On the relation between adjunction and type A coordination

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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 the terminology of Lakoff 1986; an example is *Here's the whisky I went to the store and bought*.) We argue, following Ross, that extraction is possible because the second conjunct in type A coordination is in fact an adjunct. We present experimental evidence showing that the pattern of argument and adjunct extraction from type A coordination matches the pattern of argument and adjunct extraction from adjunction structures in a number of crucial respects. We then develop a theory of coordination and coordinators which captures similarities between regular symmetric coordination and type A coordination (as highlighted in Kehler 2002). Our theory crucially separates the role of the coordinator from syntactic coordination, which is argued to be a structure of mutual adjunction. This dissociation allows coordinators to show up in non-coordinate structures, including in type A coordination.

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

1. Introduction

The starting point of this paper is the coordinate structure constraint, which can be formulated as in (1) (see Ross 1967, Grosu 1973, De Vries 2017, among others).

(1) *Coordinate structure constraint*

a. Conjunct condition: Conjuncts cannot be moved.

b. Element condition: Movement out of a coordinate structure is possible only if the moved category binds a trace in each conjunct.

According to (1b), extraction from conjuncts must take place in an across-the-board fashion.

Thus, the structure in (2a) is ruled in, but (2b) and (2c) are ruled out (we borrow (2b,c) from Ross 1967:160)

(2) a. The madrigals which$_1$ Henry [[sings t_1] and [listens to t_1]] are mostly Venetian.

b. *The lute which$_1$ Henry [[plays t_1] and [sings madrigals]] is warped.

c. *The madrigals which$_1$ Henry [[plays the lute] and [sings t_1]] sound lousy.

Ross (1967: 168) already observed that there are apparent counterexamples to the coordinate structure constraint. In (3), for instance, relativization seems unobjectionable.

(3) Here's the whisky which$_1$ I [[went to the store] and [bought t_1]].

He further points out, citing George Lakoff, that non-across-the-board extraction is conditioned by the interpretation of the coordinate structure. In the case at hand, the first conjunct describes an event that facilitates the event described in the second conjunct. More in general, non-across-the-board extraction depends on specific asymmetric interpretations of the coordinate structure (Lakoff 1986). This fact can be brought out in various ways. For example, reordering of the conjuncts in (3) leads to ungrammaticality (see (4a)), while reordering in regular coordinate structures is unproblematic (see (4b)):

(4) a. *Here's the whisky which$_1$ I [[bought t_1] and [went to the store]].

b. The madrigals which$_1$ Henry [[listens to t_1] and [sings t_1]] are mostly Venetian.

There are two basic ways of analysing this constellation of facts. First, it could be that what you see is what you get. That is, examples like (3) could feature standard coordinate structures, as long as the coordinate structure constraint is revised to permit non-across-the-board extraction under specific interpretive conditions (or is replaced by other constraints that have this effect). We will refer to analyses of this type as *interpretive accounts* (because interpretation directly governs extraction). Second, one could argue that the obligatory

asymmetric interpretation of examples like (3) is indicative of a syntactic structure that is not a standard coordination, and that it is this structure that permits extraction. On an approach along these lines, extraction is still sensitive to interpretation, but only indirectly. We will refer to accounts of this type as *syntactic accounts* (because it is the syntax that regulates extraction).

Both these positions have been defended. An interpretive account is adopted in Lakoff 1986 (see also Deane 1991, Na and Huck 1992, Kehler 2002, Chaves 2012 and Kubota and Lee 2015). Ross (1967: 170) takes the second route and argues that examples like (3) do not contain standard coordinate structures when extraction takes place (see also De Vos 2009, Weisser 2015 and Bošković 2018). They are only transformed into standard coordinate structures later, or never contain such structures at al. This of course begs the question what kind of hidden structure we are dealing with. Ross suggests that the second conjunct is an adjunct to the first conjunct, in the same way that the purpose clause in (5) is an adjunct to VP. As English permits extraction from (certain) adjuncts (see Truswell 2011, among others), the grammaticality of (3) can be captured.

(5) Here's the whisky which$_1$ I [[went to the store] [to buy t_1]].

Variants of this view have been defended by Brown (2017), Déchaine (1993) and Weisser (2015). Note that the latter two argue that the *first*, rather than the *second* conjunct is an adjunct. Yet another syntactic account is put forward in De Vos (2009) and Bošković (2018), who contend that asymmetric coordination involves coordination, but of a type that is syntactically distinct from standard coordinate structures.

The debate continues because asymmetric coordination shares properties both with standard coordination (as expected under semantic accounts) and with adjunction (as expected under many syntactic accounts). The similarity with coordination is apparent from the surface form. The similarity with adjunction is not immediately obvious. However, we will argue,

partly based on new experimental evidence, that the pattern of extraction in asymmetric coordinate structures closely resembles the pattern of extraction in adjunction structures (as predicted on Ross's analysis). Given this state of affairs, the data seem paradoxical, suggesting that the answer must lie in a deeper understanding of the phrase-structural status of coordination and adjunction. (see also Weisser (2015), who argues that a coordination structure can be derived from an adjunction structure through movement).

Before we give an outline of the paper, we must point out two important limitations of our analysis. To begin with, Lakoff (1986) shows that extraction from a single conjunct is possible when a coordinate structure expresses a course of events that fits into one of three semantic frames, which are described in (6) and exemplified by (3), (7a) and (7b), respectively (the example in (7b) is taken from Na and Huck 1992; see Deane 1991 and Kehler 2002 for similar categorizations of asymmetric coordination).

(6) A coordinate structure permits non-across-the-board extraction if and only if it expresses a sequence of events which
   a. fits normal conventionalized expectations (**type A**),
   b. runs counter to conventionalized expectations (**type B**), or
   c. 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 have to restrict our discussion to a single type of asymmetric coordination. We have chosen to explore type A coordination here and will therefore leave the analysis of type B and type C coordination for future research.

We also exclude from our discussion instances of so-called contiguous coordination. Contiguous coordination in found in examples like *he sat and drank whisky*. It differs from

type A coordination in not exhibiting any island effects and must therefore involve a different kind of structure (for discussion, see Carden and Pesetsky 1977, De Vos 2005, 2007, Wiklund 2007 and Brown 2017, among others). Note that the example in (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.

We start, in section 2, with a brief re-evaluation of three arguments against Ross's proposal that the second conjunct in type A coordination is an adjunct. These will show that there are at least some similarities between regular and asymmetric coordination.

We then present, in sections 3-5, the results of a series of experiments designed to test whether the profile of possible and impossible extractions from type A coordination matches what is found in uncontroversial adjunction structures. Factors we consider are the nature of the extracted category (argument *vs* adjunct), the locus of extraction (left *vs* right conjunct) and the nature of the matrix verb (unaccusatives *vs* transitives). We demonstrate that, contrary to some claims in the literature, there is a close match between extraction from adjunction structures and extraction from type A coordination. This match is predicted by an account in which the second conjunct is an adjunct, but not in any obvious way by the interpretive account (whose predictions for some crucial data points remain unclear), or by alternative syntactic accounts.

Our findings raise questions about the nature of coordination and its relation to adjunction. We take up this matter in section 6, where we argue that coordination does not result from projection of the coordinator, but is rather *mutual adjunction*: if α and β are conjoined, then α is an adjunct to β and β is an adjunct to α. This hypothesis leads to a separation of syntactic coordination and the marking of disjunction or conjunction through merger of a coordinating element. We show that the resulting analysis does not only capture aspects of the syntax of coordination, but also affords some insight into the nature of asymmetric coordinate

structures.

2. Three arguments against the adjunction account

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

(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, in that it does not rule out that what appears to be the 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 a source in independently existing modifiers. Moreover, there are various adjuncts that describe an event that must take place (*after*, *before* and *while* clauses are examples). Be that as it may, we should note that the truth conditions of type A coordinate structures overlap with those of regular coordination.

Lakoff (1986) develops an argument with a broader thrust. He notes that there can apparently be more than two conjuncts in asymmetric coordinate structures, as shown in (9). The possibility of iteration is characteristic of coordination, but not of subordination, which is a relation between two phrases. By this criterion, then, type A coordination cannot be adjunction (which is a subtype of subordination).[1]

[1] This criterion is not as clear as it appears, given the option of recursion in adjunction and subordination (compare *John went to the store to buy malt whisky in order to impress Mary*. Thus, the hypothesized adjuncts in (9) could all be attached to the matrix VP *go to the store*, or each could be attached to the previous VP, or we could be

(9) What$_1$ did he [go to the store], [buy t_1], [load t_1 in his car], [drive home] and [unload t_1]?

This argument is based on the tacit assumption that a syntactic account must assume a one-to-one correspondence between interpretation and structure. That is, if a coordinate structure is underlyingly an adjunction structure, then it must be interpreted asymmetrically (i.e. as a sequence of events), and if a coordinate structure is interpreted asymmetrically, then it is underlyingly an adjunction structure. However, this tacit assumption is stronger than it needs to be: a one-way implication that an adjunction structure must be interpreted asymmetrically is sufficient to capture the core data. (This weaker assumption is likely to be correct, given that in discourse unconnected sentences can also be interpreted sequentially.)

If regular coordinate structures permit the sequential interpretation that is required by adjunction structures, Lakoff's example in (9) poses no particular problems (as already pointed out in Weisser 2015). In fact, it can be analysed in at least two ways. To begin with, it could consist of a regular coordinate structure with two conjuncts: [*go to the store, buy, load in his car*] and [*drive home and unload*]. Each of these conjuncts is itself built through asymmetric coordination (i.e. adjunction). In the first conjunct, the coordinate structure [*buy, load in his car*] is adjoined to [*go to the store*]. In the second conjunct, [*unload*] is adjoined to [*drive 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.

(10) $$\text{What}_1 \text{ did he } \left[\begin{array}{c}\text{[go to the store]} \left[\begin{array}{c}\text{[buy } t_1\text{]} \\ \text{[load } t_1 \text{ in his car]}\end{array}\right] \\ \text{[drive home] and [unload } t_1\text{]?}\end{array}\right]$$

Nowhere in the proposed structure is iteration of asymmetric coordination required, and nowhere does extraction violate the coordinate structure constraint. Indeed, it is possible to

dealing with a combination of high and low recursion. However, we agree with the general point that recursion of adjuncts is an unlikely analysis in the case at hand.

build comparable examples with a mix of coordination and purpose clauses, as in *What did he go to the store to buy and load in his car and drive home to unload?*. This sentence has a parallel structure to (10) and permits the same pattern of extraction:

(11) What_1 did he $\left[\begin{array}{c}\text{[go to the store] to } \left[\begin{array}{c}\text{[buy } t_1\text{]} \\ \text{and [load } t_1 \text{ in his car]}\end{array}\right] \\ \text{and [drive home] to [unload } t_1\text{]?}\end{array}\right]$

Alternatively, (9) can be analysed as a coordinate structure with three conjuncts, as in (12). Again, parallel structures with purpose clauses can be constructed, as (13) shows.

