These findings confirm all predictions tested. In both experiment IIA and experiment IIB we find that extraction from the right-hand domain is easier when the verb that heads the left-hand domain is not a transitive verb, but rather a motion verb accompanied by a directional modifier or a posture verb (predictions 4 and 4'). This explains the high positive correlation between extraction from adjuncts and extraction from type A coordination (prediction 5).

There is, however, an unexpected wrinkle in the data. While motion verbs and posture verbs facilitated extraction from purpose clauses to the same degree, posture verbs had a greater impact on acceptability than motion verbs in type A coordination. Since both classes of verb are unaccusative, why should there be such a contrast?

We suggest that the explanation might lie in the existence of so-called contiguous coordination, a structure similar to, but distinct from, type A coordination. An example of contiguous coordination is given in 37.

(37) Amara sat and read a book.

As mentioned in section 1, contiguous coordination is different from type A coordination in at least two respects. First, it does not necessarily have the sequence-of-events reading typical of type A coordination. Second, it does not create selective islands in the way that type A coordination does. We are not able to give an analysis of contiguous coordination here, except to say that the apparent right conjunct may be a selected clause rather than an adjunct. The crucial point for our current purposes is that contiguous coordination is a less likely analysis, as compared to type A coordination, if the left conjunct contains more material. Wiklund (2007) shows, for example, that extraction from Swedish coordinate structures yields selective island effects if a posture verb in the left conjunct is accompanied by a directional PP. Apparently, the presence of the PP blocks an analysis of 38a as involving contiguous coordination, leaving type A coordination as the only option. Similarly, contiguous coordination is not possible with a motion verb that is accompanied by a directional PP, as 38b shows.

(38)a. Hur satte han sig (??på stolen) o [sjöng t]? (Wiklund 2007: 144)
how sit:DIR.PAST he REFL (on chair.DEF) and sing.PAST

‘How did he sit down on the chair and sing?’

b. ??Hur högt gick John till stan o [sjöng t]? (Wiklund 2007: 106)
how loudly go.PAST John to town.DEF and sing.PAST

‘How loudly did John go to town and sing?’

In experiment IIA, the test items with motion verbs contained a goal PP (as in *travel to New York*), while posture verbs were typically accompanied by a particle. The design of the experiment was based on De Vos’s (2005, 2009) claim that this is enough to ensure that we are dealing with what he calls scene-setting coordination (\approx type A coordination). However, Wiklund argues that in English, like in Swedish, a full directional PP must be included in the first conjunct to rule out contiguous coordination. It is therefore possible that some of our participants treated some of the items with posture verbs as contiguous coordination, rather than type A coordination. This would have resulted in higher average scores.

To test whether this hypothesis explains the slight discordance between experiments IIA and IIB, we conducted a follow-up study to experiment IIA. We reran the acceptability

judgement task after revising the test items to make sure that both posture and motion verbs were accompanied by a goal PP. We report the results in section 4.2.

4.2 EXPERIMENT III

In our follow-up study, we re-examined the predictions tested in experiment IIA, namely that compared to transitives, motion verbs and posture verbs should facilitate extraction from type A coordinate structures (prediction 4). As both verb classes are unaccusative, there is no reason to expect a contrast in the degree to which motion verbs and posture verbs facilitate extraction. Thus, the results should exhibit the same pattern as found with extraction from purpose clauses in Experiment IIB: posture \approx motion > transitive.

VERB CLASS was manipulated as a within-subject factor with three values (posture, motion, and nonmotion transitive), so that there were three conditions. We give a sample test item for each condition in 39. As in the previous experiments, each test item was preceded by a short context consisting of an assertive variant of the test item with the second conjunct replaced by a purpose clause. Most items were recycled from Experiment IIA. However, like motion verbs, posture verbs were accompanied by a directional PPs, as in 39a,b. This was to remove the possibility of contiguous coordination.

- (39) a. [*Sally came to our office in order to sign the contract.*]
 What contract did Sally come to our office and sign? (motion)
- b. [*Sally sat down on her chair in order to sign the contract.*]
 What contract did Sally sit down on her chair and sign? (posture)
- c. [*Sally grabbed a pen in order to sign the contract.*]
 What contract did Sally grab a pen and sign? (transitive)

We created twelve sets of test items, and so there were thirty-six test items in total (twelve sets \times three conditions). The test had a Latin square design, with test items distributed across three lists. In each list, the test items were combined with four practice items and twenty-four fillers. Nonpractice items were pseudorandomized per participant.

A linear mixed effects model was fitted to the results of experiment III with VERB CLASS

as a fixed effect predictor. As expected, the linear mixed effects model revealed a main effect of VERB CLASS. As shown in Figure 7, in comparison with nonmotion transitive verbs, both posture verbs and motion verbs aided extraction from the right conjunct in Type A coordination (posture: Estimate = 0.29, SE = 0.05, $t = 5.34$, $p < .001$; motion: Estimate = 0.26, SE = 0.05, $t = 4.65$, $p < .001$).

<INSERT FIGURE 7 ABOUT HERE>

A post-hoc Tukey test revealed that there were significant differences in acceptability between (i) the motion and transitive conditions ($p < .001$) and (ii) the posture and transitive conditions ($p < .001$). However, there was no significant difference between the motion and posture conditions (Estimate = -0.02 , SE = 0.05, $t = -0.05$, $p > .8$).

The results of experiment III, our follow-up study, match the results of Experiment IIB. Extraction from the right conjunct in Type A coordination and extraction from purpose clauses exhibit the same pattern: Posture \approx Motion $>$ Nonmotion Transitive. In both structures, the two types of unaccusative verb facilitated extraction to the same degree, as expected. Thus, the wrinkle in the data observed when we compared the results of experiments IIA and IIB disappears when posture verbs are accompanied by a directional PP, in line with Wiklund's (2007) claim that posture verbs accompanied by just a particle permit contiguous coordination, but posture verbs accompanied by a directional PP do not.

These findings suggest that the correlation between extraction from type A coordination and extraction from purpose clauses is even stronger in reality than as measured using the results of experiments IIA and IIB.

