

Not at issue any more

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Abstract

This paper reconsiders the theoretical interpretation of an observation made by AnderBois et al. (2011) that the (not)-at-issue status of appositive relative clauses (ARCs) depends on their position in the sentence: Sentence-final ARCs are “more at-issue” and more able to be targeted by, for instance, direct denial than sentence-medial ARCs. It is shown that this prediction can be derived from a general theory of discourse interpretation. In the proposed view, (not)-at-issue status of ARCs boils down to their salience in discourse and accessibility for attachment of new discourse material as regulated by standard discourse mechanisms such as the Right Frontier Constraint (Polanyi, 1988). The present paper explores the theoretical implications of this approach. One of them is that the (not)-at-issue status of one and the same piece of content can change in time. What is at issue at one point in discourse may not be at issue any more at another point. This and other consequences of the proposed approach call into question some widely held assumptions about not-at-issue content and open up a new perspective on the relationship between attachment, at-issueness, and projection.

1 Introduction

It has become standard to identify at least three additional layers of meaning next to core assertive content: presuppositions, conversational implicatures and conventional implicatures. After Potts (2005), this whole big class of meaning types received the label of not-at-issue content—content that is secondary with respect to the main point of the sentence. Presuppositions and implicatures do not contribute to the truth conditions of the sentence in the “normal” way. One manifestation of this deviant behaviour is *projection*: if a presupposition or conventional implicature trigger occurs in the syntactic scope of an operator (such as negation, modal operators, quantifiers, etc.) it is interpreted as if it were outside the scope of that operator. Another manifestation, which is often used as a test for not-at-issue status, is the apparent inability of not-at-issue content to be directly denied by expressions like *No* or *That’s not true* (see Tonhauser, 2012, and references therein).

The focus of this paper is on one class of expressions that contribute not-at-issue content—appositive relative clauses (henceforth ARCs)—and in particular on the observation recently made by AnderBois et al. (2011) and studied in more detail by Koev (2013) and Syrett and Koev (2015) that (not)-at-issue status of ARCs depends on their position in the sentence. So in particular, the sentence final ARC in (1-a) can be more easily targeted by a subsequent direct denial (2) than a sentence medial ARC as in (1-b).

- (1)
 - a. He took care of his husband, who had prostate cancer.
 - b. His husband, who had prostate cancer, was being treated at the Dominican Hospital.
- (2) No, he had lung cancer. ✓ after (1-a); ?? after (1-b)

Koev (2013) and Syrett and Koev (2015) argue that this observation presents a challenge to the widely held assumption that not-at-issueness is hard-wired in the conventional semantics of ARCs. They develop an alternative view in which the (not)-at-issue status of ARCs depends on the order of processing of the ARC and the main clause. Roughly, sentence-final ARCs can be at-issue because (depending on the underlying syntactic construal) they can be processed after the processing of the illocutionary act associated with the main clause is completed. In this way, they constitute the most recently processed and therefore the most salient content by the time a denial like (2) is proffered.

The present paper further develops this line of thinking, but makes it run on discourse structure rather than syntax. Existing general theories of discourse interpretation, such as Asher and Lascarides (2003), provide an elaborate set of mechanisms that regulate the order of processing of discourse units and the salience/prominence of related content,¹ as well as its accessibility for further discourse operations such as denial. The approach presented in this paper simply makes use of those mechanisms, and capitalizes on the idea that at-issue status of one and the same piece of content can *change in time*. What is at issue at one point in discourse may be not at issue any more (or yet) at another point. The main goal of this paper is to explore the theoretical ramifications of this radically discourse-based notion of at-issueness. It will be shown that if this view is correct, then it presents a challenge to a number of widely held assumptions about not-at-issue content. First, it calls into question the immunity of not-at-issue content to truth-value judgement on which the direct denial test is based. Second, it implies that appositive relative clauses share some of their not-at-issue properties with other kinds of subordinate clauses which are unheard of to contribute projective content, suggesting that we should rethink the relationship between at-issueness and projection. Finally, if some piece of content is not at issue any more it means that it *was* at issue at some point, and at that point it would have behaved like normal at issue content, which undermines the attempts to hard-wire not-at-issue status in the semantics of appositive relative clauses and presents a serious problem for approaches like AnderBois et al. (2015).

It is not the goal of this paper, however, to provide empirical evidence for these hypotheses. Intuitive examples illustrating the predictions and indirect evidence from previous corpus-based and experimental studies will be provided where possible. However, the proposed hypotheses will largely remain open for future experimental testing. Neither is it our goal to develop a full-scale formalization of the theory. The main argument will be held at a conceptual level, but can be easily embedded in a formal framework such as Segmented Discourse Representation Theory of Asher and Lascarides (2003) or the dialogue grammar of Ginzburg (2012).

The paper is structured as follows: Section 2 recapitulates the findings of Syrett and

¹I assume that salience is a specific manifestation of prominence, which reflects the degree of activation of semantic entities (individual, event, proposition, question under discussion, etc.) in the context. Prominent elements of a linguistic representation serve as anchors for larger structures and license more operations than less prominent elements. In particular, salient semantic entities more easily serve as antecedents for anaphoric expressions, and discourse structure is built around those anaphoric links.

Koev's (2015) experimental study on the linear position dependence of the at-issue status of ARCs and their theoretical interpretation. Section 3 presents the generalized discourse-based view of at-issue status and reinterprets Syrett and Koev's results within that framework. The central section of this paper is section 4 in which further implications of the theory developed in section 3 are explored, with the main focus on the impossibility of direct denial as a characteristic of not-at-issue content. Finally, section 5 rounds up the discussion and sketches out some rough directions towards linking up the discourse-based approach to at-issueness with a pragmatic approach to projection *à la* Simons et al. (2011).

2 Syrett and Koev (2015)

This section briefly summarizes the findings of Syrett and Koev (2015, henceforth S&K) concerning appositive relative clauses (ARCs), the effect of their position in a sentence on the at-issue status and their contribution to the truth value of the sentence as a whole.

Experiments: One of the most interesting results of S&K's experiments is evidence for the observation (previously made by e.g. AnderBois et al., 2011) that the (not-)at-issue status of ARCs depends on their position in a sentence. Sentence-medial ARCs as in (3-a) are normally not at issue, whereas sentence-final ARCs (3-b) are more likely to be at issue.

- (3) a. My friend Sophie, who performed a piece by Mozart, is a classical violinist.
b. The symphony hired my friend Sophie, who performed a piece by Mozart.

It is generally assumed that only at-issue content can be targeted by a direct denial, such as *No* or *That's not true*. In one of the experiments (Experiment 2), S&K asked the participants to choose between a denial of the main clause content—*No, she's not* for (3-a) or *No, they didn't* for (3-b)—and a denial of the appositive content (*No, she didn't*). As expected, the results showed an overall preference for the denial targeting the content of the main clause (73.9% of cases). However, a denial targeting the appositive content was chosen more frequently for sentence-final ARCs (35.5%) than for sentence-medial ARCs (21.1%). These results show that although appositives are largely not at issue, they *can* be at issue. Moreover, sentence-final ARCs are more likely to adopt this status than sentence-medial ones.

In another experiment (Experiment 3), S&K replicated this result using elliptic questions instead of denials. Sentences with medial and final ARCs, (4-a) vs. (4-b), were followed by an elliptic question consisting of just the *wh*-word *Why?* Depending on the ellipsis resolution to the main or the appositive clause the question could be interpreted either as *Why was Chloe chosen to audition?* and *Why did Chloe decide to dress in a classical ballet style?* The participants were offered a choice between answers matching the two interpretations of the question, cf. (5).

- (4) a. Chloe, who decided to dress in a classical ballet style, has been chosen to audition for the 'All Stars' Dance Company.
b. The 'All Stars' Dance Company has chosen to audition Chloe, who decided to dress in a classical ballet style.

- (5) a. Because they think Chloe could be a good addition to their company. (main)
- b. Because she wants to be taken seriously as a classical ballet dancer. (appos)

It turned out that participants perceived the main and the appositive clause as equally possible targets of the *Why?* question (51.7% vs. 48.3%, respectively). However, the answer linked to the ARC was chosen 67.1% of the time when it was sentence final, and only 29.6% of the time when it was sentence medial.

Finally, in the next group of experiments S&K addressed the question whether the appositive clause makes a contribution to the truth conditions of the sentence as a whole. They constructed sentences in which both the main clause and the appositive content were factually true (6-a), the main clause was true but the appositive was false (6-b), the appositive was true but the main clause was false (6-c), and where both were false (6-d). Participants were asked to judge the sentences as true or false and to estimate their confidence on a scale of 1 to 5.

- (6) a. Australia, which is a continent, is in the Southern hemisphere. T-MC, T-APP
- b. Australia, which is a planet, is in the Southern hemisphere. T-MC, F-APP
- c. Australia, which is a continent, is in the Northern hemisphere. F-MC, T-APP
- d. Australia, which is a planet, is in the Northern hemisphere. F-MC, F-APP

The results revealed that only sentences like (6-a), where both the main clause and the appositive were true, were judged true. In all the other three cases, the sentences were overwhelmingly and confidently judged false. That is, whenever one of the propositions, no matter whether it appeared as a main clause or as an appositive, was false, the whole sentence was judged false. In other words, it seems that the truth values of the main clause and the appositive (whether at issue or not) were combined to determine the truth value of the whole sentence just like in a regular logical conjunction. Moreover, this result obtained regardless of the linear position of the ARC in the sentence, which was also systematically varied.

In sum, S&K showed that, contrary to previous claims in the literature, appositive relative clauses contribute to the truth conditions of the sentence in a regular fashion. However, their ability to be targeted by denials or questions depends on their position in the sentence. Final ARCs are more able to serve as anchors for subsequent utterances than medial ARCs.

Theoretical discussion: S&K discuss a number of previous approaches to the semantics of ARCs: multidimensional approaches, such as Potts (2005), which represent the main clause and the appositive clause content as two distinct layers of meaning not combined in sentence semantics; as well as unidimensional approaches (AnderBois et al., 2011; Murray, 2010; Schlenker, 2010), which assume that sentences with appositives have a single truth value, of which appositive content is a vital part, but while appositives have an immediate effect on the context and hence are not at issue, main clauses only potentially update the context—they introduce an update proposal, which can be accepted or rejected by the conversational participants—and hence are at issue. While some of these approaches may be more or less successful in explaining S&K’s finding that the appositive content makes a contribution to the truth conditions of the sentence as a whole, none of them accounts for the finding that sentence-final ARCs

behave more often like at-issue content than sentence-medial ARCs.²

Koev's (2013) and S&K's explanation is as follows: The first assumption is that appositives are *illocutionarily independent*, that is, the appositive and the main clause represent two independent speech acts. Second, sentence-medial ARCs are always syntactically attached to their anchor, whereas sentences with final ARCs are structurally ambiguous: the ARC can be attached to either the anchor or the root node of the sentence. Given that appositives are interpreted in their syntactic structural position, it follows that the assertion associated with a medial ARC is introduced next to the anchor before the assertion associated with the main clause is completed. If denials and questions primarily target the assertion that has been performed last, then it is clear that they will target the main clause content in this case. The same holds for sentence-final ARCs in case they are attached to the anchor. However, if they are attached at the root level, the appositive and the main clause are attached at the same level and the assertion of the main clause is completed before the appositive clause is interpreted. Hence the appositive clause content is asserted last and therefore serves as reference point for subsequent denials and questions.