(12) What_1 did he $\left[\begin{array}{c}\text{[go to the store], [buy } t_1\text{]} \\ \text{[load } t_1 \text{ in his car]} \\ \text{[drive home] and [unload } t_1\text{]?}\end{array}\right]$

(13) What_1 did he $\left[\begin{array}{c}\text{[go to the store] to [buy } t_1\text{],} \\ \text{[load } t_1 \text{ in his car]} \\ \text{and [drive home] to [unload } t_1\text{]?}\end{array}\right]$

On the adjunction analysis, (10) and (12) are the *only* feasible structures for Lakoff's example in (9). We will demonstrate in section 3 that there is a strong preference for the left-hand part of a type A coordinate structure to be headed by an unaccusative predicate (such as the motion predicates *go to the store* and *drive home*), as opposed to a transitive predicate (such as *buy* and *load in his car*). As a consequence, there are just two structures that simultaneously satisfy the coordinate structure constraint and contain only well-formed type A coordinations. These are the ones given.[2]

If this conclusion is correct, it is predicted that coordinate structure constraint violations will be detected in the example in (9) if any of the gaps is replaced by a pronoun. This effect is indeed found. As already reported in Kehler 2002, variants of (9) in which the final or prefinal

[2] There is a third analysis that is formally grammatical, namely one in which the structure as a whole is a type A coordination introduced by *go to the store*. The second part of this type A coordination is a regular coordinate structure with three conjuncts: [*buy*], [*load in his car*] and [*drive home and unload*] (the latter of these three is itself a type A coordination). While possible, we do not think this analysis feasible, as it would imply that going to the store is an event that facilitates all other events mentioned, which runs counter to our intuitions about the interpretation of the example. Note, however, that even if this structure did exist, it would not undermine the argument based on the coordinate structure constraint presented immediately below.

gap is plugged are very considerably worse than the original. The same is true of the variant in which the initial gap is plugged. In order to demonstrate that the data follow, we give the structures of the relevant examples in (14) (on the analysis in (10)) and (15) (on the analysis in (12)). The conjuncts involved in the coordinate structure constraint violation are labelled with capitals. In (14), either A or B does not contain a trace; in (15) this is true of either A, B or C.[3]

(14) a. *This is the cake which$_1$ Harry **[**$_{\mathbf{A}}$ [went to the store], [[bought t_1], [loaded t_1 in his car]]**]**, **[**$_{\mathbf{B}}$ [drove home], and [unloaded it]**]**.

b. *This is the cake which$_1$ Harry [[went to the store], [**[**$_{\mathbf{A}}$ bought t_1**]**, **[**$_{\mathbf{B}}$ loaded it in his car**]**]], [[drove home], and [unloaded t_1]].

c. *This is the cake which$_1$ Harry [[went to the store], [**[**$_{\mathbf{A}}$ bought it**]**, **[**$_{\mathbf{B}}$ loaded t_1 in his car**]**]], [[drove home], and [unloaded t_1]].

(15) a. *This is the cake which$_1$ Harry **[**$_{\mathbf{A}}$ [went to the store], [bought t_1]**]**, **[**$_{\mathbf{B}}$ loaded t_1 in his car**]**, **[**$_{\mathbf{C}}$ [drove home], and [unloaded it]**]**.

b. *This is the cake which$_1$ Harry **[**$_{\mathbf{A}}$ [went to the store], [bought t_1]**]**, **[**$_{\mathbf{B}}$ loaded it in his car**]**, **[**$_{\mathbf{C}}$ [drove home], and [unloaded t_1]**]**.

c. *This is the cake which$_1$ Harry **[**$_{\mathbf{A}}$ [went to the store], [bought it]**]**, **[**$_{\mathbf{B}}$ loaded t_1 in his car**]**, **[**$_{\mathbf{C}}$ [drove home], and [unloaded t_1]**]**.

This is not to say that examples like (9) are entirely unproblematic for the syntactic account. In particular they raise the question of what regulates the distribution of the coordinator *and*, which in Lakoff's example appears in an adjunct to the final conjunct, and nowhere else (on a

[3] Kehler uses a double question mark to indicate the status of (14a,b)/(15a,b). We have replaced these by a star, partly because our informants considered the examples not just marginal but ungrammatical.

par with regular coordination). We address this matter in section 6. For now, however, we conclude that Lakoff's argument from iteration is less strong than it appears at first sight.

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 (16) with a type A example.

(16) a. Sally went to the store and bought some whisky.

b. *And bought some whisky, Sally went to the store.

This, then, is a property that asymmetric coordinate structures share with regular coordination, but not with structures of clausal adjunction.

In sum, the similarity between regular coordination and type A asymmetric coordination goes beyond the surface form of the structures involved. While some of the data are compatible with an adjunction account, it is fair to say that such an account must be carefully designed so as to capture the similarity with regular coordination.

3. Experiment 1

We now turn to the first of a series of five experiments designed to test whether extraction from type A coordinate structures behaves like extraction from adjuncts.

3.1 Background, hypothesis and predictions

Before we formulate our initial hypothesis and predictions, we need to give a bit more background on extraction from adjuncts.

To begin with, extraction from adjuncts is marked. In many languages it is not acceptable at all, and even in English adjuncts are selective islands. This means that adjunct extraction is ruled out altogether, while argument extraction is less than fully acceptable.

Moreover, it is not the case that all adjuncts permit argument extraction with equal ease.

In particular, as shown in (17), object-oriented depictives permit extraction more easily than subject-oriented depictives (see Borgonovo and Neeleman 2000). The latter resist extraction to different degrees, depending on factors not of immediate relevance here (see Tanaka 2019 for discussion and references).

(17) a. We served [the meat]$_1$ [wrapped in foil]$_1$.

b. What did we serve [the meat]$_1$ [wrapped in t_{WH}]$_1$?

c. John$_1$ danced [dressed as Carmen Miranda]$_1$.

d. *What$_1$ did John$_1$ dance [dressed as t_{WH}]$_1$?

e. Angela$_1$ finished the portrait [covered in blue paint]$_1$.

f. *What$_1$ did Angela$_1$ finish the portrait [covered in t_{WH}]$_1$?

Object-oriented depictives are attached low in VP, in a position c-commanded by the object (see (18a)). Subject-oriented depictives, by contrast, are attached in a position c-commanded by the subject but outside VP proper (see (18b); for discussion, see Williams 1980, 1994, among many others). The contrast in (17) suggests, then, that argument extraction is more felicitous from adjuncts merged within VP.

(18) a. DP$_1$ [$_{VP}$ V DP$_2$ Pred$_2$] → *Pred* transparent for argument extraction.

b. DP$_1$ [$_{VP}$ V (DP$_2$)] Pred$_1$ → *Pred* opaque for argument extraction.

The pattern repeats itself with purpose clauses. These allow a range of orientations (see Williams 1994), but permit extraction more easily if associated with the object:

(19) a. Billy bought [a shelf]$_1$ [to hold books]$_1$.

b. ?What books did Billy buy [a shelf]$_1$ [to hold t_{WH}]$_1$?

c. They hired [a decorator]$_1$ [to paint the hallway].

d. What hallway did they hire [a decorator]$_1$ [to paint t_{WH}]$_1$?

e. Clara$_1$ opened the book [to read the final chapter]$_1$.

f. *What chapter did Clara$_1$ open the book [to read t_{WH}]$_1$?

g. Tessa$_1$ presented her passport [to cross the border] $_1$.

h. *What border did Tessa$_1$ present her passport [to cross t_{WH}]$_1$?

In many cases, extraction from an adjunct is easier if the matrix verb is unaccusative or reflexive, as opposed to transitive (see Cormack and Breheny 1994, Borgonovo and Neeleman 2000 and Fábregas and Jiménez-Fernández 2016; for related discussion, see Brown 2017). Thus, there is a clear contrast between (20b,f) and (20d,h).

(20) a. John$_1$ killed Bill$_2$ [thinking about Mary]$_1$.

b. *Who did John$_1$ kill Bill$_2$ [thinking about]$_1$?

c. Bill$_1$ died t$_1$ [thinking about Mary]$_1$.

d. Who did Bill$_1$ die [thinking about]$_1$?

e. Cassie$_1$ hurt Bill$_2$ [trying to fix the roof]$_1$.

f. *What did Cassie$_1$ hurt Bill$_2$ [trying to fix]$_1$?

g. Cassie$_1$ hurt herself$_1$ [trying to fix the roof]$_1$

h. What did Cassie$_1$ hurt herself$_1$ [trying to fix]$_1$?

This can be understood as follows. Certain participial depictives – in particular those that expresses or imply a psychological activity – have a strong tendency to be subject-oriented. This is shown by the data in (21) (we give (22) for comparison).

(21) a. *As for Bill, John killed him$_1$ [thinking about his betrayal]$_1$.

b. *As for John, Mary hired him$_1$ [hoping for a decent salary]$_1$.

c. *As for Charlotte, they rescued her$_1$ [fearing for her life]$_1$.

d. *As for Christine, I introduced her$_1$ [wondering about her suitability for the role]$_1$.

(22) a. As for the lamb, they served it$_1$ [dripping with garlic and olive oil]$_1$.

b. As for the petri dish, John stored it$_1$ [containing far too much liquid]$_1$.

c. As for her car, Dawn parked it$_1$ [leaking oil on the marble driveway]$_1$.

d. As for the sheriff, they killed him$_1$ [lying on the ground]$_1$.

This means that such participial depictives will normally be attached outside VP and hence resist extraction. However, when the object and the subject have the same interpretation, it is possible for a depictive to be associated with the object *syntactically* and – by transitivity – be associated with the subject *semantically*. Consider the scheme in (23).

(23) DP$_1$ [$_{VP}$ V t_1/REFL$_1$ Pred$_1$] → *Pred* transparent for argument extraction.

Here the depictive (Pred) is attached in VP and formally associated with the object (as indicated by coindexation). However, since the object is a trace or a reflexive bound by the subject, the depictive is still subject-oriented in its interpretation. Therefore, unaccusativity and reflexivity make it straightforward for a subject-oriented depictive to be merged in a position low enough to render the depictive transparent for argument extraction (as in (20d,h)).[4]

If extraction from type A coordination involves adjunction, then *the second conjunct would have to be a low subject-oriented adjunct*, on a par with (23). (Notice that in type A coordination, the second conjunct is subject-oriented as a matter of course.) We represent this analysis schematically in (24) for a structure in which the apparent left conjunct is headed by an unaccusative verb; the apparent right conjunct is represented as *&-VP*. This is the hypothesis that we will test experimentally.

(24) DP$_1$ [$_{VP}$ V t_1 &-VP$_1$] → *&-VP* transparent for argument extraction.

[4] The effect of reflexivity is not absolute, as pointed out by Truswell (2011:30). Thus, Truswell accepts examples like *what did John drive Mary crazy whistling?* (but see Brown 2017 for contradictory evidence). If the argumentation in the main text is on the right track, examples of this type would have to involve subject-oriented depictives exceptionally merged in a low position. We cannot explore the feasibility of this suggestion here.

Our hypothesis generates a series of predictions, two of which will be tested in experiment 1. To begin with, if the right conjunct in type A coordination is indeed an adjunct, then the left conjunct is part of the matrix clause. This predicts that argument extraction from the left conjunct should be easier than argument extraction from the right conjunct (**Prediction 1**). After all, argument extraction from VP is routine, while argument extraction from adjuncts is less than fully acceptable (as adjuncts in English are selective islands, see section 4).

This prediction can be contrasted with the predictions of a range of alternative accounts, which are all 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 and Huck 1992 and Kehler 2002, and the syntactic accounts in Postal 1998, De Vos 2005; 2009, Weisser 2015 and Bošković 2018). There is variation in how this effect is achieved. Weisser 2015, 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 of a type A coordination 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).