5. THE EXTRACTED CATEGORY EFFECT

5.1 EXPERIMENTS IVA AND IVB

As discussed in section 2.2, VP-internal adjuncts in English are selective islands: they impose a small penalty on argument extraction and block extraction of adverbials and other adjuncts altogether. This property is used in experiment IVA to further test the hypothesis that the right

conjunct in type A coordination is in fact an adjunct. On this hypothesis, we expect to the right conjunct to exhibit selective island effects: *the right conjunct in type A coordination should marginally allow extraction of arguments, but not allow extraction of adjuncts at all* (PREDICTION 6). In contrast to this, we expect that *the left conjunct in type A coordination should freely permit extraction of adjuncts as well as arguments* (PREDICTION 7). After all, if the right conjunct is an adjunct, then the left conjunct must be the matrix predicate. While adjunct extraction from adjuncts is impossible, both adjunct and argument extraction from the main predicate should be unproblematic. Taken together, predictions 6 and 7 yield two contrasts: (i) extraction from the right conjunct should be worse than extraction from the left conjunct (compare prediction 2 in section 3.2), and (ii) the effect of the extraction site should be much sharper for adjuncts than for arguments.

As before, the behavior of type A coordination should be mirrored by that of structures containing purpose clauses (given that purpose clauses are the closest adverbial correlate to type A coordination). We therefore ran a parallel experiment on such structures (experiment IVB), with items that form minimal pairs with their counterparts in experiment IVA. We tested two predictions. First, *a purpose clause should marginally allow extraction of arguments, but not allow extraction of adjuncts at all* (PREDICTION 6'). Second, *the VP in which the purpose clause appears should freely permit extraction of adjuncts as well as arguments* (PREDICTION 7'). In other words, (i) extraction from purpose clauses should be worse than extraction from main predicate (compare prediction 2'), and (ii) the effect of the extraction site should be much sharper for adjuncts than for arguments.

We summarize the effects of predictions 6-7' in Table 1, where the columns indicate extraction sites and the rows extracted categories. In addition to these predictions, the adjunction analysis leads us to expect a highly positive correlation between the results of experiments IVA and IVB (PREDICTION 8).

<INSERT TABLE 1 HERE>

It is important to note that some of these predictions go against received wisdom in the literature, which has it that extraction from the left conjunct in type A coordination is *harder* than

extraction from the right conjunct (see, for instance, Deane 1991, Na & Huck 1992, and Weisser 2015).

Experiment IVA had a 2×2 factorial design in which we manipulated two factors: CONJUNCT (left vs. right) and EXTRACTED CATEGORY (argument vs. adjunct). Similarly, Experiment IVB had a 2×2 factorial design in which we manipulated GAP POSITION (matrix clause vs. purpose clause) and EXTRACTED CATEGORY (argument vs. adjunct). Manipulating these factors allowed us to test the predictions in Table 1, namely (i) whether in the two constructions under consideration extraction of both arguments and adjuncts from the right domain is harder than extraction of these categories from the left domain, (ii) whether adjunct extraction from the right domain is harder than argument extraction, and (iii) whether, by contrast, there is no significant difference between the acceptability of adjunct extraction and argument extraction from the left domain.

Given this design, each experiment had four conditions. A sample set of test items is given in 40 (for Experiment IVA) and in 41 (for Experiment IVB). In each test item, the left domain was headed by a motion verb accompanied by a directional PP (recall that such combinations are unaccusative, which facilitates extraction). As in the other experiments, test items were preceded by a short context to make sure that participants construed the items as intended.

(40) [*Ali travelled to Kinshasa on a jumbo jet in order to defeat the heavyweight champion with a well-timed right hook.*]

- a. Ken knew the city which Ali travelled to on a jumbo jet and defeated the heavyweight champion. (Left | Argument)
- b. Ken saw the jumbo jet on which Ali travelled to Kinshasa and defeated the heavyweight champion. (Left | Adjunct)
- c. Ken knew the heavyweight champion who Ali travelled to Kinshasa and defeated with a well-timed right hook. (Right | Argument)
- d. Ken noticed the well-timed right hook with which Ali travelled to Kinshasa and defeated the heavyweight champion. (Right | Adjunct)

(41) [*Ali travelled to Kinshasa on a jumbo jet in order to defeat the heavyweight champion with a well-timed right hook.*]

- a. Ken knew the city which Ali travelled to on a jumbo jet in order to defeat the heavyweight champion. (Matrix | Argument)
- b. Ken saw the jumbo jet on which Ali travelled to Kinshasa in order to defeat the heavyweight champion. (Matrix | Adjunct)
- c. Ken knew the heavyweight champion who Ali travelled to Kinshasa in order to defeat with a well-timed right hook. (Purpose | Argument)
- d. Ken noticed the well-timed right hook with which Ali travelled to Kinshasa in order to defeat the heavyweight champion. (Purpose | Adjunct)

For a variety of reasons, we created sentences derived by relative clause formation rather than *wh*-extraction. (For instance, in several items *wh*-extraction would have been pragmatically deviant, while relativization yielded perfectly natural results).

The choice of adjuncts was a challenge in the design of the test items, as we needed to make sure that their attachment site was unambiguous. For this reason, we steered away from regular locational PPs, and instead used what Maienborn (2001, 2003) calls event-internal modifiers. These often look like locative PPs but are distinct in their semantics. Take an example like *Lian rode around on a bike in London*. The *in*-PP is a regular locational expression: it places the riding event in London. The *on*-PP, which is an event-internal modifier, cannot be understood in the same way, given that it is the rider, rather than the riding event that is located on a bike. This gives the *on*-PP a manner-like or instrumental-like flavor. (Note that the *on*-PP can answer the question *How did Lian ride around in London?*, but not the question *Where did Lian ride around in London?*)

The use of event-internal modifiers made it relatively straightforward to design unambiguous test items. In 40 and 41, for example, the two adjunct PPs *on a jumbo jet* and *with a well-timed right hook* have interpretations that exclude alternative attachment sites. An additional benefit of this restriction to event-internal modifiers was that all adjunct extractions involved the same type of modifier, thus preventing unwanted interference of potential contrasts in extractability across modifier classes.

As shown in 40a,c and 41a,c, we included an adjunct PP in each conjunct from which an argument was extracted. This was to make sure that examples with argument extraction and adjunct extraction from a given conjunct were equally complex. However, we omitted adjunct PPs in the conjunct unaffected by extraction to reduce unnecessary processing costs.