In other words, S&K propose that the linear order effects on the at-issue status of ARCs have to do with the order of interpretation of the appositive and the main clause. While this idea appears essentially correct, it can and should be embedded in a general theory of discourse interpretation. S&K briefly mention another possible avenue for the analysis of the order effects suggested in a footnote by AnderBois et al. (2011), who in turn have it from Nicholas Asher (p.c.). The idea is that (final) appositives can enter into "matrix-level discourse relations in a discourse structure". Medial appositives, as AnderBois et al. put it, would be subject to more constraints on their interpretation because they would be discourse-subordinate to the clause they are syntactically attached to, while final appositives need not be. In the rest of this paper a theoretical analysis of the linear order effect is developed based on this idea. While remaining close in spirit to S&K, it is shown that since this theoretical approach is derived from a general theory of discourse interpretation, it has rather more far-reaching theoretical implications.

3 Appositive relative clauses in discourse

This section first presents a general picture of the hierarchical discourse structure and its processing (section 3.1) and then applies that approach to ARCs, first on the assumption that ARCs are discourse-structurally subordinate to their main clauses (section 3.2) and then extending the scope to cases of discourse-structural coordination (section 3.3).

3.1 Subordination and coordination in discourse structure

As a starting point let us take the widely accepted view that discourse structure is characterized by coherence relations that connect discourse units (clauses, sentences,

²In a more recent version of their paper AnderBois et al. (2015) fix this problem in their framework by stipulating that sentence-final ARCs can be ambiguous between a direct update imposition and an update proposal. However, they leave open the question why this could be so, referring to Koev's ideas on this account as a likely solution strategy.

paragraphs) in discourse and assign each discourse unit a function with respect to another unit. For example, one sentence can be an *Elaboration* or an *Explanation* of another sentence; it can be in *Contrast* with another sentence, or form a *Narration* together with one or more other sentences (Asher, 1993; Asher and Lascarides, 2003; Kehler, 2002, and many others; see also Zeevat 2011 for a recent overview). In addition, it is assumed that each discourse unit addresses an *issue*, or a question under discussion (QUD). For example, (7-a) could be seen as addressing the question *What happened?*, whereas (7-b) is an *Explanation* of (7-a) and an answer to the QUD *why* the Millers bought a house in the country.³

- (7) a. The Millers bought a house in the country.
 b. The prices for country houses started to rise again.

It is standard to make a distinction between two kinds of coherence relations: coordinating and subordinating ones. The distinction is crucial for explaining how discourse progresses and which of the previously processed utterances are open for attachment of new discourse material at each point in discourse interpretation. Informally, in coordinating relations (*Contrast, Parallel, Narration*) the discourse units are on a par and the discourse progresses in a normal left-to-right fashion, whereas subordinating relations (*Elaboration, Explanation*) lead to hierarchical structures and discourse embedding, and do not “push the discourse forward”. Here is an illustration of what that means. The discourse structure of (7) is shown in Figure 1. By convention, coordinated discourse units are arranged horizontally from left to right in the order of processing and subordinated units are arranged vertically from top to bottom. Since (7) contains only one subordinating coherence relation (*Explanation*) the discourse units are arranged vertically.

The accessibility of the nodes of the discourse graph for attachment of new discourse material is regulated by the Right Frontier Constraint (going back to the ideas of Polanyi, 1988; Webber, 1991), which says that only the nodes on the right frontier of the discourse graph are open for attachment. The right frontier consists of the last processed (rightmost) node and all the nodes it is subordinated to (the nodes that are above it). Obviously, in (7) (figure 1) both nodes are on the right frontier. This means that the next sentence in discourse can pick up on the prices, cf. (8-a), or it can go back to the topic of the first sentence (7-a) and continue about the Millers, cf. (8-b). It is in this sense that subordinating relations do not push the discourse forward.

- (8) a. They rose by 1.7% since the start of the year. [the prices]
 b. They rented it out. [the Millers]

Notice that the interpretation of the pronoun *they* goes together with the attachment of the sentence: *they* = the prices in (8-a); *they* = the Millers in (8-b). This is the result of the strongly anaphoric nature of such pronouns, which require a salient antecedent for their interpretation. Being part of the sentence to which the current sentence is directly attached is one of the factors that make a potential antecedent salient.

The continuation in (8-a) is an *Elaboration* of (7-b) giving more information about the prices. Since *Elaboration* is again subordinating, it expands the structure in the vertical dimension, cf. figure 2, so all the nodes remain on the right frontier and open

³For discussion of the mapping between coherence relations and questions under discussion see e.g. Onea (2013).

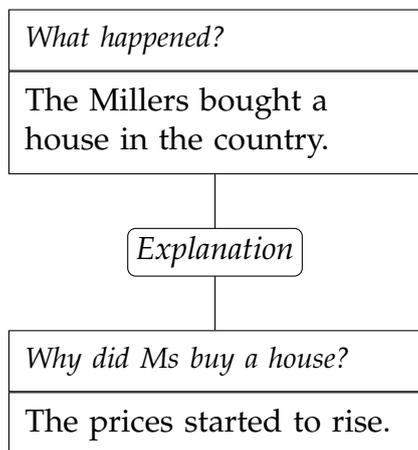


Figure 1: Discourse structure for (7)

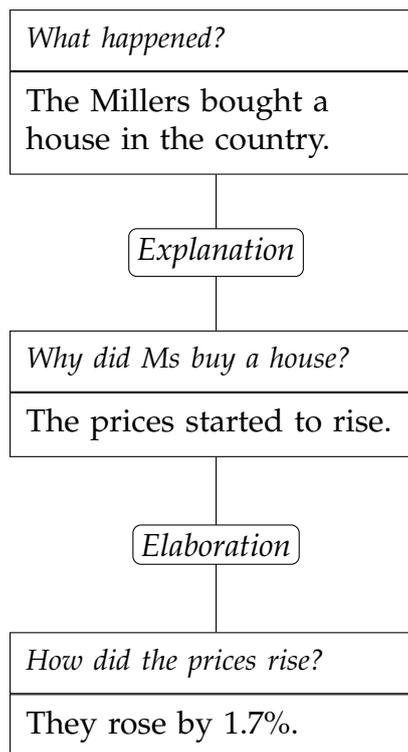


Figure 2: Discourse structure for (7)–(8-a)

for attachment. The continuation in (8-b) stands in a *Narration* relation to (7-a)—it tells the next event in the story. *Narration* is a coordinating relation, therefore the structure expands from left to right, as shown in figure 3. In addition, coordination leads to the construction of the Coordinated Discourse Topic node (Txurruka, 2003), represented here as the overarching QUD *What happened?*, which is split into subquestions *What happened at t_1 ?* *What happened at t_2 ?* corresponding to the coordinated units (7-a) and (8-b).⁴ This time the right frontier has moved forward: the nodes corresponding to the sentences (7-a) and (7-b) are not accessible any more; the right frontier contains the last processed node of (8-b) and the root QUD node *What happened?* This means that the next sentence in this discourse could only connect to the last processed sentence or to the discourse as a whole, represented by the root node. If the next sentence again starts with the pronoun *they*, the pronoun could only refer to the Millers (or somewhat less plausibly to the group of the Millers and the prices together), but it could not refer just to the prices. It is in this sense that coordinating relations push the discourse forward, or make it progress.

The Right Frontier Constraint is in fact a structural reformulation of a generalization formulated earlier by Grosz and Sidner (1986) in more procedural terms. The point is that hierarchical structures require a stack memory model (first-in-last-out) for their processing, whereas flat structures require a queue memory model (first-in-first-out). In Grosz and Sidner’s terms, each utterance in discourse is associated with a *focus space* containing all semantic entities that are introduced by that utterance—individuals, events, propositions, etc. Let us assume that the QUD also constitutes

⁴These questions are subquestions of *What happened?* in the logical sense of e.g. Groenendijk and Stokhof (1997) only if the latter question is construed as *What happened at which time (within a specific time domain)?* Arguably, this is the most plausible and the intended construal.

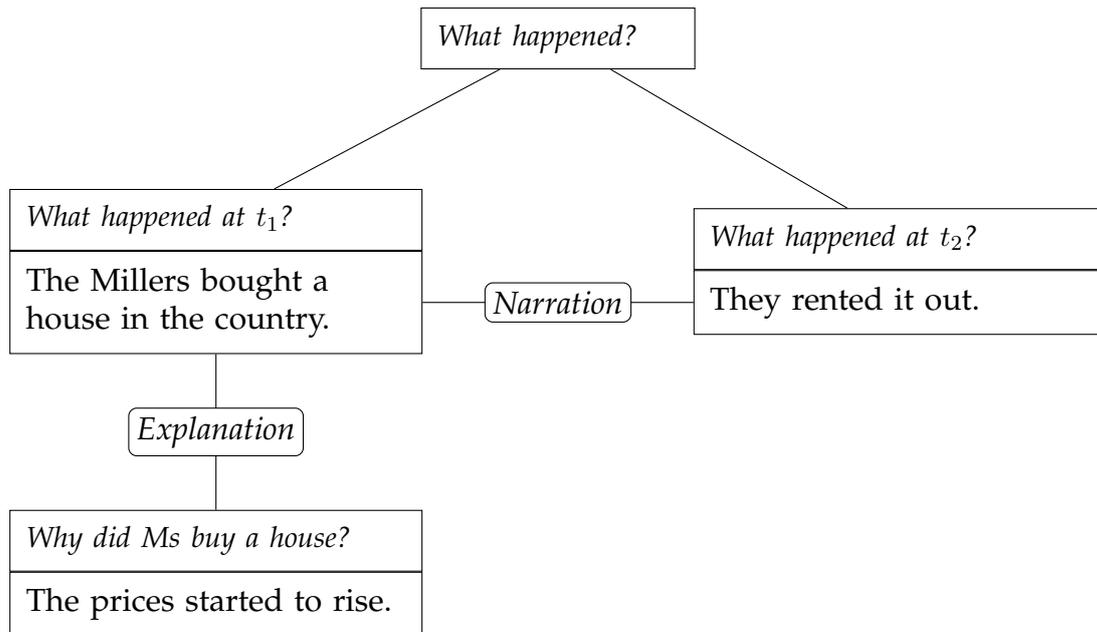


Figure 3: Discourse structure for (7)–(8-b)

part of the focus space. Thus focus spaces and in particular QUDs as their part are stacked when a subordinating relation is processed, and queued when a coordinating relation is processed.⁵

The updates of the stack of focus spaces/QUDs for (7) and its continuations is shown in figures 4 and 5. Figure 4 shows that in the case of (7)–(8-a) we start out with the issue *What happened?* (appropriately restricted in time, space, and/or related to a particular occasion). Since (7-b) stands in a subordinating relation to (7-a) its issue (*Why?*) is *pushed* on top of the stack, so the original issue (*What happened?*) is not removed but stays underneath the new issue. The same happens with the issue (*How?*) of the third sentence (8-a), since it is again subordinate to (7-b).⁶ The topmost issue on the stack is the current QUD, the content of the utterance associated with it is currently *at issue* and it is open for further discourse operations. However, the issues stacked underneath it can be made available by *poppping* focus spaces off the stack. Hence the

⁵Most examples of coordination discussed in the literature are simple enough for the queue to always have the trivial length of one. This is why there is a lot of talk about stacks (notably Ginzburg, 1996; Roberts, 1996, with respect to QUDs), and little talk about queues. However, see Ginzburg (2012, pp. 98–100) for discussion of cases that lend themselves naturally to an account in terms of non-trivial queues.