The second prediction to be tested in experiment 1 concerns the effects of the choice of matrix predicate. As mentioned, extraction from subject-oriented participial depictives improves when the matrix verb is unaccusative verb as opposed to transitive (see (20)). Hence, if type A coordination does indeed involve adjunction of the right conjunct, then extraction from that conjunct should be also be easier when the left conjunct is headed by an unaccusative verb. If it is headed by a regular transitive verb, &-VP would normally have to be attached outside VP, and hence it would resist extraction:

(25) DP_1 [$_{VP}$ V DP_2] &-VP_1 → *&-VP* opaque for argument extraction.

We expect that extraction from the *left* conjunct should also be facilitated by unaccusativity of the predicate that heads it. The argumentation that leads to this expectation is based on the observation that not every apparently coordinate structure permits extraction: only a handful of specific types have been identified (namely types A, B and C, as mentioned in the introduction). This means that transparency for extraction requires a particular construction, and in the case of type A coordination we have identified that construction as involving low adjunction (for a tree, see section 6). As low adjunction can only be combined with subject orientation if the verb is unaccusative, unaccusativity of the head of the first conjunct (as opposed to transitivity) should aid extraction from the first, as well as the second conjunct (**prediction 2**).

Of course, given the semantics of type A coordination, not every unaccusative verb can be used to test this prediction: the left conjunct must describe an action that can be construed as having the purpose of bringing about the event described by the right conjunct. We will therefore look at motion verbs accompanied by a directional modifier (such as *travel to Denver*). As is well-known, these are unaccusative (Hoekstra 1984 and Levin and Rappaport Hovav 1995); nonetheless they can easily describe a purposeful action.

It is generally acknowledged that type A coordinate structures are often 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). However, it is controversial 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) and Brown (2017) suggest that transitivity inhibits extraction.[5]

[5] Brown (2017) presents experimental evidence showing that transitive matrix verbs inhibit extraction from pseudocoordination and participial adjuncts in English, as compared to intransitive matrix verbs.

3.2 Materials, participants and procedure

Experiment 1 had a 2×2 factorial design in which we manipulated two factors: CONJUNCT (left vs. right) and VERB CLASS (motion vs. non-motion). Manipulation of the first factor allowed us to test prediction 1. We expect that in type A coordination extraction from the left conjunct is easier than extraction from the right conjunct. Manipulation of the class to which the verb in the first conjunct belongs allowed us to test prediction 2. We expect that extraction from type A coordination displays the same sensitivity as extraction form adjunction structures. In particular, extraction from both the left and the right conjunct should be easier when the left conjunct is headed by an unaccusative verb. In the non-motion verb items, we used transitive VPs in which the object can be understood as an instrument for the event described in the second conjunct (e.g. *present a credit card and buy a modernist painting*). Such examples have been claimed, for instance by Schmerling (1972), to be instances of Type A coordination and thus to allow extraction from the right conjunct, contrary to our expectations.

Given the experiment's factorial design, there are four conditions. A sample set of test items is given in (26a,b) and (27a,b). 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 (these contexts are given between square brackets in (26) and (27)). Contexts were added to help the participants construe the event described in the left conjunct of the test item as having the aim of bringing about the event described in the right conjunct. (Recall that such a course of events has been assumed to be a prerequisite for type A coordination since Lakoff 1986).

(26) [*Mary went to New York in order to buy a modernist painting.*]

a. What city did Mary go to and buy a modernist painting? (Left | Motion)

b. What modernist painting did Mary go to New York and buy? (Right | Motion)

(27) [*Mary presented her credit card in order to buy a modernist painting.*]

a. What credit card did Mary present and buy a modernist painting? (Left | Non-M.)

b. What modernist painting did Mary present her credit card and buy? (Right | Non-M.)

We created twelve sets of test items, and so there were forty-eight test items in total (twelve sets × four conditions). The experiment had a Latin square design. The 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 preceded the other items (but they were not identified as such). The remaining thirty-six items were pseudo-randomized 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 *wh*-extraction out of various types of islands (such as Complex NPs, subjects, and *wh*-clauses; see Ross 1967).

Eighty self-reporting native speakers of English were recruited online via *Prolific* (https://www.prolific.co/). All participants were eighteen years old or over. Participants were paid for their participation.

The online experiment was created and conducted using *Gorilla* (https://gorilla.sc). Before starting the study, participants were asked to carefully read a set of instructions. Items were presented one-by-one, each below a context sentence. After a short time, a seven-point Likert scale appeared below each item. Participants were instructed to indicate the acceptability of each item by clicking one of the points on the Likert scale: with a score of seven corresponding to full acceptability and a score of one corresponding to complete unacceptability. Participants were required to rate all items. This procedure was also used for the other experiments in which we used acceptability judgment tasks.

3.3 Results and discussion

In order to eliminate potential scale biases, we transformed the raw acceptability scores of each

participant into z-scores (see Schütze and Sprouse 2014). A 2×2 ANOVA revealed a significant main effect of CONJUNCT ($F_1(1,79) = 67.6079$, $p<.001$; $F_2(1,11) = 71.2888$, $p<.001$), a significant main effect of VERB CLASS ($F_1(1,79) = 174.4510$, $p<.001$; $F_2(1,11) = 154.0748$, $p<.001$), and a significant interaction between CONJUNCT and VERB CLASS ($F_1(1,79) = 21.4588$, $p<.001$; $F_2(1,79) = 20.7091$, $p<.001$).

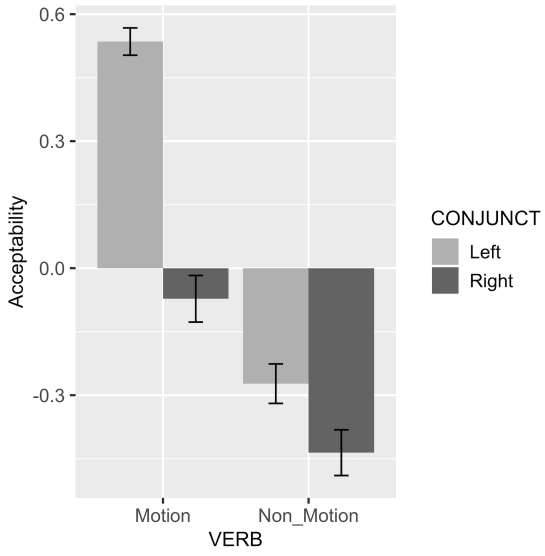


Figure 1: Mean acceptability by condition (z-scores; CONJUNCT × VERB CLASS) in experiment 1

Pair-wise comparisons show that for both verb classes, extraction from the right conjunct scored lower than extraction from the left conjunct. However, this contrast was much sharper in the motion verb condition ($F_1(1,79) = 85.4596$, $p<.001$; $F_2(1,11) = 88.4334$, $p<.001$) than in the non-motion verb condition ($F_1(1,79) = 5.6710$, $p<.05$; $F_2(1,11) = 5.5694$, $p<.05$).

In addition, in comparison with non-motion verbs, motion verbs facilitated extraction from both the left conjunct ($F_1(1,79) = 208.0984$, $p<.001$; $F_2(1,11) = 193.4533$, $p<.001$) and the right conjunct ($F1(1,79) = 24.4350$, $p<.001$; $F2(1,11) = 22.5587$, $p<.001$). Figure 1 depicts these results (error bars indicate standard errors).

The results show that prediction 1 and prediction 2 are both correct. First, argument extraction from the right conjunct scored worse than argument extraction from the left conjunct, as expected if the right conjunct of a type A coordinate structure is an adjunct, while the left conjunct is the main clause predicate.

Second, extraction from both the left and the right conjunct was easier when the left

conjunct was headed by a motion verb than when it was headed by a transitive verb. This shows that extraction from type A coordination is sensitive to verb class in the same way as extraction from adjuncts.

The difference in acceptability between extraction from the left and right conjuncts was much smaller with regular transitives than with motion verbs. Moreover, extraction from both the left conjunct and the right conjunct was rated significantly less acceptable in the non-motion verb condition than in the motion verb condition. This suggests that it is not possible, or at least much harder, to form a type A coordination with a transitive verb as the lexical head of the left conjunct. Rather, coordinate structures formed with such verbs are symmetric and consequently subject to the coordinate structure constraint. Thus, our results are in line with claims by De Vos 2015 and Brown 2017 that motion and transitive verbs are not equal in their ability to support type A coordination.

4. Experiment 2

4.1. Background and predictions

Adjuncts that permit extraction in English are selective islands. That is to say, they allow argument extraction, but not adjunct extraction. Thus, there is a sharp contrast between (28a) and (28b) and between (28c) and (28d) (the latter examples are from Szabolcsi 2006).

(28) a. [What song]$_1$ did Vicky arrive whistling t_1 softly.

b. *[How softly]$_1$ did Vicky arrive whistling the Marseillaise t_1?

c. [Which topic]$_1$ did you leave [without talking about t_1]?

d. *How$_1$ did you leave [without behaving t_1]?

This fact can be used to further test the hypothesis that the right conjunct in type A coordination is in fact an adjunct. If it is, we expect that conjunct to exhibit selective island effects (**prediction 1**).

In addition, we predict that the *left* conjunct in type A coordination should permit extraction of adjuncts as well as arguments (**prediction 2**). After all, if the right conjunct is an adjunct, then the left conjunct is the matrix predicate. While adjunct extraction from adjuncts is impossible, both adjunct and argument extraction from the main predicate should be unproblematic. This prediction goes against much of the literature (see, for instance, Deane 1991, Na and Huck 1992 and Weisser 2015).

Finally, as already mentioned in section 3, selective islands marginally inhibit argument extraction, so we expect that although argument extraction from both conjuncts should be possible, it should lead to reduced scores if the argument originates in the right conjunct (**prediction 3**). This prediction was already tested in experiment 1 but should be replicable in experiment 2.

4.2. Materials and participants

Experiment 2 had a 2 × 2 factorial design in which we manipulated two factors: CONJUNCT (left vs. right) and EXTRACTED CATEGORY (argument vs. adjunct). Manipulating these factors allowed us to test whether adjunct extraction from the right conjunct is harder than argument extraction (prediction 1), whether, by contrast, there is no significant difference between the acceptability of adjunct extraction and argument extraction from the left conjunct (prediction 2), and whether argument extraction from the right conjunct is more degraded than argument extraction from the left conjunct (prediction 3).

Given this factorial design, there were four conditions. A sample set of test items is given in (29). For a variety of reasons, we created sentences derived by relative clause formation rather than *wh*-extraction. (For instance, in a number of items *wh*-extraction would have been pragmatically deviant, while relativization yielded perfectly natural results). In each test item, the left conjunct was headed by a motion verb accompanied by a directional PP (recall

that such combinations are unaccusative, which facilitates extraction). As in Experiment 1, test items were preceded by a short context consisting of a variant of the test item with the second conjunct replaced by a purpose clause.

(29) [*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 heavy weight 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)

The choice of adjuncts was a challenge in the design of the test items, as we needed to make sure that adjuncts were unambiguously attached inside a specific conjunct. For this reason, we steered away from regular locational PPs, and instead used event-internal modifiers (see Maienborn 2001, 2003). These often look like locative PPs but tend to have a manner or instrumental interpretation. In (29), for example, the two adjunct PPs *on a jumbo jet* and *with a well-timed right hook* have instrumental interpretations that make it possible to 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 (29a) and (29c), we included an adjunct PP in each conjunct from which an argument was extracted. This was in order 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 in order to reduce unnecessary processing costs.