For each experiment, we created twelve sets of test items, so that there were forty-eight test items in total (twelve sets \times four conditions). These test items were distributed across four lists in a Latin Square fashion. The lists also contained four practice items and twenty-four fillers. Nonpractice items were pseudorandomized per participant. The fillers and practice items were the relative clause counterparts of those used in Experiments IA and IB.

A linear mixed effects model was fitted to the results of experiment IVA, with CONJUNCT, EXTRACTED CATEGORY and their interaction as fixed effect predictors.

The model revealed a main effect of CONJUNCT (Estimate = 0.86, SE = 0.08, $t = 10.715$, $p < .001$), reflecting the fact that extraction from the left conjunct scored much higher than extraction from the right conjunct both in the adjunct extraction condition (Estimate = 0.86, SE = 0.08, $t = 10.71$, $p < .001$) and the argument extraction condition (Estimate = 0.23, SE = 0.07, $t = 2.92$, $p < .01$).

<INSERT FIGURE 8 ABOUT HERE>

EXTRACTED CATEGORY did not have a significant effect (Estimate = -0.10 , SE = 0.06, $t = -1.576$, $p > .1$). However, there was a highly significant interaction between CONJUNCT and EXTRACTED CATEGORY (Estimate = 0.62, SE = 0.11, $t = 5.70$, $p < .001$) due to the fact that in the right conjunct condition, adjunct extraction scored much lower than argument extraction (Estimate = -0.52 , SE = 0.08, $t = -6.06$, $p < .001$), while in the left conjunct condition, there was no significant difference in the acceptability of argument and adjunct extraction (Estimate = 0.10, SE = 0.06, $t = 1.57$, $p > .1$).

A linear mixed effects model was also fitted to the results of experiment IVB, with GAP POSITION, EXTRACTED CATEGORY and their interaction as fixed effect predictors.

The model revealed a main effect of GAP POSITION (Estimate = 1.19, SE = 0.07, $t = 15.506$, $p < .001$). This reflects the fact that extraction from the matrix clause scored much higher

than extraction from a purpose clause both in in the adjunct extraction condition (Estimate = 1.19, SE = 0.07, $t = 15.50$, $p < .001$) and the argument extraction condition (Estimate = 0.70, SE = 0.07, $t = 9.14$, $p < .001$).

<INSERT FIGURE 9 ABOUT HERE>

EXTRACTED CATEGORY again did not have a significant effect (Estimate = 0.03, SE = 0.07, $t = 0.43$, $p > .6$). However, there was a highly significant interaction between GAP POSITION and EXTRACTED CATEGORY (Estimate = 0.48, SE = 0.08, $t = 5.61$, $p < .001$). This is because in the purpose clause condition, adjunct extraction scored much lower than argument extraction (Estimate = -0.51 , SE = 0.07, $t = -7.25$, $p < .001$), while in the matrix clause condition, there was no significant difference in the acceptability of argument and adjunct extraction (Estimate = -0.03 , SE = 0.07, $t = -0.43$, $p > .6$).

We also compared the results of the two experiments. The acceptability of extraction from Type A coordination constructions and from purpose clause constructions showed a highly positive correlation ($\tau = 0.5921986$). About 70% of the variance of the acceptability of extraction from Type A coordination can be explained based on the acceptability of extraction from purpose clauses ($r^2 = 0.7078$). This positive correlation is highly significant ($t = 10.556$, $df = 46$, $p < 0.001$).

<INSERT FIGURE 10 ABOUT HERE>

The highly significant correlation between the results of Experiment IVA and IVB confirms our hypothesis that the right conjunct in Type A coordination is an adjunct (prediction 8). As per predictions 6 and 6', adjunct extraction from the right domain in the structures under consideration scored much lower than argument extraction. As per predictions 7 and 7', adjunct and argument extraction from the left domain did not differ in acceptability. Finally, as implied by predictions 6 and 7 and prediction 6' and 7', argument extraction from the left domain was more acceptable than argument extraction from the right domain.

These outcomes provide further support for our main hypothesis. Like purpose clauses,

the right conjunct of a type A coordination gives rise to selective island effects. By contrast, extraction from the left conjunct is like extraction from a matrix predicate.

5.2 EXPERIMENT V

Our interpretation of the data generated in experiments IVA and IVB is based on the notion that in English VP-internal adjuncts are selective islands: they block extraction of adjuncts, but marginally permit extraction of arguments. The effect could be observed in experiment IVB (purpose clauses are generally taken to be adjuncts) and was used as a diagnostic in the analysis of the results of experiment IVA (difficulties with the extraction of adjuncts shows that the right conjunct in type A coordination is itself an adjunct).

However, there is a potential alternative explanation of the data. It is well known that in acceptability judgment experiments length of movement is inversely correlated with acceptability: longer movements lead to lower scores, even in structures that are arguably grammatical (see Sprouse et al. 2013, 2016 and Kush et al. 2018, among others). This effect presumably has its origin in the computational load associated with parsing movement dependencies. Now, it is conceivable that this effect is stronger for extraction of adjuncts than it is for extraction of arguments. If so, the results of experiments IVA and IVB could simply be attributed to the fact that extraction from the left conjunct constitutes a shorter movement than extraction from the right conjunct. The effect would be there for both arguments and adjuncts but would be stronger for the latter. If this take on the data were to hold water, the case for the selective islandhood of the second conjunct in a type A coordination would be weakened considerably.

Given this alternative explanation, we decided to run a final experiment to test whether the length effect is indeed stronger for adjuncts than for arguments, using clause-internal movement versus movement that crosses a nonisland clausal boundary. Our argumentation so far is premised on the assumption that the length effect does not discriminate between arguments and adjuncts (instead the contrast observed in experiments IVA and IVB is attributed to the selective islandhood of the right domain). Thus, our expectations can be summarized as follows. First, *both argument and adjunct extraction are more degraded when they cross a clause boundary than when they do not* (PREDICTION 9). Second, *nonisland clausal boundaries reduce*

the acceptability of adjunct and argument extraction to the same degree (PREDICTION 10). If these predictions are correct, the island effect in experiments IVA and IVB must be real. The argument-adjunct asymmetry we observed in those experiments cannot be attributed to the general effect of length of extraction if the latter is insensitive to extraction type to begin with (this argument takes its cue from arguments advanced by Sprouse and collaborators).