⁶Previous QUD-based approaches to discourse interpretation such as Roberts (1996) employed the stack mechanism in a more restricted way. For instance, Roberts only allows question q' to stack on top of q if the complete answer to q' contextually entails a partial answer to q . Whether this condition applies to subordinate questions *Why?* and *How?* in relation to *What happened?* would strongly depend on our assumptions on what is in the context, i.e. which premises are input to ‘contextual entailment’. In any case, *Why?* and *How?* are not subquestions of *What happened?* in any more or less simple sense of context (such as e.g. Groenendijk and Stokhof, 1997).

Nevertheless I assume, projecting the ideas of Grosz and Sidner (1986), Polanyi (1988) and Asher and Lascarides (2003) on the present QUD-based setting, that these questions should be treated like subquestions in terms of stack processing. Why this is so, that is, why such questions are subordinate while e.g. *What happened next?* is not, or yet in other words, why *Elaboration* and *Explanation* are subordinating relations while e.g. *Contrast* and *Narration* are coordinating, is a difficult question and a matter of on-going research (see e.g. Onea, 2013). For the time being, we will have to take it for granted.

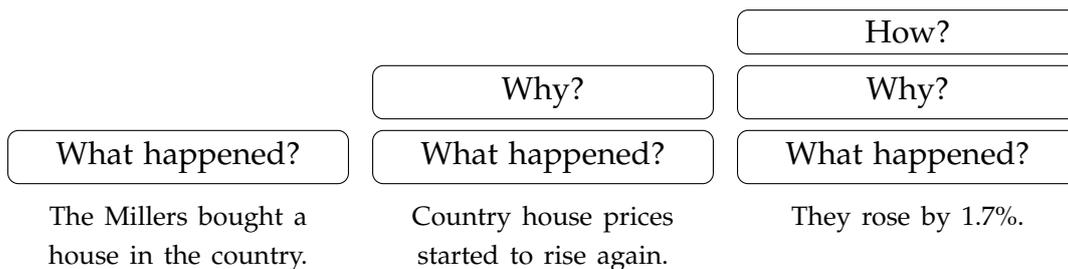


Figure 4: QUD stack update for (7)–(8-a).

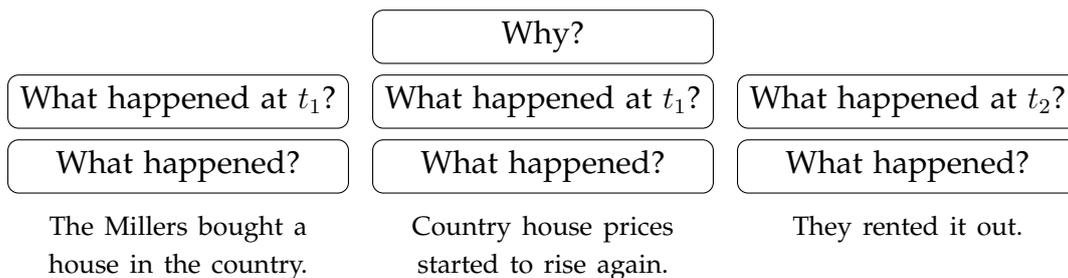


Figure 5: QUD stack update for (7)–(8-b).

content of earlier utterances associated with those issues can be made at issue again.

Notice that we have to use this option in (7)–(8-b) in order to be able to connect (8-b) at the level of the first sentence (7-a), cf. figure 5. First, the issue associated with (7-b) *Why did the Millers buy a country house?* must be considered handled and popped off the stack. Next, since *Narration* is a coordinating relation and coordinated QUDs are processed on the first-in-first-out basis, the question associated with (7-a) *What happened at t_1 ?* must be considered resolved and popped off the stack as well, to be subsequently replaced by the coordinated question *What happened at t_2 ?* Crucially, at the end the *Why?* issue and the *What happened at t_1 ?* issue cannot be reopened because they are gone from the stack. Therefore the content of the respective utterances is not available for further discourse operations and is not at issue any more.

3.2 ARCs as subordinate discourse units

Now let's apply the approach sketched out above to the analysis of the linear order effect with ARCs. I follow S&K in assuming that ARCs are illocutionary acts independent from that of the main clause. A further assumption is that each illocutionary act addresses an issue of its own and constitutes a discourse unit, i.e. participates in coherence relations.⁷ It appears that ARCs have a strong tendency to connect to their main clauses via subordinating coherence relations (see e.g. Loock, 2007, and discussion in section 4.2.1). For example, the ARC in (9) addresses the question *Who is Chloe?* and is supposed to help the hearer identify the referent behind the name. The coherence relation can be characterized either as *Elaboration* (the ARC provides more information on one of the entities mentioned in the main clause) or as *Background* (the ARC supplies missing presupposed content and helps understand the main clause). In either case

⁷The reverse is not true: A discourse unit is not necessarily a speech act. In particular, it can be smaller than a speech act. See discussion in section 4.2.

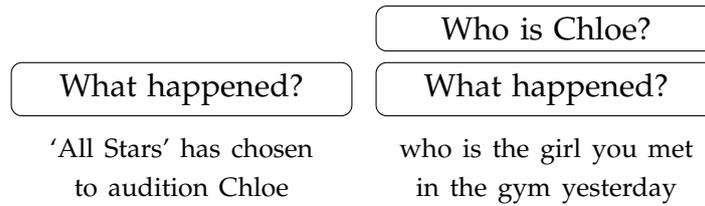


Figure 6: QUD stack update for a sentence-final ARC.

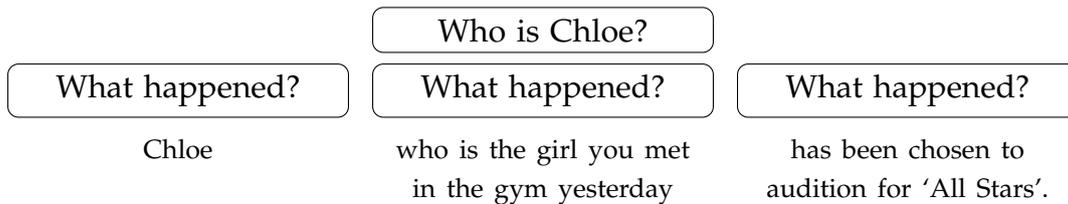


Figure 7: QUD stack update for a sentence-medial ARC.

the relation is subordinating.

- (9) a. 'All Stars' has chosen to audition Chloe, who is the girl you met in the gym yesterday.
 b. Chloe, who is the girl you met in the gym yesterday, has been chosen to audition for 'All Stars'.

Figure 6 shows the sequence of QUD stack updates for (9-a), where the ARC is final. As is generally the case with subordinating coherence relations, the issue associated with the ARC is pushed on the stack on top of the main clause issue. And this is the final state of the stack for this sentence. The ARC's issue *Who is Chloe?* is on top, therefore the ARC content is at issue. However, the main clause issue *What happened?* is still there underneath it. Just like in example (7)–(8-a) we have the option to pop off the topmost question, in which case the main clause issue becomes topmost, and the main clause content becomes at issue again. This reconstructs S&K's prediction that sentence-final ARCs can be at issue or not.

In (9-b), which has a medial ARC, the update of the QUD stack must take place in the middle of the sentence, cf. figure 7. From the fact that the medial ARC is followed by a portion of the main clause, and the assumption that the issue associated with the currently processed discourse unit must be topmost on the stack, it follows that the issue associated with the ARC (*Who is Chloe?*) must be popped off the stack before the rest of the main clause is processed. This means that by the end of the sentence only the main clause issue (*What happened?*) is left on the stack. Therefore the main clause content is at issue and the ARC content is not at issue any more. That is, again, S&K's prediction that (by the end of processing the sentence) medial ARCs are always not at issue is replicated.

Certain care is required with sentence-medial ARCs when reasoning in structural terms. Recall that the Right Frontier consists of the last processed node and all the nodes it is subordinated to, i.e. the nodes that are above it, and not the nodes that are below it. In sentences with medial ARCs the last processed node is the main clause. The ARC is structurally below it. Therefore the ARC is not on the Right Frontier, even

though the naive geometry of the discourse graph might suggest the contrary. In other words, whether the theory is stated in procedural or in structural terms, the predictions are the same.

3.3 Continuative ARCs

In section 3.2 it was assumed that ARCs are connected to their main clauses by subordinating coherence relations such as *Explanation*, *Elaboration*, *Background*, etc. However, if ARCs and main clauses form independent illocutionary acts that participate in coherence relations on a par with other discourse units, it should be possible, in principle, to connect ARCs via other kinds of coherence relations, in particular, by coordinating relations like *Narration* and *Contrast*. This is in fact the case: Holler (2008) argues that coordinating coherence relations holding between the main and the relative clause is a characteristic feature of the class known in the literature as *continuative* ARCs.⁸ The following German examples (from Holler, 2008) illustrate ARCs connected to the main clauses by a *Narration* relation (10) and by a *Contrast* relation (11).

(10) *Narration*:
 Oskar traf einen Bauern, den er dann nach dem Weg fragte.
 Oskar met a farmer whom he then for the way asked
 ‘Oskar met a farmer, whom he then asked the way.’