We created twelve sets of test items, so that 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. Non-practice items were pseudo-randomized per participant. The fillers and practice items were the relative clause counterparts of those used in Experiment 1.

We recruited eighty self-reporting adult native speakers of English through *Prolific,* none of whom had taken part in Experiment 1. Participants were paid for their time.

4.3. Results and discussion

A 2 × 2 ANOVA revealed a main effect of CONJUNCT ($F_1(1, 79) = 109.8280$, $p<.001$; $F_2(1, 11) = 127.8953$, $p <.001$), a main effect of EXTRACTED CATEGORY ($F_1(1, 79) = 20.6567$, $p<.001$; $F_2(1, 11) = 14.8942$, $p<.01$), and a significant interaction between CONJUNCT and EXTRACTED CATEGORY ($F_1(1, 79) = 34.4670$, $p<.001$; $F_2 (1, 11) = 48.5419$, $p<.001$).

Pairwise comparisons revealed that extraction from the left conjunct scored much higher than extraction from the right conjunct, both in the adjunct extraction condition ($F_1(1, 79) = 112.2500$, $p<.001$, $F_2(1, 11) = 153.9996$, $p<.001$) and in the argument extraction condition ($F_1(1, 79) = 12.0877$, $p<.001$, $F_2(1, 11) = 14.0364$, $p<.01$). In the right conjunct condition, adjunct extraction scored much lower than argument extraction ($F_1(1, 79) = 46.3939$, $p<.001$; $F_2(1, 11) = 50.7030$, $p<.001$), while in the left conjunct condition, there was no significant difference in the acceptability of argument and adjunct extraction ($F_1(1, 79) = 2.6666$, $p=0.1065$; $F_2(1, 11) = 2.3784$, $p = 0.1513$). Figure 2 depicts these results.

The results of Experiment 2 follow our hypothesis that the right conjunct in Type A

coordination is an adjunct. As per prediction 1, adjunct extraction from the right conjunct scored much lower than argument extraction. As per prediction 2, adjunct and argument extraction from the left conjunct did not differ in acceptability.

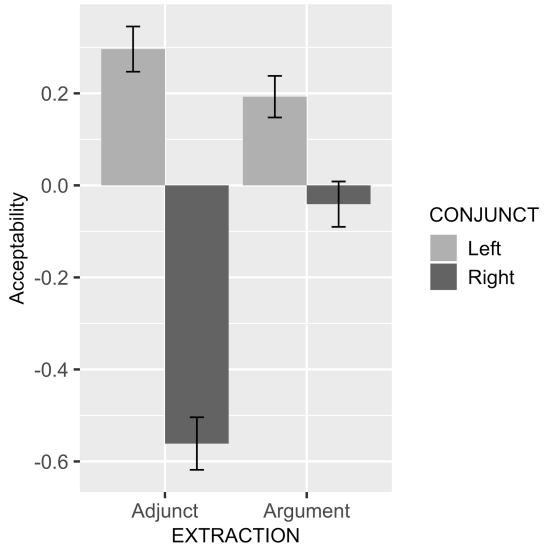


Figure 2: Mean acceptability by condition (z-scores; CONJUNCT × EXTRACTED CATEGORY) in Exp. 2

Finally, as per prediction 3, argument extraction from the left conjunct was more acceptable than argument extraction from the right conjunct. These outcomes provide further support for our main hypothesis. Like non-tensed adjuncts, the right conjunct of a type A coordination gives rise to selective island effects. By contrast, extraction from the left conjunct is similar to extraction from a matrix predicate.

5. Experiments 3, 4 and 5

5.1. Background and Predictions

This section reports on experiments 3, 4, and 5 and a follow-up study to experiment 3. The aim of experiments 3, 4 and 5 was to determine whether the acceptability of extraction from type A coordination correlates better with the acceptability of extraction from purpose clauses or with the perceived naturalness of the sequence of events described by the relevant coordinate structure. The notion of naturalness figures frequently in the literature on asymmetric coordination. Lakoff (1986:153) suggest that extraction is conditioned by what people view as a "natural course of events". Na and Huck (1992:257) speak of "a natural flow of events" that allows the first event as to be seen as setting the scene for the second event (the notion of scene-setting is also present in Deane 1991, De Vos 2005 and Weisser 2015). Kehler (2002) argues

that type A coordination instantiates the discourse relation of *Occasion*, adding (on page 22) that "much what makes for a coherent Occasion is […] based on knowledge gained from human experience about how eventualities can enable (or otherwise set the stage for) other eventualities in the world." In this connection Kehler mentions the notion of 'scripts' as explored in Samet and Schank 1984 (while also noting its limitations). Abstracting away from details, it seems to us that sequences of events which fit a stored pattern will appear more natural to speakers than sequences of events which do not.

In order to check the potential correlations we are interested in, we tested the acceptability of *wh*-argument extraction from the right conjunct in type A coordination (in **experiment 3**), the acceptability of *wh*-argument extraction from purpose clauses (in **experiment 4**), and the naturalness of the contexts used in experiments 3 and 4 (in **experiment 5**). In all three experiments, we varied the verb class of the head of the left conjunct/matrix predicate. We used three verb classes: motion verbs, posture verbs, and (non-motion) transitives.

The predictions to be tested are as follows. Our analysis predicts a high positive correlation between extraction from adjuncts and extraction from type A coordination. This is because purpose clauses are the closest adverbial correlate to type A coordination and should therefore display similar island behaviour. By contrast, alternative semantic/pragmatic theories appeal to the naturalness of the sequence of events described by a type A coordination in order to regulate extraction. Therefore, those theories predict a high positive correlation with perceived naturalness.

Both accounts are compatible with a situation in which there is a high positive correlation with perceived naturalness as well as with extraction from purpose clauses. On our proposal, this would show that in addition to syntactic constraints, there is a semantic requirement of naturalness. On semantic/pragmatic accounts, this would show that extraction

from purpose clauses is subject to the same semantic condition as type A coordination. However, our proposal is falsified if there is a high positive correlation with naturalness, but not with extraction from purpose clauses, while semantic/pragmatic accounts are falsified if there is a high positive correlation with extraction from purpose clauses, but no correlation with perceived naturalness. Both theories are in trouble if there is no correlation with either factor.

We begin by describing experiments 3 and 4, which tested extraction from type A coordination and from purpose clauses.

5.2. *Experiments 3 and 4: Materials and participants*

We have already identified the choice of verb in the left conjunct as one of the factors that influence the acceptability of extraction from type A coordinate structures. As is well known, unaccusative main verbs facilitate extraction from adjuncts. We tested whether, in line with this, motion verbs accompanied by a directional modifier facilitated extraction from type A coordinate structures, in view of the fact that predicates that express directed motion tend to be unaccusative (see experiment 1). 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 and Rappaport Hovav 1995), and it has been observed that they permit formation of type A coordinate structures (De Vos 2005, 2009 and Weisser 2015; see also Lakoff 1986, Deane 1991). These two verb classes contrast with regular transitives, which we found in experiment 1 inhibit extraction from type A coordinate structure.

We made use of this sensitivity to verb class in the design of experiments 3 and 4. In experiment 3, 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 non-motion transitive). Experiment 4 had a similar 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 3 constituted a minimal pair with its counterpart in Experiment 4. As in our earlier experiments, each test item was preceded by a short context. We give sample test items in (30) (for experiment 3) and (31) (for experiment 4).

(30) 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? (non-motion transitive)

(31) 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? (non-motion transitive)

We expected to find, in both experiments, that motion verbs and posture verbs facilitated extraction, as compared to regular transitives. This prediction is in line with 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 (≈ type A coordination) yields weak island effects, unlike contiguous coordination.

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 1). All non-practice items were pseudo-randomized per participant.

For each experiment, we recruited eighty self-reporting adult native speakers of English via Prolific (no one participated in the previous experiments). Participants were paid for their time.

5.3. Experiments 3 and 4: Results

We ran an ANOVA to analyse the results of each experiment, as well as a correlation analysis that compared the mean acceptability scores per item. We report the results of the correlation analysis first. The aim was to test whether, for a given minimal pair, the acceptability of argument extraction from a purpose clause was a good predictor of the acceptability of argument extraction from the right conjunct in type A coordination.

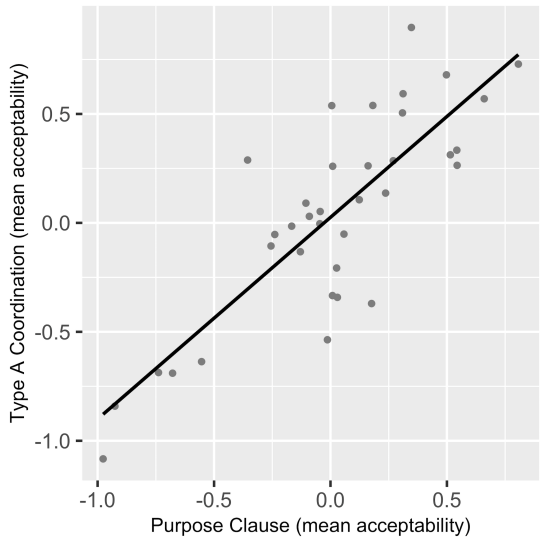


Figure 3: Correlation between the acceptability of extraction from purpose clauses and from Type A coordination (each dot represents one item)

As it turned out, the mean acceptability of extraction from purpose clauses and that of extraction from the right conjunct in type A coordination 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 on the basis of the acceptability of extraction from purpose clauses (r^2 = 0.6652). This correlation is highly significant (t = 8.3987, df = 34, p<.001), as will clear from figure 3.

Thus, the output of the correlation analysis suggests that 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.

The strong positive correlation depicted in figure 3 would lead one to expect that extraction patterns from purpose clauses and type A coordination should mirror each other. We conducted two ANOVAs in order to find out whether VERB CLASS (motion, posture or non-motion transitive) indeed affected the acceptability of extraction in similar ways for purpose clauses and the right conjuncts in type A coordination.

We begin by considering the results of experiment 3 (type A coordination). A one-way ANOVA revealed a main effect of VERB CLASS ($F_1(2, 158) = 37.191$, $p<.001$; $F_2(2, 22) = 46.981$, $p<.001$). A post-hoc Tukey test revealed significant differences in all pair-wise comparisons ($p<.001$).

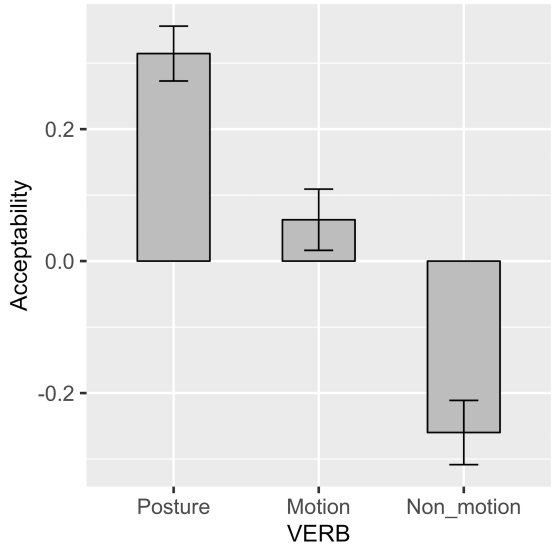


Figure 4: Mean acceptability by VERB CLASS (z-scores) in experiment 3

As shown in Figure 4, extraction from type A coordination was easier when the left conjunct was headed by a motion or posture verb than when it was headed by a regular transitive verb. 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.