The experiment had a 2×2 factorial design in which we manipulated two factors: LENGTH (short clause-internal movement vs. long cross-clausal movement) and EXTRACTED CATEGORY (argument vs. adjunct). Manipulating these factors allowed us to test whether both adjunct and argument extraction display a length effect and whether that effect is similar in strength for adjuncts and for arguments.

Given the factorial design of the experiment, there were four conditions. A sample set of test items is given in 42. Test items were created on the basis of the items used in Experiments IVA and IVB, but we used cleft constructions rather than relative clause constructions in this experiment (compare 42 with 40 and 41). This allowed us to embed the short cleft constructions in such a way that the overall complexity of the long-movement and short-movement items was identical (compare 42a and 42c with 42b and 42d).

(42)[Ali defeated the heavyweight champion with a well-timed right hook.]

- a. Kim said that it was the heavyweight champion that Ali defeated with a well-timed right hook. (Short | Argument)
- b. It was the heavyweight champion that Kim said that Ali defeated with a well-timed right hook. (Long | Argument)
- c. Kim said that it was with a well-timed right hook that Ali defeated the heavyweight champion. (Short | Adjunct)
- d. It was with a well-timed right hook that Kim said that Ali defeated the heavyweight champion. (Long | Adjunct)

We created twelve sets of test items, so there were forty-eight test items in total (twelve sets × four conditions). These test items were distributed across four lists in a Latin Square fashion. Each list also contained four practice items and twenty-four fillers. Nonpractice items were

pseudorandomized per participant. Almost all the fillers and practice items were the cleft counterparts of those used in Experiment IVA and IVB.

A linear mixed effects model was fitted to the results of the experiment, with LENGTH, EXTRACTED CATEGORY, and their interaction as fixed effect predictors. The model showed a significant main effect of LENGTH (Estimate = -0.39 , SE = 0.07 , $t = -5.58$, $p < .001$). This suggests that the presence of an embedded clause boundary inhibited the movement required for cleft formation in both the argument and adjunct extraction conditions (argument: Estimate = -0.39 , SE = 0.07 , $t = -5.58$, $p < .001$; adjunct: Estimate = -0.45 , SE = 0.07 , $t = -6.31$, $p < .001$).

<INSERT FIGURE 11 ABOUT HERE>

The effect of EXTRACTED CATEGORY was marginal (Estimate = 0.11 , SE = 0.06 , $t = 1.96$, $p < .1$). While this marginal effect suggests that adjunct cleft formation is slightly easier than argument cleft formation, it did not reach the threshold of significance.

We did not observe an interaction between the two factors (Estimate = -0.05 , SE = 0.08 , $t = -0.65$, $p > .5$). The lack of such an interaction suggests that embedded clause boundaries reduce the acceptability of argument and adjunct extraction to the same degree. Indeed, in the long movement condition there was no difference between the acceptability of argument and adjunct extraction (Estimate = -0.06 , SE = 0.06 , $t = -1.06$, $p > .2$).

The results of experiment V thus confirmed both prediction 9 and prediction 10. As per prediction 9, longer movements were rated lower than shorter movements. As per prediction 10, this length effect did not discriminate between extraction of adjuncts and extraction of arguments. This rules out the alternative account of the results of experiments IVA and IVB outlined at the onset of this section. The results of those experiments cannot be due to a stronger length effect with extraction of adjuncts, given that experiment V shows that there is no such effect to begin with. Therefore, the only remaining explanation for the results of experiments IVA and IVB is that the right extraction domains in these experiments (the right conjunct in experiment IVA and the purpose clause in experiment IVB) are selective islands. The parallel behavior of the two right domains follows if the right conjunct in type A coordination is an adjunct, just like purpose clauses are.

6. GENERAL DISCUSSION

We started this paper with the question whether exceptions to the CSC, in particular type A coordination, should be explained by assuming a structure distinct from regular coordination (thus maintaining the standard CSC) or by relying on their asymmetric interpretation (thus restricting the CSC's domain of application to symmetrically interpreted coordination). We dubbed the two approaches syntactic and interpretive accounts, respectively.

We approached this question through a series of web-based experiments which demonstrated that extraction from type A coordination is subject to the same restrictions as extraction from structures containing a purpose clause. These restrictions have to do with the extraction domain (in both cases, extraction from the left domain is easier than extraction from the right domain), with the category that is extracted (in both cases, argument extraction from the right domain is easier than adjunct extraction), and with the nature of the predicate in the left domain (in both cases, extraction is easier if that predicate is unaccusative, rather than transitive). Thus, our first claim was the following:

- A. There is an empirical parallel between extraction from structures containing purpose clauses and extraction from type A coordinate structures.

What could explain this empirical parallel? The interpretive accounts of type A coordination in Deane 1991, Na & Huck 1992, and Kehler 2002 predict that extraction from the *left* conjunct is harder than extraction from the *right* conjunct. The same is true of the syntactic accounts of type A coordination in De Vos 2005; 2009, Weisser 2015, and Bošković 2020. These proposals are therefore not compatible with our observation that in type A coordination it is the *right*, rather than the *left* conjunct that is a selective island. Therefore, they also do not provide a good basis for an explanation of our findings.

Truswell's (2011) well-known study on extraction from adjuncts refers to event structure to capture a variety of observations. However, even this semantically-informed proposal relies on the syntax to capture the observation that adjuncts are selective islands; that fact does not follow from the semantic conditions Truswell identifies. Hence, those semantic conditions can also not explain why in type A coordination the apparent right conjunct is a selective island. Thus, we are led to a second claim, namely that in type A coordination the apparent right conjunct is in fact an

adjunct, so that it has the same syntactic status as a purpose clause (a conclusion shared with Altshuler and Truswell 2022):

B. Like purpose clauses, the apparent right conjunct in a type A coordination is an adjunct.

While English allows extraction from adjuncts, not all adjuncts behave alike. One factor that plays a role is attachment height: transparent adjuncts are attached lower than intransparent ones. We have assumed that the cut-off point is between VP-internal adjuncts on the one hand and adjuncts adjoined to VP or higher on the other. We therefore claimed that in type A coordination the apparent right conjunct is attached within the apparent left conjunct, as in 25a, making use of this hypothesis in our account of the predicate effect in section 3.3.