(11) *Contrast*:
 Oskar machte einen Versuch, der aber restlos scheiterte.
 Oskar made an attempt which however completely failed
 ‘Oskar made an attempt, which however completely failed.’

First, let’s see that the predictions of the discourse-based approach are different for these cases than for cases with discourse-structurally subordinate final ARCs like (9-a) in section 3.2. The discourse structure for (10) is shown in figure 8. Notice that the node corresponding to the ARC and the overarching discourse topic node (*What happened?*) are now on the right frontier. However, since the coherence relation between the ARC and the main clause is coordinating, the node of the main clause is closed off by the subsequent ARC, and is therefore not on the right frontier. This means that a subsequent denial, *Why?* question, *Explanation* or any other kind of discourse continuation could only relate to the ARC or the sentence as a whole, whereas the content of the main clause alone is not accessible.

The same argument phrased in terms of the QUD stack update: Since the relation between the ARC and the main clause is coordinating, their focus spaces and QUDs are processed in a first-in-first-out fashion, i.e. the question associated with the main clause (*What happened at t_1 ?*) is first resolved and popped off the stack, after which the question of the ARC (*What happened at t_2 ?*) is pushed on the stack, cf. figure 9. This means that by the end of processing (10) the ARC is at issue, while the main clause is not at issue any more. Moreover, unlike the case with discourse-structurally subordinate final ARCs, cf. (9-a) and figure 6, there is no way to make the main clause at issue again because its QUD *What happened at t_1 ?* is gone from the stack. In other words, the

⁸In the terminology used by Holler (2008), continuative and appositive relative clauses are mutually exclusive subclasses of non-restrictive relative clauses. I will, however, continue using the term ‘appositive’ as a synonym of ‘non-restrictive’ with respect to RCs.

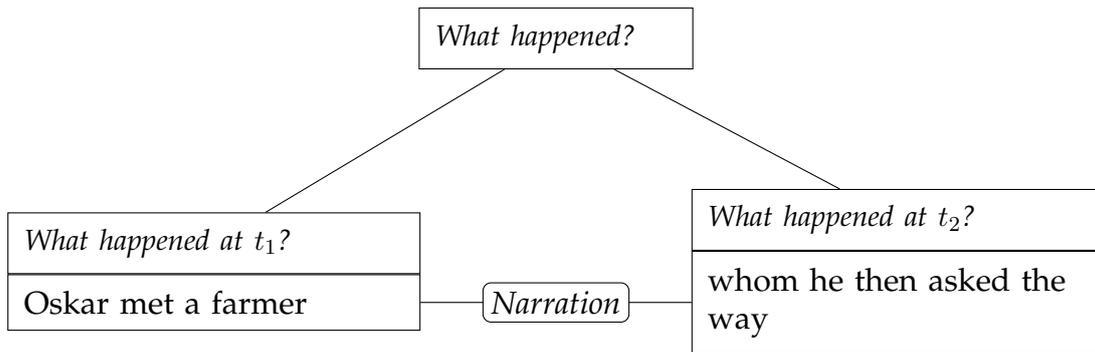


Figure 8: Discourse structure for (10)

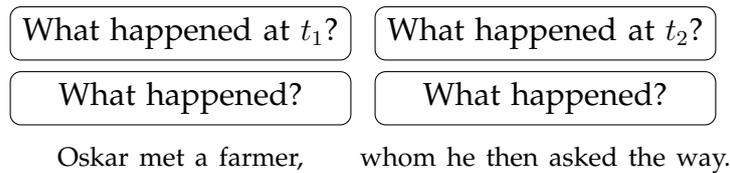


Figure 9: QUD stack update for (10)

prediction for sentence-final continuative ARCs is that they are at issue, while the main clause cannot be at issue. As a consequence, in an experimental setting we should expect even more expressed at-issue behaviour from final continuative ARCs than from final discourse-structurally subordinate ARCs.

Second, it has been repeatedly claimed in the literature that continuative ARCs can only be sentence-final (Loock, 2007; Holler, 2008, and references therein). If this is correct then this is an additional factor that could have magnified the effect of position in S&K's experiments. Since S&K did not control for coherence relations it could well have happened that the manipulation of position of the ARC would go together with a change in interpretation in terms of coherence relations. Indeed, this is what seems to be going on in example (4), repeated below. The sentence medial ARC in (12-a) can be naturally interpreted as an *Explanation* of the main clause: Chloe's decision to dress in a classical ballet style (on some occasion that preceded the audition) was a factor that positively influenced the Company's choice to audition her, i.e. Chloe was chosen *because* she appeared in a classical outfit. It could also be an *Elaboration* just describing how Chloe looked in that situation. However, the sentence in (12-b) has an additional and perhaps even dominant interpretation: After Chloe has been chosen to audition, she decided to dress in a classical ballet style for that audition, in which case the ARC is related to the main clause by *Narration*. Crucially, this interpretation does not seem to be available for (12-a).

- (12) a. Chloe, who decided to dress in a classical ballet style, has been chosen to audition for the 'All Stars' Dance Company.
 b. The 'All Stars' Dance Company has chosen to audition Chloe, who decided to dress in a classical ballet style.

In other words, this is what could have happened in the experiments: Medial ARCs would always be interpreted as related by subordinating coherence relations, whereas

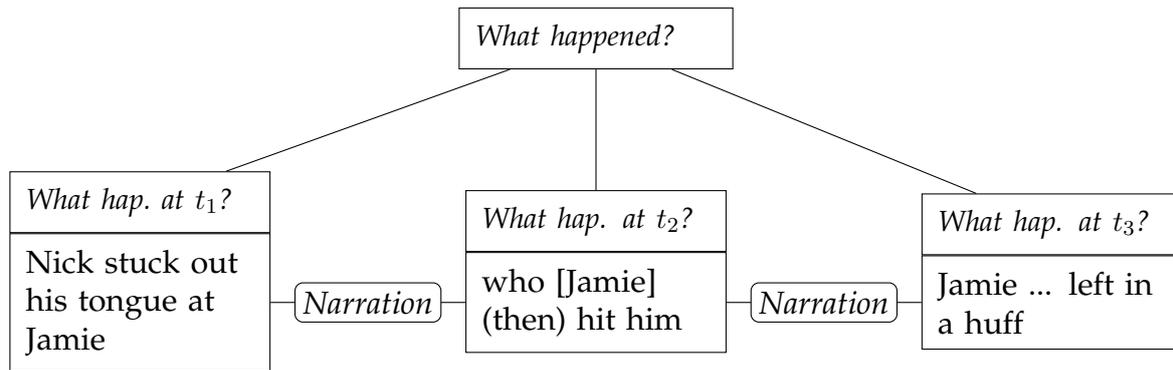


Figure 10: Discourse structure for (13)

final ARCs would sometimes be interpreted with subordinating and sometimes with coordinating relations. Since in the latter case the ARC is predicted to *always* be at issue, sentence-final ARCs could have received more at issue interpretations because they received more continuative interpretations.⁹

However, Koev (2013, pp. 26–37) contests the generalization that only sentence-final ARCs can be continuative. He discusses examples like (13) which show that a sentence-medial ARC can introduce an event that forms part of the main story line, that is, it is connected by a *Narration* relation to the surrounding discourse units, see figure 10.

(13) Nick stuck out his tongue at Jamie. Jamie, who (then) hit him, left in a huff.

But notice that the hitting happens after Nick’s sticking out his tongue and before Jamie’s leaving. That is, by the end of processing the sentence with the ARC, the ARC does not represent the last event in the sequence. The main clause event follows it, which suggests that the main clause is attached to the ARC by another *Narration* relation and closes the ARC off as a possible attachment site. Therefore, the ARC is not at issue. Indeed, it seems impossible to interpret the medial ARC as representing an event that happens after the event of the main clause.¹⁰ In other words, yes, medial

⁹In fact, this is very likely the explanation alluded to by Nicholas Asher in his p.c. to AnderBois et al. (2011).

¹⁰A possible reason why the continuative medial ARC in (13) cannot introduce an event following the event of the main clause is because the latter has not been introduced in the discourse universe yet. This is particularly true for ARCs anchored to subjects. However, if the medial ARC follows the verb, as in (i), the interpretation where the ARC event follows the main clause event is possible, and maybe even preferred. Interestingly, the continuation in (ii-a) which picks up on the main clause event seems more coherent than (ii-b) which picks up on the medial ARC.

- (i) Chloe introduced Christine, who then suddenly had to leave, to Fernando.
- (ii)
 - a. He was impressed by her faultless Portuguese.
 - b. She was summoned to the hospital for an urgent operation.

This suggests that even though the ARC presents the next event in the story, it is an event from a different story than the one the speaker wants to tell right now. So even though the ARC is related by *Narration* to the main clause, for all other purposes it is handled like a subordinating coherence relation. On the face of it, this example presents a challenge to the simple picture outlined in this section. However, the assumption that subordination/coordination is an intrinsic property of specific coherence relations has been questioned in the literature. In particular, Asher and Vieu (2005) have argued that at least some

ARCs can be continuative, but this does not change anything with respect to our main point. They are not on the right frontier and are not at issue by the end of the sentence.

In sum, the approach based on discourse structure even offers two different possible explanations to the positional effects observed by S&K: one based just on the considerations related to the order of processing of embedded structures (outlined in section 3.2), the other one based on order-dependent differences in coherence relations. Teasing apart these two factors remains a task for future research. The rest of the paper mainly concentrates on the majority case: discourse subordinate ARCs.

4 Further implications

The previous section showed that S&K's predictions with respect to the positional effects of ARCs can be reconstructed in the discourse-based approach to (not-)at-issue content. This section will show that the discourse-based approach makes predictions that go beyond those of S&K. Section 4.1 discusses the prediction that positional effects should be observable not only in the acceptability of direct denials but also in a wide range of discourse continuations of other kinds, as well as in the interpretation of anaphoric expressions in subsequent discourse. Section 4.2 discusses parallelisms between ARCs and other kinds of subordinate clauses, in particular adverbial clauses. It extends the analysis offered in the previous section to cover the specifics of subordinate clauses and discusses the possibility that the behaviour of ARCs is a manifestation of a more general regularity that concerns all subordinate clauses. Finally, section 4.3 explores the predictions that follow from the dynamic nature of at-issueness.

