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Interleaved discourse, the case of two-step enumerative structures[*]

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1 Introduction

Right Frontier Constraint (RFC) is a principle widely used across discourse theories because it manages to explain a wide variety of discourse phenomena. However, interleaved structures, described for example in (Asher, 1993), seem to constitute a problem for the standard version of this principle. These constructions have been described as allowing discourse attachment to closed off constituents contrarily to RFC predictions. We aim at proposing a treatment of two-step enumerative structures (Porhiel, 2007) based on some recent contributions on enumerative structures (Bras et al., 2008). We take this specific structure as an entry point for more general interleaved constructions that constitute a crucial challenge for discourse structure theories.

The paper is organized as follows. We will start by presenting some examples (Section 2) and the general idea of our proposal (section 3). Then we will have a closer look at the semantic aspect of two-step enumerative structures by treating with some details a complex example wrt. spatio-temporal structure (Section 4). Finally, in section 5 we will attempt to draw some first generalizations inspired by the preceding sections.

2 Two-step enumerative structures

Classical enumerative structures, illustrated by the first part of example (1:a-g), are composed of an introducing sentence (hereafter, *introducer*) –here (a)– and of several co-items (here two items described by (b-d) and (e-g)). These structures have been already described in (Luc et al., 1999), but two-step enumerative structures have been ignored until the recent work of (Porhiel, 2007). Such structures may be illustrated by (1) where a second step (h-n) follows the introducing sentence and the first list of co-items. Introducers and co-items are characterized by a combination of typographic (*':'*, *'-'*) and linguistic markers (*'twice'* for the introducer, *'first'*, *'then'* for the co-items). Let us also underline the structuring contribution of frame introducers like *'At Beaubourg'* along (Charolles, 2005) and (Vieu et al., 2005) for the SDRT account: in (1) for instance, (b) dominates (c-d) and (e) dominates (f-g). The second step is constructed by recalling the co-items of the classical enumerative structure, here by repeating the frame introducers in (h) and (l).

(1)   (a) Deux fois, Nil crut sombrer dans le gouffre : (b) d'abord chez Vrin, (c) où il feuilletait des livres avec Anne-Geneviève, (d) quand Laure y entra inopinément ; (e) ensuite à la bibliothèque de Beaubourg, (f) où il était assis en face de Laure, (g) et où Anne-Geneviève apparut soudain. (h) Chez Vrin, (i) dès qu'il avait vu Laure, (j) Nil s'était lâchement jeté dans l'arrière-boutique, (k) pour n'en sortir (l) qu'après s'être assuré que son amante numéro deux ne se trouvait plus dans la librairie. (m) A Beaubourg, (n) Anne-Geneviève n'était, Dieu merci, restée qu'un instant [...], (o) et Laure n'avait même pas levé le nez de ses cahiers. *(MATZNEFF Gabriel /Ivre du vin perdu, 1981)*
(a) Twice, Nil thought that he was in big trouble: (b) First at Vrin, (c) where he was browsing books with

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Anne-Geneviève, (d) when Laure entered unexpectedly; (e) then at Beaubourg library, (f) where he was seated in front of Laure, (g) and where Anne-Geneviève suddenly appeared. (h) At Vrin, (i) as soon as he had seen Laure, (j) Nil cowardly escaped in the backroom, (k) and only re-appeared (l) after checking that his lover number two got out of the library. (m) At Beaubourg, (n) Anne-Geneviève, thank god, only stayed for a second [...] (o) Laure did not look up from her books.)

Similar examples, such as (2), have been analyzed in (Schnedecker, 2007) in the context of a study on anaphoric correlates *('corrélats anaphoriques')* like *the former, the later* in English. However, a different strategy for anaphoric reference is used. In (2), the anaphoric link is supported by a more complex referring mechanism involving co-items and anaphoric correlates.

(2)   Les organisations de salariés doivent choisir entre deux options stratégiques: soit se laisser intégrer dans les pactes nationaux pour la compétitivité, soit tenter de s'en dégager. Dans le premier cas, elles ne défendront les salariés que dans la mesure où cette compétitivité de l'économie nationale le permettra [...] Dans le second cas, elles peuvent tenter de retrouver leur capacité de mobilisation et se reconstituer en tant que force d'opposition. (Schnedecker, 2007, pp:307)
(a) Workers organizations have to choose among two strategic options: (b) either concede their integration in national agreements for competitiveness, (c) or attempt to escape from them. (d) In the first case, (e) they might only protect workers (f) when national economy competitiveness allows it [...] (g) In the second case, (h) they can try to recover their mobilization ability (i) and to constitute again an opposition strength.