C. Like transparent purpose clauses, the apparent right conjunct in a type A coordination is an adjunct attached VP-internally.

This is not the only logical possibility. Altshuler and Truswell (2022) assume, following Truswell 2011, that categories adjoined to VP can be transparent for extraction of arguments. This allows them to argue that type A coordination involves adjunction of the second conjunct *to*, rather than *within* the first conjunct. On their account, interpretive constraints would then have to capture the predicate effect observed in our experiments.

Let us now return to the question whether the acceptability of extraction from type A coordination should be explained by assuming a structure distinct from regular coordination (in line with the standard CSC) or by relying on its asymmetric interpretation (restricting the CSC to symmetric coordination). We consider this question in the light of claims A-C.

Claim C necessitates a syntactic account of type A coordination, that is, it leads to the conclusion that regular coordination and type A coordination are structurally distinct. This is because it states that in type A coordination the apparent right conjunct is adjoined within the matrix VP, whereas no account of regular coordination assumes that the right conjunct is attached within the left conjunct.

Claim B is in principle compatible with an interpretive account of type A coordination (if

conclusion C is rejected). Under an interpretive account, regular coordination and type A coordination are structurally identical and the differences between them with respect extraction are attributed to their distinct interpretations. Now, Munn (1993) proposes an analysis of regular coordination as rightward adjunction (see also Bošković & Franks 2000, Hartmann 2000, and Zhang 2010). Hence, if Munn is right, both regular VP coordination and type A coordination would involve adjunction of the right VP to the left VP (as in 25b), and an interpretive explanation would be required for CSC violations, as in Altshuler & Truswell 2022.

Acceptance of claim B under rejection of claim C is also compatible with a syntactic account of type A coordination, at least as far as the selective islandhood of adjuncts is concerned; the predicate effect would presumably need a semantic explanation along the lines of Truswell 2011. Given that Type A coordination would receive a Munn-style adjunction analysis, regular coordination must be assigned one of various competing analysis available in the literature (for references, see section 1).

The net result is that if claim C turns out to be incorrect, while claim B is confirmed, the choice is between a syntactic account in which type A coordination is adjunction and regular coordination is not, and an interpretive account in both type A coordination and regular coordination are adjunction structures (as suggested in Altshuler & Truswell 2022). Which account is closer to the truth must then be decided based on the properties of regular coordination. Either way, the data we have gathered substantially restrict analytical options.

If both claim B and claim C are rejected, so that type A coordination is not adjunction, the empirical parallel between it and structures with purpose clauses can presumably not be explained in syntactic terms. Instead, it will most likely require an explanation in terms of the shared semantic properties of the two structures. While such an explanation could be attractive in principle, it is unclear what it might consist of. As mentioned, existing purely interpretive accounts of type A coordination do not capture the results of our online experiments, which implies that they are also not suitable to explain the parallelism between type A coordination and structures containing purpose clauses. Conversely, there are – to the best of our knowledge – no purely interpretive accounts of adjunct islands. If so, there are also no semantic theories of this domain that one could try to expand to type A coordination. Therefore, a purely semantic account of the parallel mentioned in claim A must remain a promissory note.

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FOOTNOTES

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¹ The demarcation between good and bad extractees from selective islands is a matter of considerable debate (see Abrusán 2014 for discussion and references). The argument-adjunct distinction is a reasonable first approximation that suffices for the purposes of this paper.

² A reviewer points out that some languages distinguish accomplished from unaccomplished/unspecified purpose clauses (Hawaiian Creole is an example). It is therefore possible that type A coordination is the way Standard English realizes accomplished purpose clauses.

³ Kehler uses pronouns to plug the relevant gaps. This may introduce a confound, however, as these may be analyzed as resumptive pronouns by at least some speakers. Our questionnaire study confirmed that resumptive pronouns can marginally be used in coordinate structures like (i), and moreover that if pronouns are used to plug the gaps in 9, a pattern of judgments results that is similar to 12, but with elevated scores (see (ii)).

(i) ?This is the book that John read *t* numerous times and knows the woman who wrote *it*. (2.8)

(ii) ATB: 4; Gap 1 filled (pronoun): 2.25; Gap 2 filled (pronoun): 3; Gap 3 filled (pronoun): 3.17

⁴ The acceptability markings given in 21 and 22 are in line with the literature on extraction from adjuncts (see, for instance, Szabolcsi 2006), and reflect the judgments of five native speakers

(three native speakers of British English and two native speakers of North American English).

⁵ The acceptability markings given in 23 and 24 reflect the judgments of five native speakers (three native speakers of British English and two native speakers of North American English). The claim about extraction from purpose clauses is supported by the results of experiment IVB.

⁶ The minimal pairs in 26 were constructed by us. The acceptability markings given reflect the judgments of five native speakers (three native speakers of British English and two native speakers of North American English).

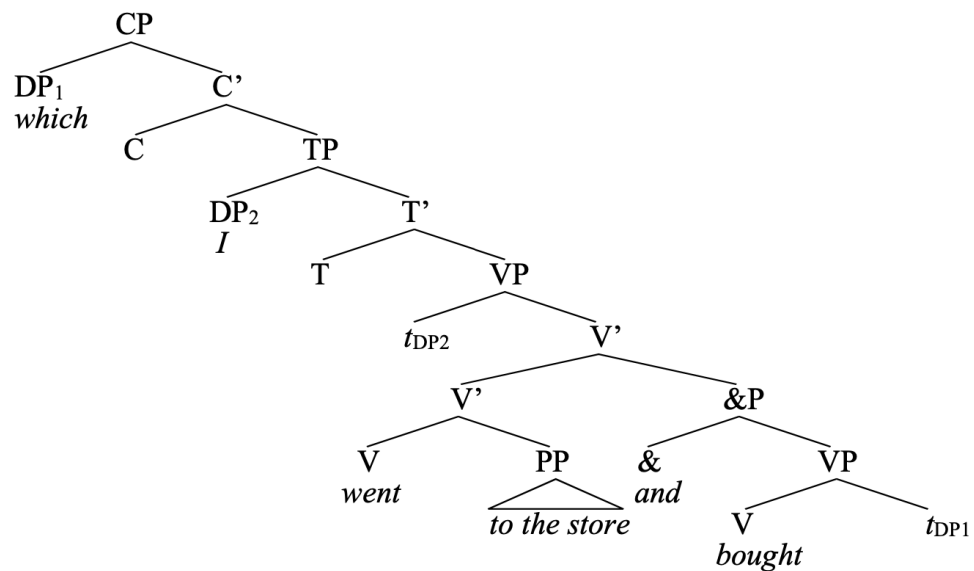
⁷ D-linking requires that the range of felicitous answers to a question is limited to a contextually salient set. It thus distinguishes between *which* questions (which are taken to be D-linked) and *what* questions (which are not). See Abrusán 2014 for critical discussion and references.