4.1 Discourse attachment other than denial

Recall that one of the tests used to assess the at-issue status of a piece of content is the direct denial test (Tonhauser, 2012) and one of S&K's findings was that sentence-final ARCs are easier to deny in a subsequent utterance like *No* or *That's not true* than sentence-medial ARCs, cf. (14)–(15). In the discourse-based approach this finding can be explained as follows: By the end of processing a sentence with a final ARC the focus space of the ARC is on top of the stack. Therefore the ARC is open for attachment of new discourse material, so (15) can be attached to the ARC in (14-a) by, let's say, a *Denial* coherence relation. Of course, it should also be able to attach to the main clause since it is on the right frontier assuming that the relation to the ARC is subordinating. So (15) could be a denial of the ARC or of the main clause depending on its discourse attachment point. Furthermore, the proposition expressed by a sentence is one of the semantic entities contained in the focus space of the respective discourse unit (Grosz and Sidner, 1986). Accordingly, if the focus space of the ARC is on top of the stack, the proposition of the ARC is the most salient and the pronoun *that* in (15) is expected to refer to the ARC. If, however, the focus space of the main clause is on top of the stack, then the proposition of the main clause is most salient and *that* should refer to the main clause. If the ARC is medial, as in (14-b), only the main clause is accessible

relations can sometimes be one and sometimes the other. The present example would be a case for saying that *Narration* is coordinating by default, but certain linguistic mechanisms, such as realization of the event in a medial ARC, can override this default, making it subordinating.

to discourse attachment by the end of the sentence and therefore only the main clause can be denied.

- (14) a. The ‘All Stars’ Dance Company has chosen to audition Chloe, who decided to dress in a classical ballet style.
b. Chloe, who decided to dress in a classical ballet style, has been chosen to audition for the ‘All Stars’ Dance Company.
- (15) That’s not true.

Notice that this explanation does not make any reference to the fact that denial involves a truth value judgement. This is interesting because the original intuition behind the denial test was that it should fail on not-at-issue content because the latter does not contribute to the truth conditions of the sentence in the normal way. On the contrary, the present explanation is based entirely on standard assumptions about discourse attachment and the Right Frontier effect on anaphora resolution as in e.g. Asher and Lascarides (2003). But this implies that it should be more difficult to attach to sentence-medial ARCs than to sentence-final ones by any kind of coherence relation. So it should be more difficult to explain, elaborate on, give background to, draw parallels with, contrast with sentence-medial ARCs than do the same with sentence-final ARCs.¹¹ S&K’s Experiment 3 where they used *Why?* questions instead of denials goes a long way in showing just that. Moreover, only a minor modification of the materials would be needed to replicate the study for the more canonical monologue-type coherence relations. In (16) and (17) the *Why?* question is skipped, and the sentences are made directly adjacent to what used to be the answer to the *Why?*-question targeting the ARC content, cf. (4) and (5) in section 2. (The initial *because* is also skipped to exclude the possibility of syntactic attachment.) In both resulting discourses the (b)-sentence is most plausibly connected by an *Explanation* relation to the content of the ARC. Intuitively, version (17) where the *Explanation* targets the medial ARC seems less coherent than (16), where the ARC is final.

- (16) a. The ‘All Stars’ Dance Company has chosen to audition Chloe, who decided to dress in a classical ballet style.
b. She wants to be taken seriously as a classical ballet dancer.
- (17) a. Chloe, who decided to dress in a classical ballet style, has been chosen to audition for the ‘All Stars’ Dance Company.
b. ??She wants to be taken seriously as a classical ballet dancer.

In the same vein, it should be generally more difficult for anaphoric expressions to refer to semantic entities introduced in a sentence-medial ARC than to those introduced in a sentence-final ARC, in principle, regardless of what is predicated of those semantic entities. As pointed out above, according to the discourse-based explanation the pronoun *that* in *That’s not true* (15) cannot refer to the proposition of a medial ARC because by the end of processing the sentence with the ARC, that proposition is less salient than the proposition of the main clause, due to the usual manipulations with the focus spaces. However, the same should hold for the pronoun *that* in *that’s true*, *that’s surprising*, *that’s good*, *that’s unfortunate*, *that’s what I thought*, *I’ll remember that*, *someone*

¹¹In fact, Jacques Jayez and colleagues have argued this point quite generally with respect to projective content of different kinds (Jayez and Rossari, 2004; Jayez and Tovena, 2008; Jayez, 2010), cf. discussion in section 5.

has already told me that, etc. In all such cases we should be able to observe positional effects similar to those found by S&K. In other words, it is not that the content of a medial ARC is somehow more immune to truth value judgement. It is more immune to reference in subsequent discourse. Additional indirect support to this view comes from S&K's Experiments 4 and 5, which showed that ARCs contribute fully to the truth value of the sentence. The crucial difference here is that these experiments used an explicit truth judgement task, rather than a task that involves estimating the coherence of possible discourse continuations. On the present view it is not surprising that these two tasks reveal different properties of ARCs. The denial test reveals the salience of an ARC in discourse, whereas the truth judgement task reveals its contribution to the truth conditions of the sentence.

In this connection one might also wonder about the difference between direct and indirect denial. What is so special about indirect denial that makes it possible for it to access not-at-issue (i.e. discourse-structurally inaccessible) material? I believe that there is no general answer to this question, that is, the answer will depend on the specific form of indirect denial. One of the forms frequently used in discussions of at-issue/not-at-issue distinction is the *Hey, wait a minute* (HWAM) formula followed by an explicit rejection targeting an implicature, a presupposition, etc. In our case with ARCs, this formula is most naturally interpreted as a meta-communicative request that asks the speaker quite literally to *wait* and not yet pop off the QUD associated with the ARC from the QUD stack, i.e. to keep it accessible for discourse attachment. By the way, the HWAM formula can also be felicitously used to correct something that has been said a couple of sentences ago and in that sense cannot be taken as a diagnostic for projective content in the traditional sense.

In sum, the discourse-based view of at-issueness implies that *Denial* is just a special case of coherence relation. All kinds of coherence relations will, in principle, have a hard time accessing not-at-issue content, but there may be meta-communicative means of regulating accessibility/at-issueness in addition to the standard mechanisms of the Right Frontier Constraint and the QUD stack update.

4.2 Other kinds of subordinate clauses

One of the crucial assumptions that made it possible for us to apply generalizations about discourse structure to the analysis of ARCs is that ARCs function as separate discourse units and participate in coherence relations on a par with main clauses. This assumption is, in fact, a direct consequence of a more general assumption widely accepted in discourse structure analysis that the elementary unit of discourse structure is the clause. There is a certain degree of variation among existing approaches in whether all kinds of clauses or only clauses with certain grammatical or semantic characteristics are considered independent discourse units. However, apart from ARCs at the very least adverbial clauses count as independent units even in the most conservative approaches to discourse segmentation (for instance Mann and Thompson, 1988, p. 248) But that means that all the predictions we have derived for ARCs should also apply to adverbial clauses. In particular, adverbial clauses should show an effect of linear position on the possibility of attachment of subsequent discourse material.

The very thought that ARCs and adverbial clauses might show the same behaviour governed by the same underlying principles with respect to the parameters discussed in this paper is a bit disconcerting. After all, all we wanted to do is explain the appar-

ent differences in the (not)-at-issue status of ARCs depending on their linear position. Does it mean that now we are talking about (not)-at-issue status of adverbial clauses?! But adverbial clauses have never even been suspected of any relation to the class of semantic phenomena that go under the label of ‘projective content’ and that gave rise to the whole (not)-at-issue issue in the first place.

I will come back to this delicate issue in section 5. In this section, it is useful to make a step back and look at parallels between ARCs and adverbial clauses (and occasionally other kinds of subordinate clauses as well) from a broader perspective. Section 4.2.1 starts with the general tendency of subordinate clauses to express subordinating coherence relations. Section 4.2.2 discusses the preference for attachment of new discourse material to the main clause, which is empirically relatively well established but does not directly follow from the theory in section 3. It will show that this prediction can be derived with a number of additional independently motivated assumptions. Then section 4.2.3 will turn to the predicted effect of main-subordinate clause order and discuss existing experimental evidence for and against this prediction.

4.2.1 Discourse subordination vs. syntactic subordination

To begin with, there seems to exist, at least in English, a quite general tendency for subordinate clauses to go along with discourse-structural subordination. Matthiesen and Thompson (1988, p. 308) argued back in the eighties that subordinate clause syntax is a grammaticalization of the relationship of discourse subordination. Their counts based on a corpus of 18 short texts revealed that a subordinate clause would realize a subordinating coherence relation in 45 out of 48 cases,¹² and only 3 (6%) subordinate clauses realized a coordinating coherence relation. In Loock’s (2007) study of 450 English ARCs collected from texts of four different genres, only 20, i.e. 4.5% of the ARCs were continuative (i.e. discourse-structurally coordinated, cf. section 3.3). Differences in corpus size and theoretical apparatus used make it hard to compare these results. The strong skew in the distribution in both cases is nevertheless suggestive.

Obviously, there are exceptions to this general tendency both among ARCs and among adverbial clauses. Among ARCs it is the continuative ARCs discussed in section 3.3, which realize a coordinating coherence relation. Among adverbial clauses, this is typically the case with *whereas*-clauses (18), which are syntactically subordinate, but express *Parallel* or *Contrast*, which are coordinating coherence relations.

(18) John is tall, *whereas* Bill is small.

Another type of exception: In cases where both the syntactic and the coherence relation between two clauses is subordinating, the direction of subordination may not match, as illustrated by the excerpt (19) from a classical RST example (see Mann and Thompson, 1988, pp. 253–254):

(19) a. Farmington police had to help control traffic recently
b. *when* hundreds of people lined up to be among the first applying for jobs at the yet-to-open Marriott Hotel.

¹²Matthiesen and Thompson (1988) base their analysis on Rhetorical Structure Theory (RST, Mann and Thompson, 1988). They operate with the notions of ‘nucleus-satellite relation’ and ‘hypotaxis’, which are not identical but closely correspond to the notions of discourse-structural subordination and subordinate clause, respectively.

- c. The hotel's help-wanted announcement for 300 openings was a rare opportunity for many unemployed.

In Mann and Thompson's analysis, the main clause in (19-a) is discourse-structurally subordinate to the *when*-clause. This makes sense because the sentence in (19-c) is attached by a coherence relation directly to the *when*-clause in (19-b). In the classification of coherence relations assumed in the present paper, (19-c) would be a typical *Explanation* of (19-b) (Why did so many people line up?). Moreover, the rest of the text is about unemployment, and not about traffic control. So it is the *when*-clause and not the main clause that contains the most important information from the point of view of broader discourse context.

A similar example with an ARC is given in (20). Here too, the rest of the text is about the changes to the rules of royal succession rather than about the speaker's pleasure to introduce them. The main clause in (20-a) is presumably *Background* to the ARC in (20-b), whereas the next sentence (20-c) is an *Elaboration* of (20-b).