Next, we consider the results of experiment 4 (purpose clauses). A one-way ANOVA again yielded a main effect of VERB CLASS ($F_1(2, 158) = 19.368$, $p < .001$; $F_2(2, 22) = 22.196$, $p<.001$).

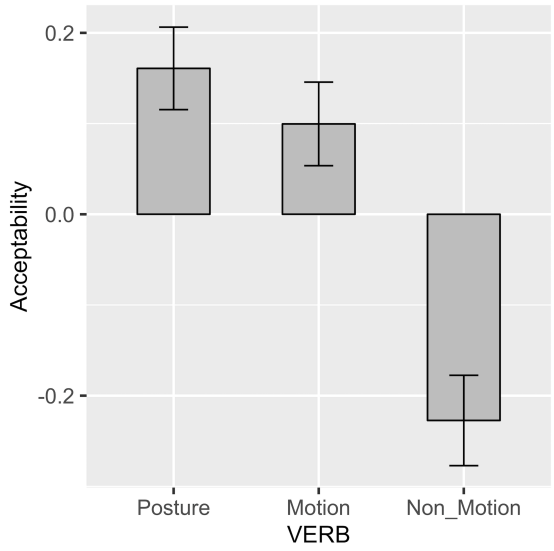


Figure 5: Mean acceptability by VERB CLASS (z-scores) in experiment 4

A post-hoc Tukey test displayed that there were significant differences between (i) motion verbs and non-motion transitives ($p<.001$) and (ii) posture verbs and non-motion transitives ($p<.001$). However, there was no significant difference between posture verbs and motion verbs ($p = .628$). As shown in Figure 5, both these verb classes facilitated extraction from adjuncts to the same degree, whereas non-motion transitives did not.

Aspects of these results require further scrutiny. In particular it is not clear why posture verbs and motion verbs contrast in experiment 3 but behave alike in experiment 4. Nonetheless, the overall pattern supports the parallelism of extraction from purpose clauses and the right conjunct of type A coordination. We will return to these findings in section 5.5, but first we report on experiment 5.

5.4 Experiment 5

The aim of experiment 5 was to determine whether the perceived naturalness of a course of events was a good predictor of the acceptability of extraction from the right conjunct of type A coordination. As explained in section 5.1, semantic/pragmatic accounts of extraction from type A coordination take naturalness to be the determining factor in extraction from the right conjunct. Of course, naturalness is extremely difficult to define. We therefore decided to adopt an operational definition: a sequence of events is more natural if judged as such by participants in an experimental setting.

The test items we used were the context sentences from experiments 3 and 4. These systematically described two events: a matrix event and a subsequent hypothetical event introduced by a purpose clause. Sample items are given below:

(32) a. John hurried to the airport in order to welcome the guest from Berlin. (Motion)

b. John stood up in order to welcome the guest from Berlin. (Posture)

c. John opened the car door in order to welcome the guest from Berlin. (Transitive)

As in Experiments 3 and 4, there were twelve sets of test items, so thirty-six test items in total (twelve sets × three verb classes). The test items were distributed across three lists in a Latin Square fashion. Each list also contained four practice items and twenty-four fillers. All non-practice items were pseudo-randomized per participant. The fillers were unrelated structures that also described sequences of events that varied in naturalness as judged by the experimenters. Fifty-nine of the participants in experiment 3 participated in this study. They were paid for their time.

The task was simple. Participants were asked to judge the naturalness of the sequence of events described by each item. As part of their instructions, participants were presented with three sample sentences. It was explained to them how to judge the naturalness of these sentences (in order to prevent interference from potential contrasts in acceptability). Items were presented one-by-one. After a short time, a seven-point Likert scale appeared below each item. Participants were asked to indicate the naturalness of the sequence of events described by each item by clicking one of the points on the Likert scale. A score of seven corresponded to full naturalness and a score of one corresponded to complete unnaturalness. Participants were required to rate all items.

Like the acceptability scores in experiments 3 and 4, the data generated by experiment 5 were transformed into z-scores per participant. A one-way ANOVA revealed that there was no

main effect of VERB CLASS ($F_1(2, 116) = 1.4107$, $p = 0.248$; $F_2(2, 22) = 1.4823$, $p = 0.249$). The mean naturalness scores per condition were not significantly different.

Next, we carried out a correlation analysis between the results of experiment 3 and experiment 5. This did not reveal a significant correlation between the acceptability of extraction from the right conjunct of a type A coordination in experiment 3 and the naturalness of the sequence of events described by the counterpart item in experiment 5 (*rho* = −0.106, p = 0.53). Within each individual VERB CLASS, we also failed to find a significant correlation between acceptability of extraction and naturalness (motion: *rho* = 0.035, p = 0.92, posture: *rho* = −0.272, p = 0.39, non-motion transitive: *rho* = 0.028, p = 0.94). (N.B. We present the results of Spearman's correlation test, as the mean naturalness scores per item were not normally distributed.)

For completeness' sake, we also examined whether the mean naturalness of a sequence of events was a good predictor for the mean acceptability of argument extraction from purpose clauses (from Experiment 4). Again, there was no overall significant correlation between naturalness and acceptability of extraction (*rho* = 0.053, p = 0.76). We also considered the verb classes individually, but only observed low and non-significant correlations (motion: *rho* = 0.041, p = 0.90, posture: rho = −0.014, p = 0.97, non-motion transitive: *rho* = 0.168, p = 0.60).

The results suggest that the naturalness of a sequence of events described by a given item is not a good predictor of the acceptability of extraction, neither from purpose clauses nor in type A coordination.

5.5 Discussion

The results of experiments 3, 4 and 5 support the hypothesis that in type A coordination the right conjunct is an adjunct. On the one hand, there is a highly significant positive correlation between argument extraction from the right conjunct in type A coordination and argument

extraction from purpose clauses. In other words, the acceptability of extraction from purpose clauses is a good predictor for the acceptability of extraction from Type A coordination. On the other hand, there is no correlation between perceived naturalness of the described sequence of events and the acceptability of extraction. This state of affairs is compatible with the adjunction analysis, but at odds with semantic/pragmatic accounts of extraction from type A coordination.

There is, however, one unexpected wrinkle in the data. Recall that in both experiment 3 and experiment 4 we found that extraction is easier when the verb that heads the left conjunct is unaccusative. That is, scores were higher if the relevant verb was a motion verb accompanied by a directional modifier or a posture verb accompanied by a particle. These findings were as expected. What is unexpected is that while motion 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 types of verb are unaccusative verbs, why should there be 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.[6] Examples of contiguous coordination are given in (33).

(33) a. Anne will try and understand the argument.

b. Martha sat and read a book.

Contiguous coordination is different from type A coordination in various respects. First, it does not necessarily have the sequence-of-events reading typical of type A coordination (in (33a) the understanding may not happen even if John tries; in (33b) the sitting and the reading

[6] The term *pseudo-coordination* is frequently used to refer to what we call contiguous coordination. However, it is also used as a cover term for contiguous coordination and type A coordination (for instance in De Vos 2005). We therefore avoid it here.

coincide). Second, contiguous coordination does not create selective islands in the way that type A coordination does. We are not in a position 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 weak 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 (34) as involving contiguous coordination, leaving type A coordination as the only option.

(34) 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?'

Similarly, contiguous coordination is not possible with a motion verb that is accompanied by a directional PP:

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

In experiment 3, 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 (≈ 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.

In order to test whether this might lie behind the slight discordance between experiments 3 and 4, we conducted a follow-up study to experiment 3. We revised the test items of experiment 3, making sure that both posture and motion verbs were accompanied by a goal PP and reran the acceptability judgement task. We report on this experiment below.

5.6 A Follow-up study to experiment 3

We examined the same hypothesis that we tested in the previous experiments, namely that in type A coordination the right conjunct is an adjunct. As extraction from adjuncts is facilitated by unaccusativity of the matrix verb, extraction should be easier if the left conjunct is headed by a motion or posture verb, as opposed to a non-motion transitive. However, 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 extraction pattern as found with extraction from purpose clauses in Experiment 4: posture ≈ motion > transitive.

VERB CLASS was manipulated as a within-subject factor with three values (posture, motion, and non-motion transitive), so that there were three conditions. We give a sample test item for each condition in (36). 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 the items recycled from Experiment 3. However, like motion verbs, posture verbs were accompanied by a directional PPs, as in (36a,b).

(36) 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 × 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. Non-practice items were pseudo-randomized per participant.

Eighty self-reporting adult native speakers of English were recruited online via *Prolific*. None of them participated in the previous experiments. Participants were paid for their time.

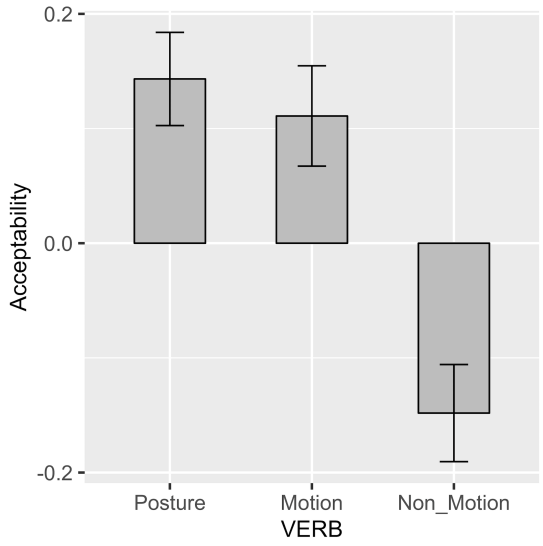


Figure 6: Mean acceptability by VERB CLASS (z-scores) in the follow-up study to experiment 3

As expected, a one-way ANOVA revealed a main effect of VERB CLASS: $F_1(2, 158) = 15.3681$, $p<.001$; $F_2(2, 22) = 14.8133$, $p<.001$). As shown in Figure 6, in comparison with non-motion verbs, both posture verbs and motion verbs aided extraction from the right conjunct in Type A coordination.

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 posture and motion conditions ($p = 0.851$).

The results of this follow-up study correspond with the results of Experiment 4. Both extraction from the right conjunct in Type A coordination and extraction from purpose clauses exhibit the same pattern: Posture ≈ Motion > Non-Motion. In other words, the two types of unaccusative verb facilitated extraction to the same degree. Thus, the wrinkle in the data noted in section 5.5 disappeared when posture verbs were 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.

One would expect that with the results of the follow-up study in place the correlation between extraction from type A coordination and extraction from purpose clauses is even stronger in reality than measured in experiments 3 and 4.

6. Coordination, adjunction and coordinators

6.1 Summary of the experimental studies

The findings from the five main experiments and the follow-up study provide considerable support for the hypothesis that in Type A coordination what looks like the right conjunct is in fact an adjunct. First, extraction from the apparent right conjunct is restricted in the same way as extraction from adjuncts (that is, argument extraction is mildly degraded, while adjunct extraction is ungrammatical). By contrast, extraction from the apparent left conjunct is unproblematic for both adjuncts and arguments (a finding that contradicts much of the existing literature; see Lakoff 1986, Deane 1991, Na and Huck 1992, Postal 1998, Kehler 2002, Weisser 2015, Bošković 2018, among others). Second, unaccusativity of the hypothesized main verb facilitates argument extraction, just as in the case of extraction from adjuncts (see Cormack and Breheny 1994, Borgonovo and Neeleman 2000 and Fábregas and Jiménez-Fernández 2016). Third, there is a strong correlation between the acceptability of extraction from the apparent right conjunct and extraction from purpose clauses, but no discernible correlation between perceived naturalness and acceptability of extraction. Taken together, these observations favour an adjunction analysis over alternative accounts.