A naive treatment of the examples introduced above runs into trouble as early as the attachment of the second step of the enumerative structure is considered. Intuitively, the first step of these enumerative structures lead to a hierarchical structure in which the introducing sentence dominates the co-items. The co-items themselves are situated at the same level of discourse organization. They might even form a narrative sequence as in (1). Therefore, according to the RFC, the co-items cannot be on the right frontier simultaneously. All but one of them must be somehow closed-off. However, they have been described as being both available for further development. In our opinion, these two-step enumerative structures are similar to the interleaved structures studied in (Asher, 1993). For Asher, interleaved structures like (3) constitute a case for the so called *discourse subordination* mechanism. In this treatment, the proper nouns[1] are supposed to be able to cross the *right frontier* in order to update the corresponding closed-off constituent with additional information. This treatment has the property to explain continuations like (4) which emphasizes that there is some kind of discourse object available for talking about all the information concerning each house.

(3)   There are two houses you might be interested in: House A is in Palo Alto, House B in Portola Valley. Both were built in 1950, and both have 3 bedrooms. House A has 2 baths and B, 4. House A also has a kidney shaped pool. House A is on quarter acre, with a lovely garden, while House B is on 4 acres of steep wooded slope, with a view of the mountains. The owner of House B is asking $425K. The owner of house A is asking $600K. ((Asher, 1993, pp:345)).

(4)   That's all I know about House A, but I will know more about House B tomorrow.

This solution takes the objects themselves (here the houses) as the organizing principle. Therefore it promotes them as discourse topics guiding the overall discourse construction. Tackling this in terms of discourse structure leads to a complicated mechanism that violates the RFC and is not supported by any requirement from discourse processing (e.g anaphora resolution). Moreover, *discourse subordination* has been introduced in (Asher, 1993) but not taken up in (Asher and Lascarides, 2003), leaving the treatment of interleaved structures in SDRT as an open question. However, while examples like (3) have an interleaved nature, it is difficult at this stage to propose a uniform treatment for them and for more standard two-step enumerative structures like (1).

Concerning anaphoric accessibility the systematic use of very specific referring tools such as definite descriptions, anaphoric correlates or repetitions of frame introducers considerably blurries

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[1]However, this example could be reworded with definites.

the RFC picture. In fact, all these elements give instructions to pick up information that is somehow buried under more recent elements. The solution proposed in (Asher, 2008) to handle this issue is to treat definites as triggering the creation of a topic for the corresponding discourse entity.[2] In our examples such a topic is also easily identified and even suggested by the frame introducers, as in example (1). A way to analyze discourse structure and RFC in this context is to look at the available discourse attachment points for discourse continuations.

3   A proposal for two-step enumerative structures

First step   The first step is a classical enumerative structure which we analyze along the line of several recent proposals. We share with (Vieu et al., 2005) the view that frame introducers introduce a new topic like *what happens at Vrin ; what happens at Beaubourg library*, for example (1), which dominates a block of sentences through the *Elaboration* relation. Then we assume with (Bras et al., 2008) that (i) co-items introduce an intermediate level which is attached to the introducer by the *Enumeration* relation[3] and (ii) a coordinating relation (by default *continuation*) is inferred between the co-items. We introduce the following axioms:

$$?(\alpha, \beta, \lambda) \wedge FirstItemMarker(\beta) > \Downarrow (\alpha, \beta, \lambda) \wedge \exists\gamma \exists R \in Coord, \, R(\beta, \gamma, \lambda)) \qquad (5)$$

$$?(\alpha, \beta, \lambda) \wedge IntroducingSentence(\alpha) \wedge MPI(\beta)) > Enumeration(\alpha, \beta, \lambda) \qquad (6)$$

$$?(\beta, \gamma, \lambda) \wedge \exists\alpha \, Enumeration(\alpha, \beta, \lambda) \wedge OtherItemMarker(\gamma) > Enumeration(\alpha, \gamma, \lambda) \wedge Continuation(\beta, \gamma, \lambda) \qquad (7)$$

In the case of example (1), we infer a *Narration* relation between the co-items thanks to the presence of two different spatial localizations inducing two different events and to the temporal interpretation of the introducer (*'times'*) that allows the lexical markers (*'first', 'then'*) to take a temporal value. In addition, we propose here to supplement this *Narration* with a *Parallel* relation based on syntactic parallelism. This construction is illustrated by the structure from *(a)* to *(g)* in the figure 3.