- (20)
- a. I am pleased to introduce the Succession to the Crown Bill 2014,
 - b. *which* facilitates Australia's national response to the United Kingdom's changes to the rules of Royal succession.
 - c. Two of the changes were initially discussed by leaders of the sixteen Commonwealth realms [...] ¹³

In other words, both ARCs and adverbial clauses seem to allow for the same types of exceptions to the general tendency for a match between discourse subordination and syntactic subordination. However, these are exceptions rather than the rule. Most of the time, subordinate clauses are also discourse subordinate to their main clauses. That is, in those layers of structure where the domains of discourse and syntax overlap, the structures *normally* do match and even if we do not know yet whether this is true to the same extent both for adverbials and ARCs, this is a plausible hypothesis.

4.2.2 The main clause preference

The pattern: Recall S&K's Experiment 2, cf. (21), which showed a clear preference for the attachment of a subsequent denial to the main clause: the participants chose the denial matching the main clause (*No, they didn't*) over that matching the ARC (*No, she didn't*) in 73.9% of cases. S&K interpret this result as confirmation of the widely accepted claim that ARCs (normally) express not-at-issue content.

- (21) The symphony hired my friend Sophie, who performed a piece by Mozart.
No, she didn't. / No, they didn't.

A similar preference has been found with adverbial clauses in a number of studies, most notably Frazier and Clifton (2005, Experiment 6), cf. (22). Sentences with adverbial clauses were followed by a sentence containing VP ellipsis (*Then Tina did too.*) which could be resolved to the antecedent either in the main or in the subordinate clause. The participants were asked to choose between an interpretation matching the antecedent in the main clause (*Tina laughed*) and an interpretation matching the antecedent in the subordinate clause (*Tina made a joke*). The VP ellipsis in that sentence

¹³From <http://www.parliament.wa.gov.au/parliament/bills.nsf/BillProgressPopup?openForm&ParentUNID=8F8B420877A79FDC48257C8B0017D6EE>. Last accessed on October 27, 2015.

was resolved to the proposition of the main clause 70% of the time.

(22) Mary laughed after she made a joke about the supervisor. Then Tina did too.

In other words, it seems that both ARCs and adverbial clauses make bad attachment sites for subsequent sentences in discourse as compared to main clauses.

Since the direction of discourse-structural and syntactic subordination tend to match (cf. section 4.2.1) and since existing experimental studies did not control for coherence relations, we do not really know whether the main clause preference is really a preference to attach to the syntactic main clause or to the clause that discourse-subordinates the other clause. In fact, a lot speaks for the latter interpretation. Frazier and Clifton (2005) themselves take their results to corroborate the following hypothesis:

(23) Main assertion hypothesis:
Other things equal, comprehenders prefer to relate material in a new sentence to the main assertion of the preceding sentence.

Obviously, the main assertion of a complex sentence is normally found in the main clause. However, Frazier and Clifton (2005) emphasize that the notion of main assertion is not a syntactic but an information-structural one. In two other experiments (Experiments 7a and 7b) they show that clausal complements of epistemic verbs (*I think that P*) can constitute the main assertion whereas the main clause only conveys the speaker's degree of commitment to the content of the complement clause and could easily be replaced with an adverb like *presumably, clearly*, etc.¹⁴ So while there is a general default tendency that main assertion is expressed by the main clause, there can be exceptions, and the examples (19) and (20) in section 4.2.1 could just be two such exceptions in the domain of adverbial and appositive relative clauses.

But this suggests the hypothesis that discourse-structural subordination and the asymmetry between the main assertion and its counterpart could be basically the same thing. That is, the main assertion of a complex sentence is the clause that discourse-structurally subordinates all other clauses in that sentence. With this interpretation of the Main assertion hypothesis, the apparent preference for attachment to the main clause might in fact be a preference to attach to the subordinating discourse unit.

However, as it stands the theory outlined in section 3 does not predict such a preference. Assuming that the subordinate clause is also discourse subordinate to its main clause, the Right Frontier Constraint only says that if the subordinate clause follows the main clause, both are open for discourse attachment. There is no prediction that the main clause is somehow 'more open'. As will become clear next, however, this prediction can be reconstructed, if we generalize and extend the domain of application of the Main assertion hypothesis on the one hand, and the tendency for matching syntactic and discourse structure on the other.

¹⁴In theories of discourse structure this difference is also sometimes described in terms of the direction of discourse subordination (provided that complement clauses are treated as independent discourse units). For instance, in discourse annotation guidelines of (Reese et al., 2007, pp. 13–15), if the speech or thought report makes the main contribution to the surrounding discourse and the main clause just indicates the source of reported information then the coherence relation is *Source*, which is a subordinating relation where reference to the source (i.e. the main clause) is subordinate. In contrast, the *Attribution* relation, which is supposed to be used in the reverse case, is subordinating in the other direction.

The subordination principle and matching structures: On the proposed interpretation of the notion of main assertion, the Main assertion hypothesis can be construed as a consequence of two more general principles. The first one (24), which I call the *Subordination principle*, says basically that if a complex discourse unit has a single *nucleus*—one subunit that discourse subordinates all the others—then attachment to the whole complex discourse unit and attachment to the nucleus is the same thing. In other words, the nucleus serves as the representative of the complex unit in relation to the surrounding discourse. This is different in coordinate structures where attachment to each of the coordinated units and attachment to the complex unit as a whole, i.e. to the overarching discourse topic node (e.g. the *What happened?*-node in figure 3, section 3) yields distinct structures.

(24) Subordination principle:

If a discourse unit C is to be attached to a complex discourse unit $[AB]$ and a subordinating coherence relation holds between the subunits A and B of that complex unit, C will attach to the subordinating subunit.

Notice that this principle is a close paraphrase of (23), the main difference is that it generalizes over clauses, sentences, paragraphs and talks about discourse units instead. However, it is essential that Frazier and Clifton's *Main assertion hypothesis* talks specifically about sentences. In a different set of experiments, Frazier and Clifton (2005, Experiments 4 and 5) have found that a coordinate clause like *and Mary did too* in (25-a) has a greater chance to attach to the complement clause, i.e. the VP ellipsis has a greater chance to be resolved as *Mary went to Europe too*, whereas the same continuation phrased as an independent sentence (25-b) is relatively more likely to attach to the main clause and the ellipsis is more likely to be resolved as *Mary said that too*. In other words, it is not generally the case that subordinate clauses are bad attachment sites for new discourse material. They are bad for sentences, but they are good if the new discourse unit is itself a clause.

- (25) a. John said that Fred went to Europe and Mary did too.
 b. John said that Fred went to Europe. Mary did too.

Frazier and Clifton take this observation to support their main claim concerning the syntax-discourse divide: Different laws are operative in syntax and in discourse, i.e. within and outside the boundaries of a sentence. At discourse level, i.e. when we consider connections between sentences as in (25-b), the Main assertion principle applies. In syntax, i.e. when we consider connections between clauses within a sentence, the recency principle applies (which ultimately ensures that the more recent complement clause is the preferred antecedent for ellipsis in (25-a)).

In our present framework, which assumes a certain degree of syntax-discourse overlap rather than an absolute divide, the difference in attachment preferences for clauses and sentences can nonetheless be explained. Recall the assumption made above that discourse structure and syntactic structure tend to match. That is, normally syntactic subordination goes with discourse subordination and syntactic coordination goes with discourse coordination. What we need now in order to explain the difference in (25) is to extend this matching principle to syntactic and discourse constituency. In other words, in those layers of structure where the domains of discourse and syntax overlap, syntactic constituents *normally* correspond to discourse constituents. This in turn could be seen as a consequence of a yet more general principle that structures at

different levels of linguistic representation “try to match”. Recently Wagner (2010) has argued for a much closer match between syntactic and prosodic constituency than is standardly assumed. Even though there is no word of discourse structure, Wagner’s *Hypothesis about attachment and prosody* in (26), which I rename as the *Matching Structures Hypothesis*, seems to be quite straightforwardly applicable to our case (Wagner, 2010, p. 187).

(26) Matching Structures Hypothesis:

In a sequence $A \prec B \prec C$, if the boundary separating A and B is weaker than the one separating B and C , then $[[AB]C]$; if it is stronger, then $[A[BC]]$.

This principle does not say anything directly about sentences and clauses, but about greater and smaller boundaries, and therefore about greater and smaller structural units, or constituents. Assuming that a sentence boundary is greater than a clause boundary, this principle says that when we attach a sentence C to a sentence that consists of two clauses A and B , we actually attach neither to A nor to B , but to the whole chunk $[AB]$, i.e. a sentence to a sentence. Next, if the relation between A and B happens to be subordinating, the subordination principle applies and C is attached to A if A is the subordinating unit and to B if B is the subordinating unit. In contrast, if A , B and C are clauses without a sentence boundary in between, then there might be some other, e.g. prosodic or punctuational indication of which clauses belong closer together. If there is no such indication, it means that neither syntax, nor prosody, nor punctuation gives us any further clue to discourse constituency and we are left with what the Right Frontier Constraint has to say about it. That is, if B is discourse subordinate to A , then both A and B are possible attachment sites for C . In other words, the absolute distinction between sentences and clauses that is implicit in Frazier and Clifton’s formulation of the Main assertion hypothesis is modelled via a relative distinction between boundaries and constituents of different structural rank.

On the assumption that syntactic and discourse subordination go in the same direction, this set of principles predicts a preference for attachment to the main clause in all the relevant examples (21)–(22) and (25-b). In all these cases, the main clause of the first sentence is A , the subordinate clause of the first sentence is B and the second sentence is C . Since the boundary between A and B is smaller than that between B and C , the discourse constituency is $[[AB]C]$ and the Subordination principle applies as described above. In (19) and (20), the constituent structure is the same but the direction of discourse subordination is opposite to that of syntactic subordination, i.e. the main clause A is discourse subordinate to the subordinate clause B . Therefore, by the same principles, attachment to the subordinate clause is predicted. Finally, in (25-a) as long as there is no perceived difference between the boundary before the *that*-clause and that before coordinate *and*-clause, both the main and the subordinate *that*-clause are possible attachment sites for the *and*-clause and no preference is predicted. However, a difference is predicted between (25-a) and (25-b): while there is a main clause preference in (25-b) there is no such preference in (25-a), i.e. more main clause attachments are to be expected in (25-b) than in (25-a). So the predictions based on the Main assertion hypothesis are reconstructed including its limitation to relations between sentences.

However, because the principles in (24) and (26) are formulated in more general terms than Frazier and Clifton’s Main assertion hypothesis, their consequences also go much further. In particular, the Subordination principle may play a role for attachment

of discourse units smaller than a sentence to the extent that boundaries of different strength can be identified at sub-sentential level. For instance, if a comma is interpreted as a greater boundary than a clause boundary not marked by punctuation, we would expect more main clause attachments in (27) than in (25-a). This prediction still needs to be tested empirically.

(27) John said that Fred went to Europe, and Mary did too.