If we accept this conclusion, the question to be addressed is why adjunction can disguise itself as coordination. The issues were introduced in some detail in section 2: if type A coordination is in fact adjunction, what in the grammar explains the appearance and distribution

of the coordinator, what explains the fact that type A coordination has a stronger interpretation than purpose clauses, and what explains the impossibility of fronting of the second conjunct?

In order to address these issues, we will first consider the syntax of coordination.

6.2 Coordination as mutual adjunction

The hypothesis that type A coordination is in fact and adjunction structure implies that coordinators can appear outside coordinate structures. In other words, our conclusions so far lead us to dissociate coordination and coordinators. This seems at odds with a well-known proposal that unifies coordination with standard X-bar theory by treating the coordinator as a functional head and the conjuncts as constituents merged inside its maximal projection (see (37)). Early proposals along these lines can be found in Thiersch 1985 and Munn 1987; the same position has been defended in Larson 1990, Kayne 1994, Zoerner 1995, Johannessen 1998, Hornstein and Nunes 2002 and De Vries 2005, among others.

(37) $[_{\text{ConjP}}$ XP $[_{\text{Conj'}}$ Conj^0 YP]]

This account, which we will refer to as the Boolean phrase hypothesis, equates projection of the coordinator with coordination, which implies that we would not expect to find coordinators in non-coordinate structures.

The Boolean phrase hypothesis faces a number of problems, which all originate in the same basic issue, namely that coordinating expressions like *and* do not behave like heads. First, there does not seem to be such a thing as selection for Boolean phrases. That is surprising, as almost any kind of projection can be selected by some head or other, either through c-selection (see Grimshaw 1979 and Odijk 1997) or through the effects of the functional sequence (see Cinque 1999 and subsequent work). But there do not appear to be heads that select for coordinate structures (say, verbs whose complement must be a coordination). This runs counter to the idea that coordinators are heads, as there is no reason why a Boolean phrase could not

be a target for selection.

Second, if a head imposes selectional requirements on its complement, it can combine with a coordinate structure only if all conjuncts are of the right type. This is illustrated in (38) (from Bruening and Al Khalaf 2020). *Become* selects nominal and adjectival predicates, but not PPs. It can combine with a coordinate structure, if all conjuncts are either NP or AP predicates.

(38) a. Danny became [[$_{NP}$ a political radical] and [$_{AP}$ very antisocial]].

b. *Danny became [[$_{NP}$ a political radical] and [$_{PP}$ under suspicion]].

A similar pattern was identified by Borsley (2005), who notes that *end up* selects an *-ing* form, while *turn out* selects a *to* infinitive. These selectional requirements affect both conjuncts in the examples in (39) and (40).

(39) a. Hobbs turned out to like Rhodes and to hate Barnes.

b. *Hobbs turned out to like Rhodes and hating Barnes.

c. *Hobbs turned out liking Rhodes and to hate Barnes.

(40) a. Hobbs ended up liking Rhodes and hating Barnes.

b. *Hobbs ended up liking Rhodes and to hate Barnes.

c. *Hobbs ended up to like Rhodes and hating Barnes.

This pattern does not follow in any obvious way from the hypothesis in (37). If Conj were a functional head, the categorial features of its complement would percolate up (see Grimshaw 1991, 2005 for relevant discussion). This would lead us to expect that only one of the conjuncts would have to satisfy the verb's selectional requirements.[7] The fact that both must requires a

[7] There is a handful of exceptions to the generalization assumed here. For example, in *You can depend on my assistant and that he will be on time*, only the left conjunct appears compatible with *depend on*'s selectional requirements. Bruening and Al Khalaf (2020) show that these counterexamples are only apparent. In the case at hand the right conjunct is in fact an NP (or DP). Note that CPs behave like NPs not only in coordination, but also in ellipsis and fronting).

pattern of selection very different from what is normally assumed in extended projections.

Third, careful typological work by Zwart (2005) has shown that the position of coordinating words like *and* does not correlate with the position of functional heads in general. Thus, even in strictly head-final languages, coordinating expressions are placed before the final conjunct. The few counterexamples to this generalization arguably all involve alternative strategies for coordination and therefore do not qualify as true counterexamples. The insensitivity of coordinators to the general headedness of a language seems at odds with the proposal in (37), as on this proposal one would expect the coordinator to follow patterns of cross-categorial harmony.

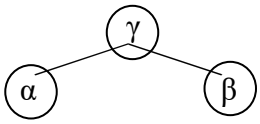
The alternative we will pursue here is that coordination is a symmetric structure (see also Bloomfield 1933, Ross 1967, Pesetsky 1982, Gazdar at al. 1985, Pollard and Sag 1994, Chaves 2007, 2012, and Bruening and Al Khalaf 2020, among others).

Our implementation of this hypothesis relies on the distinction between categories and segments, as used in Chomsky 1986 to tease apart adjunction from complementation and specification. If a node *n* takes a complement or specifier, *n* and its mother form separate categories. However, if *n* merges with an adjunct, *n* and its mother are segments of a multi-segmented category. (This distinction survives in Chomsky (2004) and subsequent work, where an operation of set-merge generates structures of complementation and specification, while an operation of pair-merge generates structures of adjunction.)

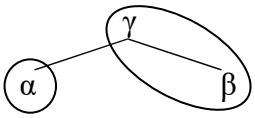
We analyze coordination as a structure of multiple adjunction (as proposed earlier in Neeleman and Van de Koot 2006 and Philip 2012).[8] What this means is that the top node of a coordinate structure is a segment shared by two categories. Consider a structure $[_{\gamma}\, \alpha\ \beta]$. If α, β

[8] Earlier adjunction analyses can be found in Munn 1992; 1993, Bošković and Frank 2000, and Hartmann 2000, but all of these assume regular, rather than mutual adjunction. Cormack and Smith (2005) propose an adjunction analysis closer to ours, but a detailed comparison is not possible within the limits of this paper.

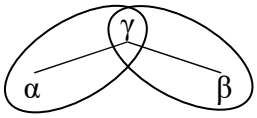
and γ form three different categories, we are dealing with complementation or specification (as indicated by the circles in (41a)). If β and γ are segments of the same category, while α forms a category on its own, we are dealing with adjunction (with α adjoined to β-γ), as in (41b). Finally, if γ simultaneously functions as the top segment of two complex categories, α-γ and β-γ, then α and β are coordinated, as in (41c).

(41) a. 

complementation, specification

b. 

adjunction

c. 

coordination

The main advantage of this analysis is that it assigns coordination a niche within phrase structure theory, while at the same time allowing it to have properties not shared by other modes of combination. (Below we will discuss the role of the coordinator, which we assume is attached to the final conjunct.)

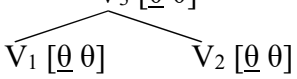
The empirical consequences of our proposal depend on the circumstances that allow nodes adjacent in a tree to be construed as segments of the same category. Central to the notion of multi-segmented categories is the requirement that segments have certain properties in common. We assume that two structurally adjacent nodes can be interpreted as segments of the same category iff (i) they do not have contradictory categorial features, and (ii) they are identical in arity information. It is uncontroversial that this definition is met by the adjoined-to category in an adjunction structure. We therefore concentrate on its consequences for coordination.

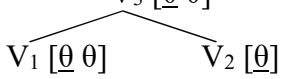
To begin with, the two verbs in (42a) constitute a well-formed coordinate structure. V_1, V_2 and V_3 are all transitive, and so V_1-V_3 and V_2-V_3 can both be construed as categories (see (43a)). By contrast, the two verbs in (42b) cannot join in a coordinate structure. If V_3 is transitive, it can form a category with V_1, but not V_2 (see (43b)); if it is intransitive, it can form

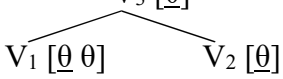
a category with V_2, but not V_1 (see (43c)).

(42) a. I saw him [$_{V3}$ [$_{V1}$ buy] and [$_{V2}$ read]] a book.

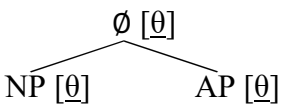
b. *I saw him [$_{V3}$ [$_{V1}$ buy] and [$_{V2}$ sleep]] a book.

(43) a. 

b. * 

c. * 

The requirement of non-contradictory categorial features allows for examples like (38a). We assume that two feature sets A and B are non-contradictory if A is a subset of B. Coordination of unlike categories can then be ruled in if we permit category-less nodes. Consider the structure in (44). Given that the empty set is a subset of every set of categorial features, the top node in (44) can be construed as being part of two multi-segmented categories (∅-NP and ∅-AP), as required for coordination.

(44) 

The contrast in (38) can now be understood as follows. Suppose that any category merged in a selected position must meet the selecting head's requirements. In the normal case there is only one such category. However, when the head merges with a coordinate structure, it combines with as many categories as there are conjuncts. For example, a head that merges with the structure in (44) in effect combines with two categories (∅-NP and ∅-AP). It follows that both of these categories must have a feature specification compatible with the head.

There are severe restrictions on the coordination of unlike categories. To begin with, Grimshaw (1991, 2005) argues that all nodes in the spine of an extended projection must share the same categorial features. If so, category-less nodes, and therefore coordination of unlike categories will only be tolerated if two extended projections are coordinated. Coordination of smaller units will require matching categorial features. Indeed, examples like (45c) are

ungrammatical (even though (45a) and (45b) are unobjectionable).

(45) a. I never saw him [$_{PP}$ near a book].

b. I never saw him [$_{VP}$ read a book].

c. *I never saw him [$_{VP}$ [$_{\emptyset}$ [$_{P}$ near] or [$_{V}$ read]] a book].

In addition, while we may tolerate nodes without categorial features, it stands to reason that nodes must have *some* feature specification. After all, a node is a syntactic object by virtue of the properties it has. This captures a generalization argued for at length in Bruening and Al Khalaf 2020, namely that coordination of unlike categories is possible only if the two categories are predicates (as in (38a)) or modifiers (as in (46), from Sag et al. 1985). Coordination of arguments requires matching categorial features (Bruening and Al Khalaf show that apparent exceptions in fact involve coordination of likes).

(46) We walked [$_{\emptyset}$ [$_{AdvP}$ slowly] and [$_{PP}$ with great care]].

We assume that selectional requirements are represented syntactically. If so, a coordination of two unlike predicates will inherit a θ-role from its mother, as in (44), repeated as (47a) for convenience. Similarly, modifiers select the category they combine with. If we represent the modifier's selectional requirements as a feature – σ for concreteness' sake, coordination of unlike modifiers will yield a top node with content (see (47b)). However, there are no features that characterize a category as an argument, and so coordination of unlike arguments yields a node without features (see (47c)). (This analysis is, in essence, a reformulation of Bruening and Al Khalaf's in terms that fit the current proposal more naturally.)