⁸ Interpretation clearly plays a role in the acceptability of extraction from subject-oriented secondary predicates. One factor that has been identified is causation: extraction is better if the secondary predicate describes an event that causes the event expressed by the main predicate, as in 33a below (see Truswell 2011 for discussion and Tanaka 2015, 2020 for experimental evidence). If the above is on the right track, such semantic factors should be understood as facilitating VP-internal attachment of a (subject-oriented) secondary predicate. The issue is too involved to discuss here.

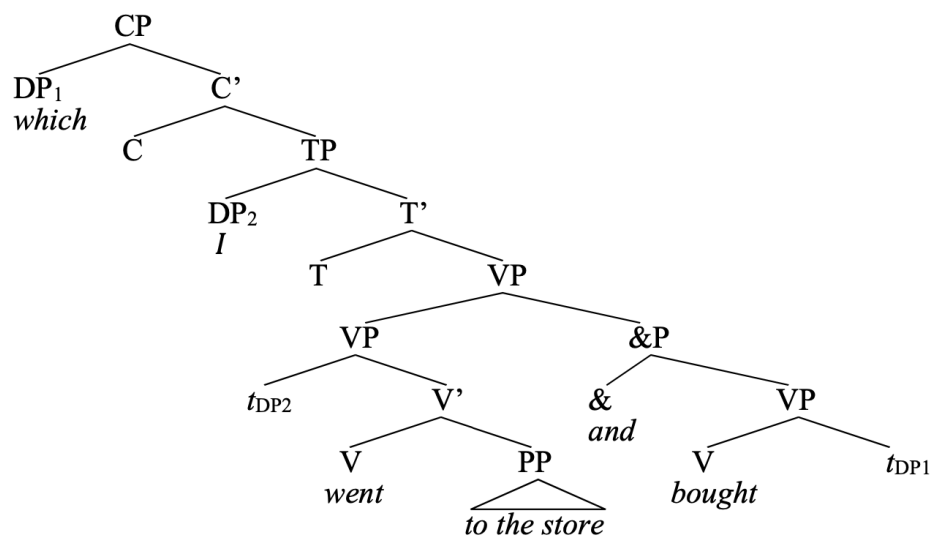
⁹ The sentence in 33a is modelled on a parallel example in Truswell 2011. The acceptability markings given reflect the judgments of five native speakers (three native speakers of British English and two native speakers of North American English). As two speakers found 33a fully grammatical, we have placed the question mark between parentheses.

SPECIAL MATTER

(25)a.



b.



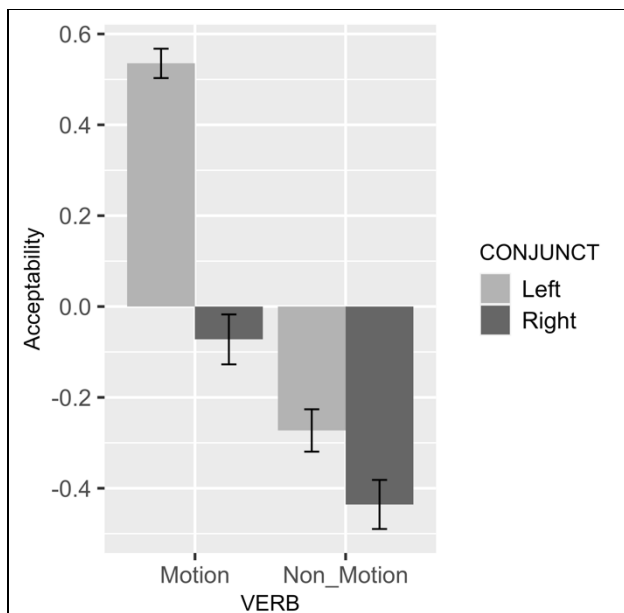


Figure 1: Mean acceptability by condition (z-scores; GAP POSITION \times VERB CLASS) in experiment IA

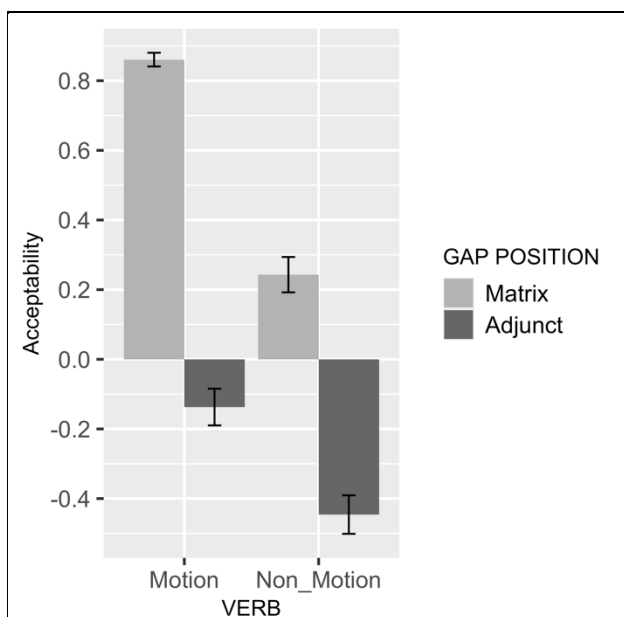


Figure 2: Mean acceptability by condition (z-scores; GAP POSITION \times VERB CLASS) in experiment IB