The same applies to higher levels of discourse structure. The Subordination principle should also be relevant for paragraphs: A paragraph should be preferentially attached to the main assertion of another paragraph. Some evidence for this prediction can be derived from the experiments reported by Silverman (1987) and Mayer et al. (2006), who have shown that a prosodic paragraph boundary, i.e. a longer pause preceded by an utterance with compressed pitch range and followed by a pitch reset increases the chance of high attachment of the subsequent sentence in the discourse structure.

In sum, the preference for attachment to the main clause that has been found in ARCs and adverbial clauses, and in particular, the difficulty to directly deny an ARC can be explained applying rather general principles which complement the theory outlined in section 3.

4.2.3 Clause order

If we forget for a second the principles added in the previous section and go back to the core theory based just on the Right Frontier Constraint, the theory predicts a clause order effect for adverbial and other kinds of subordinate clauses, as it does for ARCs. That is, a sentence-final subordinate clause can be at issue and can serve as an attachment site for new discourse material, whereas a sentence-medial or sentence-initial subordinate clause cannot.

However, the additions to the theory made in the previous section dramatically restrict the domain in which this prediction is valid. If the main and the subordinate clause (A and B) form one discourse constituent $[AB]$ and the new discourse unit C is attached to that whole constituent, by the Subordination principle, it is attached to the nucleus of $[AB]$, i.e. the main clause, regardless of the order of clauses. Only if the structural breaks between A , B and C are equally strong is the condition for Matching structures not fulfilled, and the Right Frontier Constraint determines the available attachment sites, including the order effect. On this view, the clause order effect measured by S&K for ARCs must be entirely due to cases where the main clause and the ARC were perceived as separated by a structural break as strong as a sentence boundary and each for itself as *truly on a par* with subsequent utterances in discourse.

At first glance it seems that adverbial clauses behave quite differently from ARCs in this respect. For instance, Frazier and Clifton's (2005) Experiment 6, already mentioned in connection with the main clause preference, compared sentences with an adverbial clause in initial and final position, cf. (28). No effect of position of the subordinate clause in the sentence was found: A majority of main clause VP antecedents (70%) was chosen regardless of clause order.

- (28) a. Mary laughed after she made a joke about the supervisor.
b. After Mary laughed, she made a joke about the supervisor.

In the present framework this result could be interpreted as an indication that ad-

verbal clauses belong closer together with their main clauses, than ARCs do with theirs. While adverbial clauses always form a discourse constituent with their main clause and therefore due to Matching structures and the Subordination principle give rise to the main clause preference, this is not always the case for ARCs. If the ARC is perceived as an integral part of the sentence it appears in the main clause preference is to be expected by the same principles. If the ARC is perceived as a discourse unit of the same rank as its main clause and the subsequent discourse unit, the Right Frontier Constraint predicts an order effect.

However, there are reasons to doubt the empirical generalization concerning adverbial clauses. Note that Frazier and Clifton (2005) only used *after*-clauses in their study. In a similar experiment Cooreman and Sanford (1996) used a variety of different connectives (*after, before, when, while, because* and *since*). Instead of ellipsis they used personal pronouns as the target expression: Sentences with subordinate clauses were followed by a pronoun prompt (*He...*) and the participants were asked to complete the sentences. The completions revealed the interpretations of the pronoun as referring to the subject of the main or the subordinate clause. The results showed the same overall pattern as in Frazier and Clifton's study: a preference for the antecedent in the main clause regardless of the subordinate clause position... except for one connective. After sentences with *because*-clauses, the continuation attached significantly more often to the *because*-clause and the pronoun was resolved to its subject if the *because*-clause was sentence-final. That is, Cooreman and Sanford (1996) measured an effect of position for *because* adverbial clauses similar to that found by S&K for ARCs.¹⁵

It is difficult to draw conclusions on the basis of one exception. Future research should show how robust this pattern is, whether it is characteristic of *because*-clauses only, or whether there are other connectives that show the same behaviour. However, one can start wondering what ARCs and *because*-clauses have in common that distinguishes them from other kinds of adverbial clauses investigated so far.

Recall that we started out with the assumption that the ARC and the main clause constitute separate illocutionary acts. One of the arguments S&K and Koev (2013) put forward for this assumption is that ARCs can express a different type of speech act from that expressed by the main clause, e.g. a statement vs. a question, as in (29) from Koev (2013).

(29) Marcia, whom Jack wanted to meet, didn't he?, has just arrived.

But the connective *because* is also well-known for being able to relate speech acts of

¹⁵In this connection, one should also mention the study of Clark and Sengul (1979, Experiment 3) which used an even greater variety of connectives (*because, while, when, after, before, although, since, as, just as, as soon as, and in order to*) but a different method. Clark and Sengul manipulated the order of the main and the subordinate clause in the context sentences and measured the interpretation time of the target sentence that contained an anaphoric expression that referred to an antecedent in the main or in the subordinate clause. A major difference to Frazier and Clifton's and Cooreman and Sanford's design was that here the participants were not asked to resolve an ambiguous discourse continuation. The target sentences were unambiguous with respect to their attachment site (i.e. the position of the antecedent of the target anaphoric expression) and only their interpretation difficulty was expected to differ. The results were quite opposite to those of Frazier and Clifton: there was an order effect—the target sentences were interpreted significantly longer when the antecedent of the anaphoric expression was not in the most recent preceding clause. In contrast, no significant effect of attachment to main vs. subordinate clause was found. In other words, the empirical question of whether the linear order of the main and subordinate adverbial clause affects the accessibility of the subordinate clause for discourse attachment, is far from being settled.

different types (cf. Sweetser, 1990):

(30) What are you doing tonight? Because there's a good movie on.

Another argument put forward by S&K is that ARCs can accept speech act adverbials, such as *frankly* in (31). *Because*-clauses seem to be able to do so, too, cf. (32), but in *after*-clauses (33) this works less well.

(31) Chloe, who *frankly* danced like an amateur, has been chosen to audition for the 'All Stars' Dance Company.

(32) Chloe has not been chosen, because *frankly* she danced like an amateur.

(33) Chloe cried after (*#frankly*) she danced like an amateur.

Finally, notice that both sentence-final ARCs and sentence-final *because*-clauses can be separated from their main clauses by a fullstop (or "fullstop intonation") in some communicative registers. Again, the same prosody/punctuation before *after*-clauses is marked, or at least produces a different pragmatic effect.

(34) The 'All Stars' Dance Company has chosen to audition Chloe.
Who decided to dress in a classical ballet style.

(35) Chloe has not been chosen. Because she danced like an amateur.

(36) ??Chloe cried. After she danced like an amateur.

In other words, it seems that some kinds of adverbial clauses can, like ARCs, function as independent speech acts, and if they are perceived as such, this fact can override the effects of syntactic bracketing ($[AB]C$ vs. $A[BC]$). That is, a speech act boundary can be as strong as a sentence boundary and the status as an independent speech act can upgrade a subordinate clause to a level at which it is treated as equal to the surrounding sentences so that the Right Frontier Constraint can apply and an order effect is to be expected.

It remains a task for future research to figure out how exactly the trade-off between syntactic and discourse factors works. What seems clear at this point is that the hypothesis formulated at the beginning of this section is not that implausible and is worth further investigation. The behaviour of ARCs and adverbial clauses is similar in several relevant respects. Both tend to be discourse subordinate to their main clauses, both are less accessible for attachment of new discourse material than their main clauses, and there are indications suggesting that the salience of adverbial clause content, like ARC content, and its accessibility for discourse attachment might depend on the linear position of the clause in a sentence, provided that certain conditions are met (such as the status as an independent speech act). And since *Denial* is just a way of discourse attachment (as argued in section 4.2.1), sentence-final adverbial clauses, like ARCs, should be easier to deny than non-final ones:

- (37) a. A: Chloe was not chosen, because she danced like an amateur.
B: No, she didn't.
b. A: Because Chloe danced like an amateur she was not chosen.
B: ??No, she didn't.

Of course, at this point these are merely hypotheses that await experimental testing.

Still, it is one of the most interesting predictions of the discourse-based view of at-issueness. Since it provides a uniform treatment to all subordinate clauses that form independent discourse units and speech acts, the same behaviour with respect to their at-issue status is to be expected.

4.3 The timing of discourse attachment

The central claim of this paper is that the (not)-at-issue status of one and the same piece of content is expected to change in time. Let us finally look it straight in the face.

In the model developed in section 3, ARCs are associated with their own issues or QUDs. While the ARC is processed that issue is on top of the stack. But this means that even if by the end of processing the sentence the ARC is not at issue any more, it is at issue at least at some point during processing that sentence. Therefore there must be some point when the ARC is open for attachment of new discourse material, and for direct denial in particular if denial is just a special case of discourse attachment (cf. discussion in section 4.1). The relevant moment is first and foremost the point immediately following the ARC. However, there is a difference between sentence-medial and sentence-final ARCs in this respect. The end of a sentence-medial ARC is just what it is. Any material that immediately follows it can be discourse-structurally attached to the ARC, but not to the main clause, because the latter is not yet completed. In contrast, the end of a sentence-final ARC is at the same time the end of the whole sentence, and the material that follows it can, in principle, be attached either to the ARC or to the whole sentence, and therefore to the main clause (by the Subordination principle introduced in section 4.2).

Let us first consider the unambiguous case of sentence-medial ARCs. Example (38) suggests that it is indeed possible to attach to a sentence-medial ARC if the discourse material to be attached immediately follows the ARC. That discourse material can even constitute a whole sentence, except that according to existing orthographical conventions a sentence linearly embedded inside another sentence has to be set in parentheses. Moreover, the ARC is the only possible attachment site for that sentence. The pronoun *this* in (38) can only refer to the proposition of the ARC that Chloe decided to dress in a classical ballet style.

- (38) Chloe, who decided to dress in a classical ballet style (this is surprising because she does not normally dance classical ballet), has been chosen to audition for the 'All Stars' Dance Company.

The same holds for direct denials. It should be possible to deny the content of an ARC if only the denial is proffered at the right moment. But that means that denying a sentence-medial ARC requires interrupting the speaker in mid sentence:

- (39) A: Chloe, who decided to dress in a classical ballet style...
B: No, she didn't.
A: has been chosen to audition for the 'All Stars' Dance Company.

Once again, the denial *No, she didn't* in (39) unambiguously attaches to the ARC, the answer particle *no* and the VP ellipsis resolve to the ARC without further ado, and in this sense the denial is felicitous, albeit impolite.