(47) a. Ø [θ] — NP [θ], AP [θ] b. Ø [μ] — AdvP [μ], PP [μ] c. * Ø — XP, YP

The Boolean phrase hypothesis predicts that in a coordinate structure the left conjunct c-

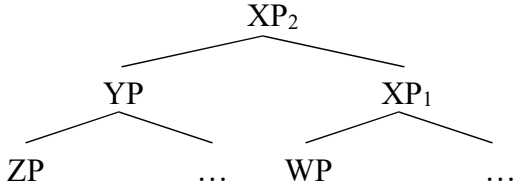
commands the right conjunct. It is generally assumed that this prediction is correct, on the basis of examples like *every man and his dog*, in which the universal that acts as the left conjunct binds a pronoun in the right conjunct (see Munn 1993 for discussion).

By contrast, the most natural interpretation of mutual adjunction is that neither conjunct c-commands the other. It is widely assumed that for two categories to stand in a c-command relation, they must exclude each other; that is, neither may have a segment that dominates the other:

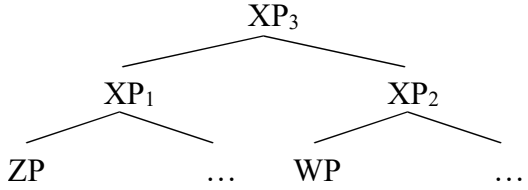
(48) A category α c-commands a category β iff (i) no segment of α dominates β and no segment of β dominates α, and (ii) the first node that dominates α also dominates β.

On this definition of c-command, an adjunct c-commands into the category it is adjoined to, but the adjoined-to category does not c-command into the adjunct. Thus, in (49a) YP c-command WP, but XP_2-XP_1 does not c-command ZP. In a coordinate structure, all conjuncts share the top segment, which entails that no conjunct excludes any other. Thus, in (49b), XP_3-XP_1 does not c-command WP and XP_3-XP_2 does not c-command ZP.

(49) a.



b.



What, then, of the bound variable reading of *every man and his dog*? To capture this, we first need to take a step back and consider the conditions under which a quantifier contained in a coordinate structure can scope outside of it. As has been observed for VP coordination by a range of authors, a quantifier may raise out of a left conjunct as long as it binds a pronoun in the right conjunct (see Rodman 1976, Reinhart 1987, Ruys 1992 and Fox 2000). The effect is illustrated in (50) for universal quantifiers and in (51) for in-situ *wh*-phrases.

(50) a. A soldier [[found every traitor] and [left unseen]]. (*∀>∃)

b. A soldier [[found [every traitor]$_1$] and [shot him$_1$]]. (∀>∃)

(51) a. *Which student [[likes which professor] and [hates the dean]]? (non-echo reading)

b. Which student [[likes which professor]$_1$ and [wants him$_1$ to be on his committee]]?

Notice that it is not enough for there to be an element in the right conjunct that the quantifier can interact with. For example, an existential in the right conjunct does not license quantifier raising out of the left conjunct (see (52a)). However, once a pronoun is present in the right conjunct, scopal interaction with an existential in subject position is unproblematic, as in interaction with an existential in the right conjunct (see (52b,c)).

(52) a. A (different) student [[likes [every professor]] but [hates some TAs]].

(*'[Every professor]$_1$ is such that a different student likes him$_1$ but hates some TAs.')

b. A (different) student [[likes [every professor]$_1$] but [hates some of his$_1$ TAs.]]

('[Every professor]$_1$ is such that a different student likes him$_1$ but hates some of his$_1$ TAs.')

c. A (different) student [[likes [every professor]$_1$] but [wants him$_1$ to fire some TAs]].

('[Every professor]$_1$ is such that a different student likes him$_1$ but wants him$_1$ to fire some TAs.')

Thus, quantifier raising out of a coordinate structure is possible only if the raised quantifier binds a variable in each conjunct. It is tempting to try and unify this condition with the coordinate structure constraint as it applies to overt movement, but we will not do so here.

The Boolean phrase hypothesis predicts that coordinated of DPs will display a pattern different from (50)-(52). Since the first conjunct c-commands the second conjunct as a matter of course, it is not only predicted that variable binding into the second conjunct is possible, but also that in a structure [DP$_\forall$ & DP$_\exists$], the universal should be able to scope over the existential.

By contrast, the mutual adjunction analysis predicts that the universal must undergo quantifier raising in order to scope over the second conjunct, which in turn implies that this reading in only available if the second conjunct contains a pronoun (exactly as in (50)-(52)). In other words, in [$DP_{\forall}$ & $DP_{\exists}$] we would not expect it to be possible for the existential to depend on the universal.

The data are as predicted by the mutual adjunction analysis:

(53) a. Every man and a woman walked in. (*∀>∃)

b. [Every man]$_1$ and his $_1$wife walked in.

c. [Every man]$_1$ and a woman he$_1$ used to date walked in. (∀>∃)

As before, the effect extends to wh-expressions in situ.

(54) a. *Which priest united which refugee and three compatriots? (non-echo reading)

b. Which priest united [which refugee]$_1$ and his$_1$ family?

It is an open question whether quantifier raising in examples like (53b) violates the conjunct condition (see (1a)). This could be so, in which case that condition must apply to overt movement only. However, it is also possible that quantifiers extend their scope through a mechanism other than movement, or that quantifier raising is displacement of an element smaller than the whole quantificational phrase (for instance, the universal operator or the *wh*-operator). We will not explore this issue here.

We now turn to the role of the coordinator. As will be clear from the above, the presence of a coordinator cannot be a precondition for coordination. After all, the coordinator is not the head of the structure, and mutual adjunction is possible in its absence. Indeed, asyndetic coordination is very common cross-linguistically. It typically occurs alongside regular coordination, but in some languages, coordination-by-juxtaposition is the only available

strategy (see Haspelmath 2013 and references given there). In (55), we give English examples of asyndetic conjunction and disjunction.

(55) a. He had brought [flowers, chocolate, champagne], and yet he felt unwelcome.

b. I found no more than [two, three] mistakes in your article.

One may wonder, then, why languages should have coordinators to begin with. The functional answer to this question is that coordinators disambiguate the interpretation of coordinate structures in two ways. First, they select either a conjunctive or disjunctive interpretation. Second, they reflect groupings in coordinate structures with more than two conjuncts.

These effects emerge from the semantics of the coordinator in combination with two rules. Let us assume that the semantic representation of a conjunction or disjunction is a *list* whose order corresponds with the order of conjuncts. The first rule (which we will call the *marking rule*) states that the constituent that denotes the final item in the list is marked by a coordinator. So, an expression like *John, Mary and Bill* constitutes a list of three individuals which terminates in *Bill*. The nature of the coordinator determines the nature of the list. The second rule (which we will call the *constituency rule*) states that if a set of items are to be interpreted as a list, they must form a constituent.

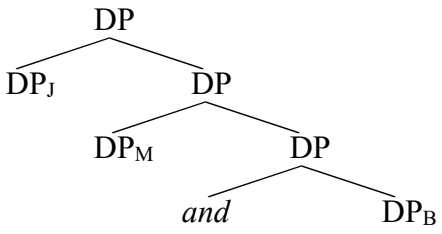
The marking rule explains why asyndetic coordination gives an impression of incompleteness (as noted before by Büring and Hartmann 2015). In (55a) three items on the list of things he brought are mentioned (flowers, chocolate and champagne). However, the third member on that list is not marked by a coordinator, which implies that it is not interpreted as the final member (which must remain unknown as it is not mentioned). In line with this interpretive effect, the intonation of the final conjunct is as if it is *not* the final conjunct.

The marking rule states a one-way implication and therefore does not ban the attachment of coordinators to non-final conjuncts. Thus, our list of three individuals can also

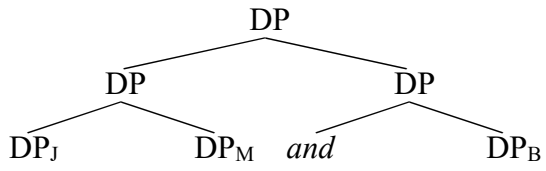
be realized as *John* [*and Mary*] [*and Bill*] (with the first coordinator merely marking continuation of the list).

The constituency rule also states a one-way implication. This implies that as long as the coordinate structure at hand is interpreted as a single list, it permits both the structure in (56a) and that in (56b). One might object that (56b) involves asyndetic coordination of *John* and *Mary*, which we have suggested comes with a sense of incompleteness (as a consequence of the marking rule). But the this is not a problem if *Bill* is interpreted as naming the final member of the same list.

(56) a.

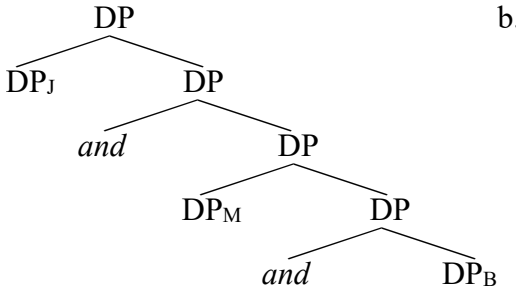


b.

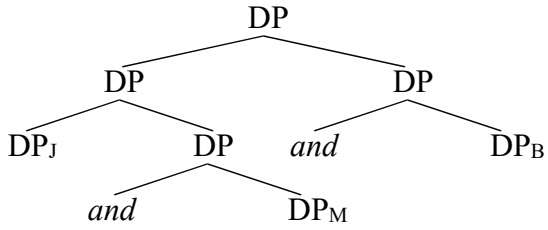


In contrast to *John, Mary and Bill*, the expression *John and Bill and Mary* need not be interpreted as a single list. It can also be interpreted as a list consisting of an individual and a pair (which is itself a list with two members) (see Borsley 2005 and Winter 2006). These multiple-list interpretations require specific structures and specific marking patterns (as observed previously by De Vries 2005 and Philip 2012, among others). If Mary and Bill form a pair, the structure must be right-branching (because of the constituency rule), with a coordinator attached to *Bill* (given that this DP denotes the final member of that pair), as well as to *Mary and Bill* (given that this constituent denotes the pair that constitutes the final member of the main list). The result is given in (57a). By contrast, if John and Mary form a pair, the structure must be left-branching, with a coordinator attached to *Mary*, as well as to *Bill* (see (57b)).

(57) a.



b.



We are not the first to argue for a separation of coordination and the linguistic marking of conjunction. Büring and Hartmann 2015 discuss German examples in which a semantic coordinator is buried in the right conjunct of an asyndetic coordination. An example is given in (58).

(58) Sie ist nicht reich, besitzt aber/jedoch eine Yacht.
she is not rich, owns but/however a yacht
'She is not rich but owns a yacht.'

There is some evidence that the particles *aber* and *jedoch* do really mark semantic coordination.

First, as already noted, unmarked asyndetic coordination often comes with a pragmatic effect of incompleteness. As Büring and Hartmann point out, this effect is absent in (58), but present in asyndetic coordinate structures whose second conjunct contains a regular adversative particle (see (59)).

(59) Sie ist nicht reich, besitzt dennoch eine Yacht…
she is not rich, owns nevertheless a yacht
'She is not rich, nevertheless owns a yacht…'

Second, clause-internal *aber* and *jedoch* can satisfy the demands of the concessive particle *zwar* (see (60a)). Whenever this particle appears in the left conjunct of a coordinate structure, it requires an adversative coordinator in the right conjunct. It is not satisfied if a regular adversative particle is inserted (see (60b)).