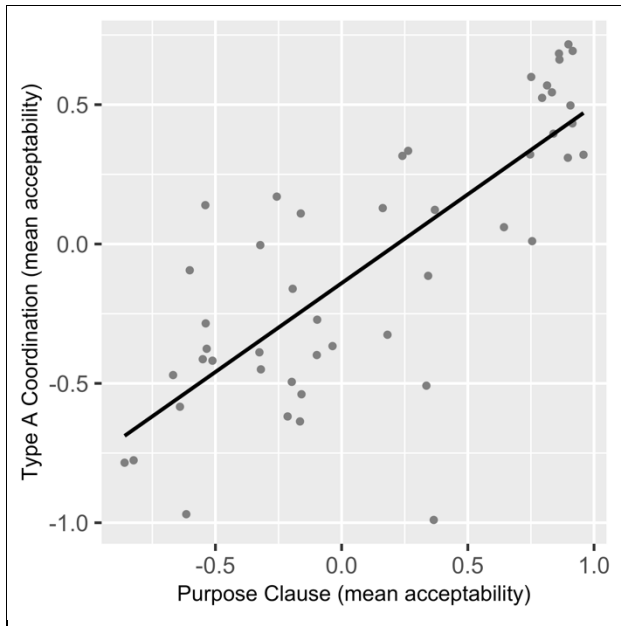


Figure 3: Correlation between the acceptability of items in experiment IB and related items in experiment IA (each dot represents one item)

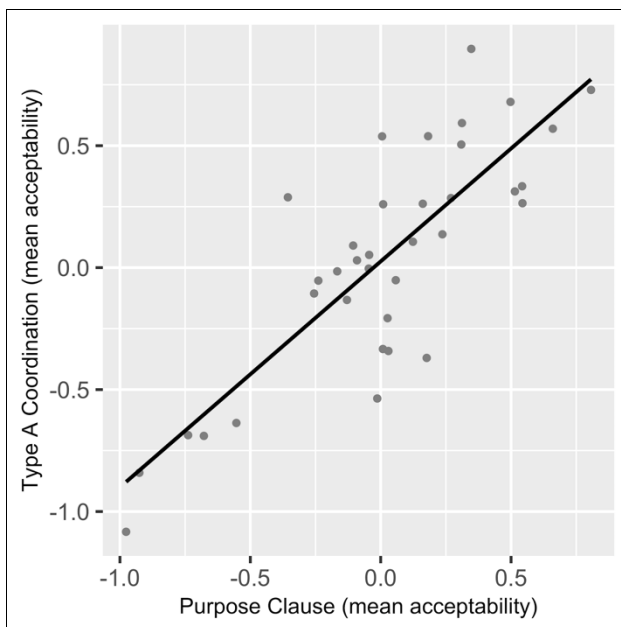


Figure 4: Correlation between acceptability of extraction from purpose clauses in Exp. IIB and from Type A coordination in Exp. IIA (each dot represents one item)

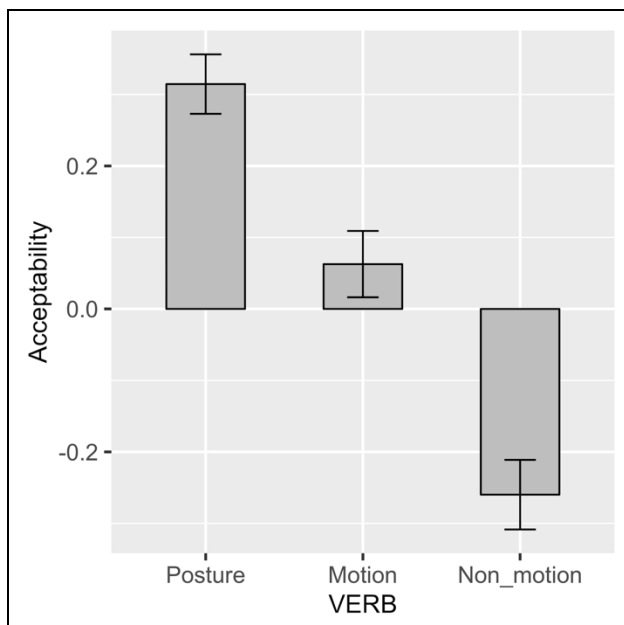


Figure 5: Mean acceptability by VERB CLASS (z-scores) in experiment IIA

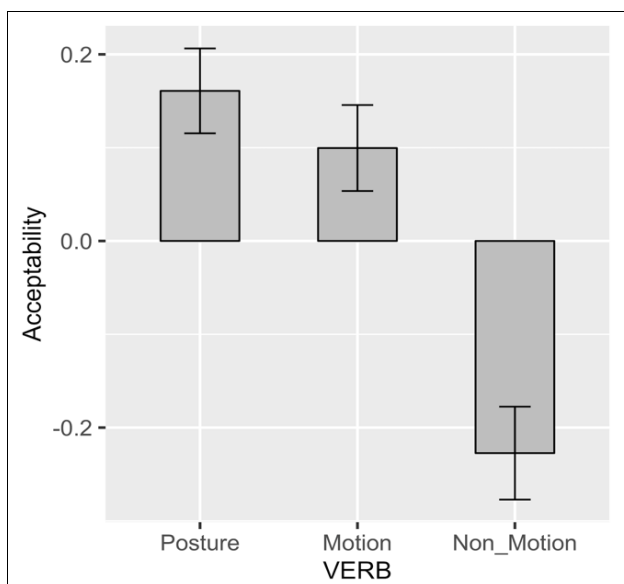


Figure 6: Mean acceptability by VERB CLASS (z-scores) in experiment IIB

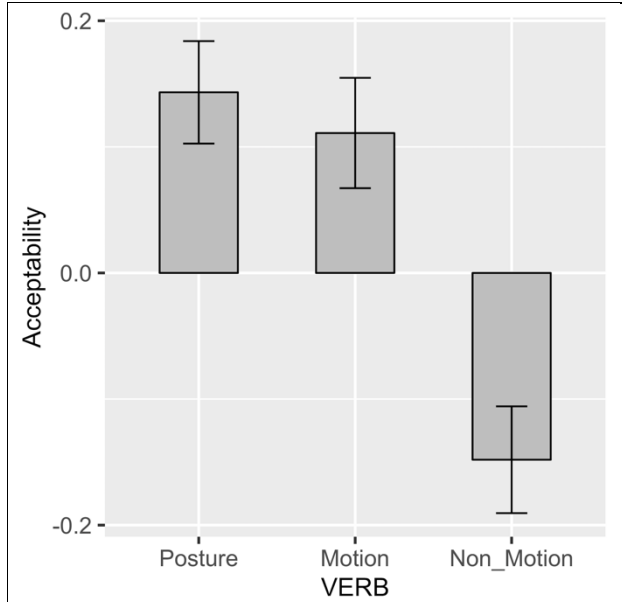


Figure 7: Mean acceptability by VERB CLASS (z-scores) in experiment III

<i>Type A coordination</i>			<i>VP containing purpose clause</i>		
	Right Conj.	Left Conj.		Adjunct	Matrix VP
Argument	?	✓	Argument	?	✓
Adjunct	*	✓	Adjunct	*	✓
	↑ Prediction 6	↑ Prediction 7		↑ Prediction 6'	↑ Prediction 7'