However, in the case of sentence-final ARCs there is always a potential attachment

ambiguity. As was explained in section 4.2, if the new discourse material to be attached is itself a sentence it will tend to attach at the level of the whole sentence in accordance with the Matching Structures Hypothesis (26), and therefore ultimately to the main clause due to the Subordination principle (24). But attachment to the ARC could be forced, or at least helped, if the new discourse material is itself a clause and there are additional prosodic or punctuational indications that it belongs closer together with the ARC than the ARC with the main clause, as in the following example:

- (40) The ‘All Stars’ Dance Company has chosen to audition Chloe, [long pause] who decided to dress in a classical ballet style [short or no pause] (which is surprising because she does not normally dance classical ballet).

It would seem that direct denials are necessarily sentential and necessarily constitute independent speech acts since they are uttered by another speaker. The status as an independent speech act cannot be taken away from them, but it is not impossible to phrase a denial as a subordinate clause:

- (41) A: The ‘All Stars’ Dance Company has chosen to audition Chloe,
who decided to dress in a classical ballet style.
B: ... which is not true.

Depending on the details of the trade-off between syntactic and discourse factors in determining the strength of structural boundaries, such a denial could be expected to target the ARC more easily than the corresponding sentential denial *That’s not true*. Moreover, the length of the pause between the target clause and the denial, the presence of a pitch reset at the onset of the denial, and other prosodic characteristics could also influence the likelihood of denying the ARC vs. the main clause.

These predictions stand in stark contrast with the view developed by AnderBois et al. (2011, 2015) which says that the content of ARCs is not submitted to the hearer’s ratification but is imposed upon the common ground without discussion, therefore ARC content is not open for negotiation “by normal means”. The “normal means” are those that belong to the range of expected responses to polar questions—*yes, no, maybe, perhaps*, etc. (Farkas and Bruce, 2010). It could be maintained that the relative clause *which is not true* in (41) is not a “normal” denial in this sense. However, the denial in (39) does belong to the range of expected answers to polar questions. The only thing that is unusual about it is its timing. In sum, it is hard to see how an account that categorically deprives ARC content from the right of being negotiated could make room for cases like (39).

In contrast, our approach is to say: Both main clause content and ARC content is, in principle, negotiable, that is, it constitutes a proposal to update the common ground subject to the hearer’s acceptance or rejection. However, the speaker makes it difficult for the hearer to negotiate content by phrasing it as an ARC because (a) the time window in which an ARC can be targeted by discourse attachment (and denial in particular) is very small (and in the case of medial ARCs it might even be socially unacceptable to use that window); and (b) the response (normally) must be phrased in such a way as to respect Matching Structures, and that is basically impossible with all “normal”, i.e. sentential means of denial. In other words, the discourse-based approach makes predictions about when and how ARCs can be negotiated, without an a priori categorical commitment to non-negotiability imprinted in the semantics of ARCs.

5 Attachment, at-issueness, and projection

Let us look back at what we have done. Our starting point was the observation of AnderBois et al. (2011) confirmed experimentally by S&K that ARCs in sentence-final position behave more like at-issue content than in sentence-medial position. The explanation of this fact developed in this paper is close in spirit to S&K's and Koev's (2013) original proposal: The main idea is that it has to do with the relative salience of the ARC content induced by the order in which the main clause and the ARC are processed. However, unlike S&K, the present approach makes it follow from standard theories of processing hierarchical discourse structure. The relevant regularities can be described in structural or in procedural terms. Talking in terms of structure, I make use of the Right Frontier Constraint, which says that only the last processed discourse unit and the units it is discourse-structurally subordinated to are open for attachment of new discourse material, and to denial in particular. Talking in procedural terms, processing hierarchical discourse structure involves pushing and popping issues, or QUDs, on and off the memory stack. The current QUD is on top of the stack and the content that addresses the current QUD is at issue. Using both reasoning styles we have reconstructed S&K's prediction that sentence-medial ARCs are not-at-issue and not accessible for denial by the end of the sentence, whereas sentence-final ARCs may or may not be at-issue/accessible.

This theoretical move, however, goes together with a strong claim. If we give a uniform treatment to the dependency of at-issue status of ARCs on their position in the sentence and the phenomena that have traditionally been explained with help of the Right Frontier constraint, we imply that these phenomena are essentially the same. The previous section identified three claims that follow from this: With respect to at-issueness and accessibility for discourse attachment, (a) *Denial* is just like other coherence relations; (b) ARCs are just like other subordinate clauses; and (c) the at-issue status changes in time just like salience of discourse entities changes in time as the discourse is progressing. However, the notion of (not)-at-issue content has emerged primarily as a way of making sense of *projection* (as in Potts, 2005), i.e. the ability of certain parts of sentence content to be interpreted outside the scope of semantic operators in whose scope they appear to be syntactically. Simons et al. (2011) come forward with the thesis that “[m]eanings project IFF they are not at-issue” (p. 309). This last section takes a brief look at how this view of projectivity fits with our three claims. It will not be possible to give a full account of projection within the limits of this paper, but I will give some initial directions towards understanding projection in the present framework.

Starting with the last claim, at first glance there is an obvious clash: At-issueness and attachment are dynamic notions, whereas projectivity is not. The at-issue status and availability for discourse attachment can change as the discourse is progressing. A piece of content can be at-issue and later not at issue any more. However, it does not make sense to say that some content is not projective and later becomes projective. In other words the relationship between projectivity and at-issueness cannot be as simple as the “IFF” of Simons et al. (2011).

This clash, however, is easy to fix. The only problem with Simons et al. is that they do not take into account the possibility that the current QUD can change in mid sentence and that ARCs can have their own QUDs. Therefore the crucial criterion for projection should not be at-issueness, but contribution to the issue associated with the

sentence root:

- (42) Content p of a constituent of sentence S projects iff p does not address the issue addressed by the root clause of S .

The notion of “addressing an issue” can be understood in two different ways here. On its strong interpretation, an answer addresses an issue if it is intended by the speaker to resolve that issue. In this sense, any two separate discourse units which by our assumption are associated with distinct QUDs do not address each other’s issues. On a weaker interpretation, which is more in line with what Simons et al. (2011) propose, to address an issue would mean to contribute to it, or to entail a partial answer to that issue. In this sense, it might not be the task of one discourse unit to resolve the QUD of another one, but the discourse unit can *happen to* provide some information relevant to that QUD, so whether two discourse units address the same issue would depend on the semantic relationship between those issues (e.g. whether one is a subquestion of the other or not). I leave it open for future discussion which understanding is more adequate here. Whichever it is, the formulation in (42) decouples projection from the dynamic nature of at-issueness, but as will become clear next it is still problematic in light of our second claim.

The second claim that follows from the discourse-based view of at-issueness is that ARCs should not be different from other subordinate clauses—from adverbial clauses at the very least—with respect to their (not)-at-issue status. This is probably the most shocking result of the present paper, because given that both adverbial clauses and ARCs constitute separate discourse units it would follow from (42) that both would address an issue distinct from that of the main clause and therefore both would project, either always or sometimes depending on the interpretation of the notion of “addressing an issue” mentioned above. But as far as we know, adverbial clauses do not project.

However, there is again a way out of this apparent problem. Notice that both relative clauses and adverbial clauses can be interpreted inside and outside the scope of operators in the main clause. When a relative clause is interpreted inside the scope of such operators it is called restrictive, and when it is interpreted outside that scope it is called non-restrictive or appositive. Similarly, adverbial clauses can be interpreted inside or outside the scope of operators in the main clause, so we could talk about restrictive and non-restrictive adverbial clauses if we wanted to. The reason why we do not use this terminology is because “non-restrictive adverbial clauses” do not pose a problem for the syntactician. If an adverbial clause is to be interpreted outside the scope of some operator in the main clause we simply assume that it is also syntactically outside the scope of that operator. In general, nothing prevents us from merging adverbial clauses at top CP level where they escape all relevant operator scopes. In contrast, the relative pronoun carries the features of its host which is an argument for a respectively deeply embedded syntactic position of the relative clause. This means that we cannot so easily use standard syntactic mechanisms to rescue the relative clause from the scope of operators in the main clause if the relative clause is supposed to be non-restrictive. This is why for non-restrictive relative clauses we need the mechanism of projection.¹⁶ Now it is clear how the statement in (42) should be amended:

¹⁶Since the early days of syntactic theory linguists have argued for the analysis of ARCs in terms of syntactic orphanage (e.g. Safir, 1986) or high attachment in the syntactic structure of the sentence (e.g. McCawley, 1982; Demirdache, 1991). A lot has happened in the syntactic analysis of relative clauses since those early works but the point remains the same. If syntax provides us with a theory according

- (43) If S contains an operator O and p is the content of a constituent of S , then p is interpreted outside the scope of O if p does not address the issue addressed by the root clause of S .

That is, if some piece of content does not contribute to the root clause issue, it is interpreted outside the scope of operators in that clause either because it projects or because it is syntactically outside the scope of those operators.¹⁷ This principle captures an intuitive generalization: If something does not belong to the content of a sentence in a pragmatic sense then it also does not belong there semantically. That in turn would normally also be reflected by the syntax. However, there are exceptions, and those exceptions require the mechanism of projection.

Finally, our first claim—that *Denial* is just like other coherence relations in terms of which content it may or may not target—does not as such present any specific problem in connection with projection. However, it is worth pointing out that building on related ideas of Ducrot (1972) this generalization has been used by Jayez and Rossari (2004), Jayez and Tovenà (2008) and Jayez (2010) as an argument for an approach in which the impossibility of discourse attachment (rather than not-at-issue status in the sense of Simons et al., 2011) is viewed as a defining property of projective content. Moreover, this point is argued for a variety of projective content types and linguistic devices including presuppositions of phase verbs, conventional implicatures of expressions like *almost* and of modal parentheticals. One difference to the present approach is that Jayez and colleagues seem to assume that inaccessibility for attachment is conventionally encoded in the semantics of these linguistic devices. It remains a question for future research to see how these assumptions fit with the approach presented in this paper. Could the “at-issueness as accessibility for attachment” approach be extended to explain the behaviour of all kinds of projective content, and if so, what is the respective role of general discourse mechanisms such as the Right Frontier Constraint and conventional semantics of lexical items and grammatical constructions in determining accessibility for attachment?

By way of conclusion: Clause order sensitivity of the at-issue status of ARCs is an important finding. It lends itself naturally to an account in terms of the dynamics of discourse interpretation, but that in turn has implications that call into question a number of widely accepted assumptions about at-issue status and projection, opening up a vast field for further theoretical and empirical research.

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to which ARCs end up outside the syntactic scope of operators in the main clause we do not, strictly speaking, need a semantic mechanism of projection to account for their “projective” behaviour. However, projection, which is an independently motivated mechanism, makes it possible to move the burden of explanation from syntax to semantics in the analysis of ARCs.

¹⁷Notice also that this is ‘if’ rather than ‘iff’, because there might be parts of content of S that do address root clause issue, but are nevertheless interpreted outside the scope of O simply because they stand outside its syntactic scope.

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