(60) a. Sie ist zwar nicht reich, besizt aber/jedoch eine Yacht.

she is ZWAR not rich, owns but/however a yacht

'It is true that she is not rich but she does own as yacht.'

b. *Sie ist zwar nicht reich und besizt dennoch eine Yacht.

she is ZWAR not rich and owns nevertheless a yacht

Finally, clause-internal *aber* and *jedoch* are in complementary distribution with uncontroversial coordinators, but regular adversative particles are not:

(61) a. *Sie ist nicht reich und/aber besizt aber/jedoch eine Yacht.

she is not rich and/but owns but/however a yacht

b. Sie ist nicht reich und besizt dennoch eine Yacht.

she is not rich and owns nevertheless a yacht

'She is not rich and nevertheless owns a yacht.'

On Büring and Hartmann's analysis, the German data demonstrate that syntactic coordination and the linguistic marking of conjunction and disjunction can be separated. The coordination in (58) is asyndetic, but adversative conjunction is marked through a particle buried in the second conjunct (Büring and Hartmann propose a semantic operation to deal with this).

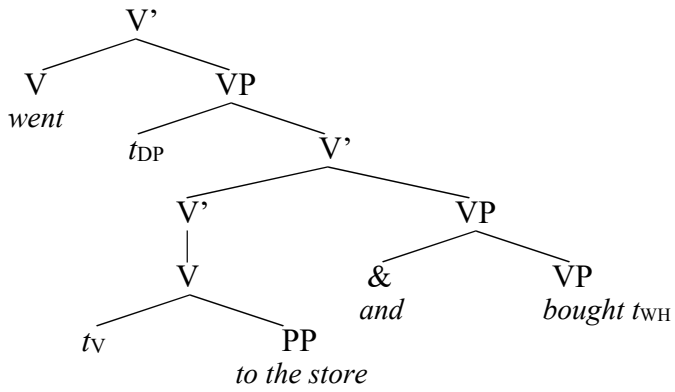
The above is obviously not a full-fledged theory of coordination, but it is sufficient for our current purposes. Before we turn to the analysis of asymmetric coordination, let us highlight two properties of the proposal. First, we have argued that coordination is a special instance of adjunction (namely mutual adjunction). This makes it perhaps less surprising that some instances of apparent coordination are in fact adjunction structures. Second, we have separated syntactic coordination from the linguistic marking of conjunction and disjunction through the coordinator. This makes it rather less surprising that a coordinator should show up in structures that do not, in fact, involve syntactic coordination.

6.3 Coordinators in type A coordination

We now return to the questions raised in section 2, which all involve similarities between regular coordination and type A coordination. As a starting point, consider the proposed analysis for the crucial portion of the example in (62), which is given in (63).

(62) Here's the whisky which$_1$ I [[went to the store] and [bought t_1]].

(63)



The apparent right conjunct is merged as a predicative adjunct, while the apparent left conjunct is part of a regular VP. This captures the patterns of extraction uncovered in sections 3-5.

Recall that in type A coordination, the first event is taken to be preparatory for the second, which we have assumed is an interpretive effect required to license the syntactic asymmetry of the structure. (It need not be encoded syntactically, as a similar construal is available for sequences of unconnected sentences.)

It is a direct consequence of our analysis that the interpretation of the apparent second conjunct is stronger than that of a purpose clause. An example like *John drank the milk warm* can only be true if the milk was warm. This effect of secondary predication carries over to (62): for the sentence to be true, the speaker must have bought whisky.

We now turn to the distribution of coordinators in type A coordination. In contrast to standard secondary predicates, the adjunct in (63) expresses an eventuality that is on a par with the eventuality expressed by the main verb. We propose that these two eventualities are

interpreted as semantically conjoined in the sense of the previous subsection: they form a list (one whose members are ordered temporally). This implies that the marking rule requires that *and* is attached to the adjunct (which denotes the final member of the list). None of this is particularly surprising on the theory developed in section 6.2. Given that the linguistic marking of conjunction and disjunction is divorced from syntactic coordination (i.e. mutual adjunction), it is possible for coordinators to show up in non-coordinate structures.

We now return to Lakoff's (1986) example in (64). We have argued that this example permits two analyses, depicted in (65) and (66), respectively.

(64) What did he go to the store, buy, load in his car, drive home and unload?

(65) What_1 did he $\left[\begin{array}{c}\text{[go to the store]}\left[\begin{array}{c}\text{[buy } t_1\text{]}\\ \text{[load } t_1 \text{ in his car]}\end{array}\right]\\ \text{[drive home] and [unload } t_1\text{]?}\end{array}\right]$

(66) What_1 did he $\left[\begin{array}{c}\text{[go to the store], [buy } t_1\text{]}\\ \text{[load } t_1 \text{ in his car]}\\ \text{[drive home] and [unload } t_1\text{]?}\end{array}\right]$

Both of these representations are grammatical, as long as the sequence of events described forms a single unstructured list (the various unmarked junctures in (65) and (66) may come with a sense of incompleteness, but this is harmless as long as the list continues). On a single-sequence interpretation, *unload* denotes the final item on the list and is therefore the only constituent that a coordinator must be attached to.

However, given the constituency rule, other groupings of events are possible. In particular, a structure with the shape of (65) is compatible with a reading in which there are two sub-sequences (going to the store, buying and loading, followed by driving home and unloading). However, if that is the target reading, the marking rule requires multiple occurrences of *and*. As in (67), *load in his car* must be marked because it denotes the final event in the first subsequence, *unload* must be marked because it denotes the final event in the

second subsequence, and *drive home and unload* must be marked because it denotes the final item on the list of subsequences.

(67) What did he go to the store, buy and load in his car, || and drive home and unload?

In the same vein, a structure with the shape of (66) allows a reading in which there are *three* subsequences (going to the store and buying, then loading, then driving home and unloading). By the marking rule, this reading requires the distribution of coordinators in (68).

(68) What did he go to the store and buy, || load in his car, || and drive home and unload?

Thus, once syntactic coordination and the linguistic marking of conjunction and disjunction are separated, the same rule that regulates the distribution of coordinators in regular coordinate structures can also capture their distribution in type A coordination. Moreover, it is correctly predicted that certain multiple-sequence readings become available if the distribution of coordinators is manipulated.

The final issue that emerges from section 2 is the observation that the adjoined category in type A coordination cannot be fronted (as opposed to purpose clauses and most other adjuncts):

(69) a. Sally went to the store and bought some whisky.

b. *And bought some whisky, Sally went to the store.

In order to tackle this issue, it is necessary to consider the exact formulation of the coordinate structure constraint. As already mentioned, it is likely that the constraint has two parts (see Grosu 1973, Postal 1998, Oda 2017 and Bošković 2018). The part most relevant so far is known as the element condition. It is a parallelism requirement that demands across-the-board movement in coordinate structures (see (1b)). But this is not enough. As it turns out, conjuncts cannot be moved even if the element condition is satisfied, as shown in (70). This implies that

a second clause must be added to the coordinate structure constraint, also known as the conjunct condition (see (1a)).

(70) a. *Who did you meet [t_{WH} [and a friend of t_{WH}]]?

b. *And who did you meet [a friend of t_{WH} [$t_{\&WH}$]]?

An apparent counterexample to the conjunct condition is given in (71a), where the position of *and John* to the right of the adverbial has sometimes been taken to be the result of extraposition (see Munn 1993). However, there is a body of work that argues that the extraposition analysis is incorrect, and that the structure is derived instead by partial ellipsis of a second clausal conjunct (see Chaves 2007 and Zhang 2010, among others; see also Hartmann 2015). One argument involves the ungrammaticality of (71b) (from Johnson 1996/2004), which follows from the ellipsis analysis, but remains unexplained under extraposition (compare (71c), where *each other* finds a plural antecedent, with (71d), where it does not).

(71) a. I met Mary yesterday and John

b. *I introduced Carrie to each other and Will.

c. I introduced [Carrie [$t_{\&DP}$]] to each other and Will.

d. [I introduced Carrie to each other] and [Will ~~I introduced~~ t_{DP} ~~to each other~~]

The conjunct condition is usually formulated in syntactic terms (as in (1a)). However, it could fairly straightforwardly be reformulated in terms of semantic coordination (as in (72)).

(72) Conjunct condition: Members of a disjunctive or conjunctive list cannot be moved.

If we take that step, the conjunct condition would apply not only to regular coordination, but also to the adjunction structures that characterize type A coordination. After all, the latter also encode a conjunctive list. This would then capture the ungrammaticality of examples like (69b). The fronted conjunct may be an adjunct, but it still denotes the final item on a conjunctive list

and is therefore immobile due to (72).

In sum, we propose to solve the apparent paradox posed by type A coordination as follows. The structure has properties of adjunction, in particular with regard to extraction, because it is in fact an adjunction structure. It also has some properties of coordination. We captured these by arguing for an analysis of coordination (in terms of mutual adjunction) which implies a separation of syntactic coordination and the the marking of conjunction and disjunction through coordinators. This separation allows us to claim that type A coordination involves the marking of semantic conjunction, even though the structure is not a coordinate structure. The distribution of the coordinator and the immobility of the apparent right conjunct can be traced back to this.

6.4 Outlook

Many questions remain. Chief among these is the severe semantic stricture on asymmetric coordination. As Lakoff (1986) shows, asymmetric coordination is licit only under three interpretive schemes (yielding type A, type B and type C coordination). The present paper does not (nor does it intend to) provide an answer as to why this stricture should exist, in common with most if not all of the literature. At the moment, we do not even know how to approach this matter, and so the conclusions drawn above come with an important qualification.

A more readily addressable issue is whether the pattern of extraction identified for type A coordination can be replicated for type B and type C coordination. At the moment we are not sure of this, but it is common wisdom that type B and C coordination permit extraction from the left conjunct only. This observation can be easily brought into line with an adjunction analysis, as many adjuncts are islands. Whether an adjunction analysis can work in other respects is very much on our research agenda.

Finally, our proposal makes a typological prediction. Extraction from adjuncts is not

universally permitted. It occurs in English (see Truswell 2011) and Swedish and Spanish (see Fábregas and Jiménez-Fernández 2016), but not in Dutch (see Bennis 1986) or French. If asymmetric coordination involves adjunction, we expect to find a cross-linguistic correlation between extraction from adjuncts and extraction from coordinate structures. The known data are compatible with this. For example, (73a) and (73b) are both ungrammatical in Dutch, and both have grammatical counterparts in English, Swedish (for relevant discussion, see Wiklund 2007 and Truswell 2011) and Spanish (Antonio Fábregas, p.c.; for relevant discussion see Fábregas and Jiménez-Fernández 2016). Similarly, Postal (1998) notes that English contrasts with French in that the latter disallows both extraction from adjuncts and extraction from type A coordination.

(73) a. *Dit is de jenever die Klaartje naar de winkel gegaan is om te kopen.
this is the gin that Klaartje to the shop gone is for to buy

b. *Dit is de jenever die Klaartje naar de winkel gegaan is en gekocht heeft.
this is the gin that Klaartje to the shop gone is and bought has

However, the known data in this domain are limited, and so more rigorous testing is necessary. How to go about this is not as straightforward as it may seem. There is crosslinguistic and language-internal variation with regard to the type of adjuncts that allow extraction. It is therefore not a priori clear what adjuncts should be considered in order to test for a correlation with extraction from type A coordination. For example, Brown (2017) reports that Danish allows non-across-the-board extraction from certain coordinate structures but disallows extraction from bare participial gerunds. However, Nyvad et al. (2017) show that Danish and the other Scandinavian languages do allow extraction from adjunct clauses (including *if* clauses and *because* clauses). In view of these complications, the typological work will have to be undertaken with a considerable degree of caution.

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