Table 1: Predictions of the adjunction analysis

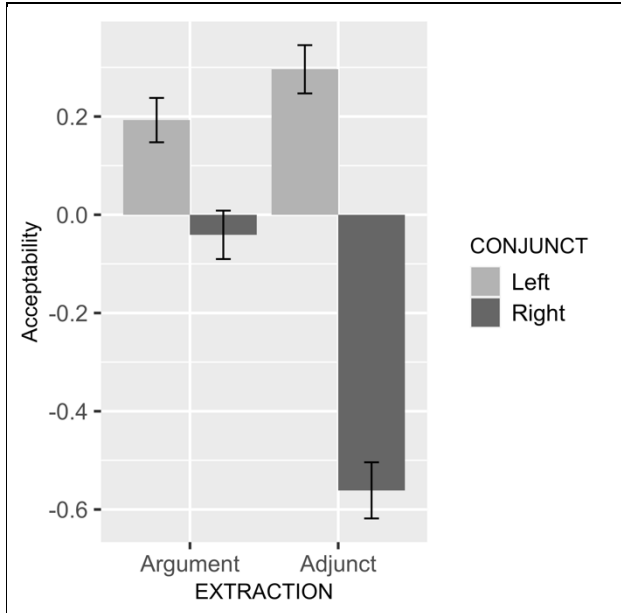


Figure 8: Mean acceptability by condition (z-scores; CONJUNCT \times EXTRACTED CATEGORY) in Exp. IVA

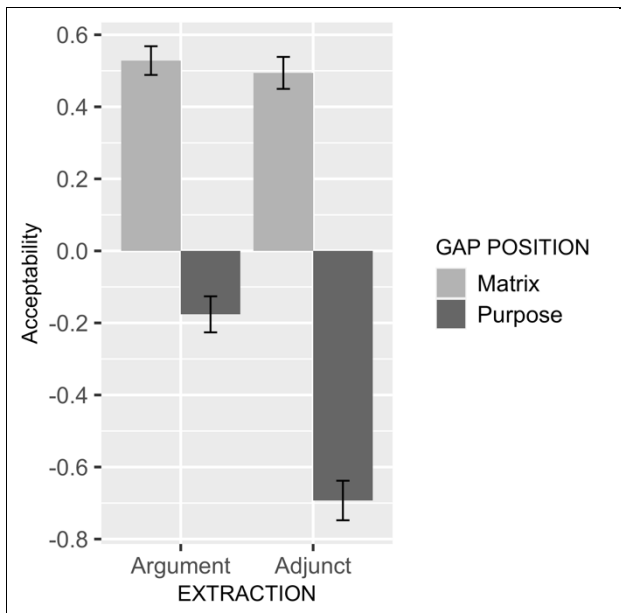


Figure 9: Mean acceptability by condition (z-scores; GAP POSITION \times EXTRACTED CATEGORY) in Exp. IVB

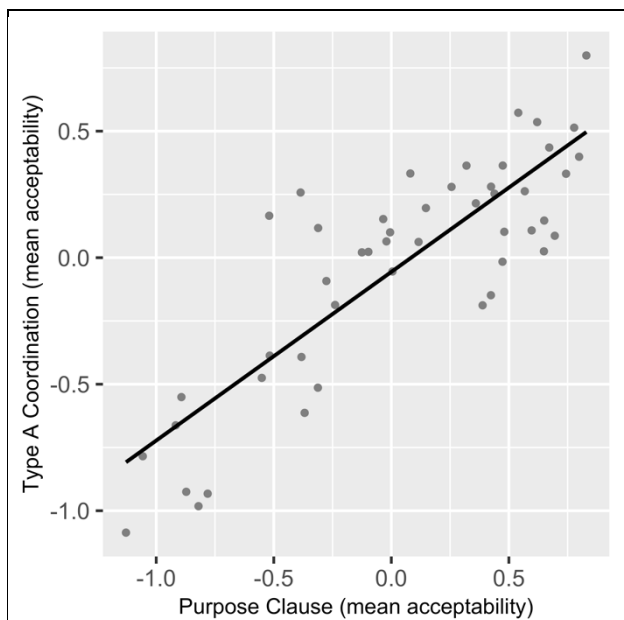


Figure 10: Correlation between the acceptability of the items in experiment IVB and the items in experiment IVA (each dot represents one item)

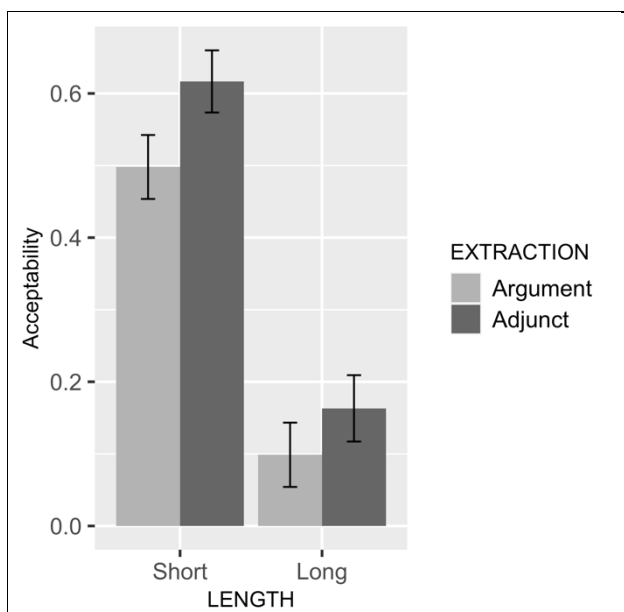


Figure 11: Mean acceptability by condition (z-scores; LENGTH \times EXTRACTED CATEGORY) in Exp. V