Second step   At this stage, we are considering the attachment of elements developing successively the co-items, by one or more steps. There are two ways to approach such examples. The first one uses *discourse subordination* and has been described briefly in the previous section. The second option consists in following more straightforwardly the surface level and in considering that the deep semantic structure is somehow secondary here and can be retrieved from semantic interpretation without a direct counterpart at the structure level.

This is the solution we retain for two-step enumerative structures. From a cognitive viewpoint, it seems to us that the two-step enumerative structure is more salient than the spatio-temporal structure of the story which comes only subsequently to the interpreter's mind. So, we prefer working at the level of the semantic interpretation for tackling spatio-temporal aspects rather than trying to capture them through the discourse structure itself.

Therefore, our solution consists in attaching the co-items of the second step directly to the constituent corresponding to the introducer as illustrated in the figure 3. As a result, this introducer constituent becomes the main topic of the overall two-step enumerative structure and it also plays the role of topic for (b) & (e) and (k) & (l). This option is supported by singular anaphoric resolutions that seem not to be allowed across co-items of the different steps but are allowed with plural anaphora as in (8).

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[2](Danlos, 2008) goes a step further and considers that definites can access any discourse referent in the left context.

[3]In (Bras et al., 2008), we argue for the introduction of this relation in SDRT. J. Busquets (personal communication) suggests that *Enumeration* could just be a predicate to be used like $Subtype_D$, to trigger the inference of Elaboration.

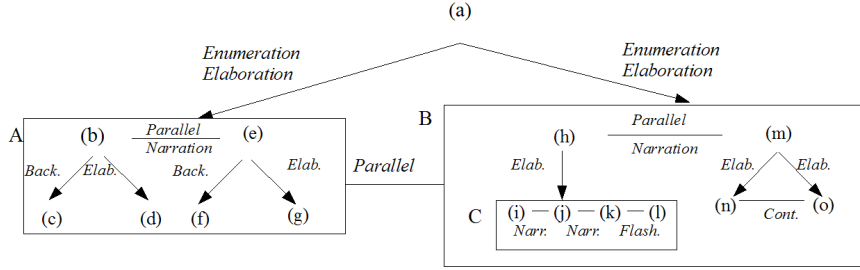(8)　　　　At Vrin, Nil feared that the two lovers recognized each other.

Figure 1: Structure for example (1)

A descriptive proposal　In its current stage, our proposal is more descriptive – it offers a discourse... strucuture – than predictive – it does not provide any rule to .....

At the current stage our proposal is more a descriptive – it offers a discourse structure for two-step enumerative structure – than a predictive – it does not provide any rule to constrain the construction of the discourse structure once its two-step nature has been identified. Although appealing, a predictive proposal is not appropriate for several reasons.

First, having a classical enumerative structure and identifying a potential second step is not sufficient to predict that the second step will have the same discourse organization as the first step. Therefore we cannot state constraints in this direction, even once a *first item marker* is recognized in the second step. Secondly, we have not studied in details second step item markers. Only few of them constrain enough the structure in order to provide predictive rules. More precisely, following (Schnedecker, 2007), it is impossible to have *l'un* without *l'autre* but, for example, *le premier* may appear without *le second*. Therefore it seems that the predictive nature of the structure comes from the individual item marker semantics rather than from a general organizing rule.

Overall, at this stage of our study, it is the compositional semantic contribution of all these different item markers that allows to build up the structure, and not rules coming from higher-level structures. Indeed these markers exhibit an interesting variety concerning the way they single out information that will be used to understand the discourse structure of such examples. This is also why we cannot treat here all the cases (for example (3)). We believe that the referring devices used influence the nature of the reference link and of the overall structure.

4　A solution for inferring deep semantic structure

We would like to combine the contribution of surface-based cohesion and deep semantics to account for the overall coherence of interleaved structures. To do so, we need to analyse their spatio-temporal semantics or more generally their semantic structure (alternative/consequence in (2), spatio-temporal relationships in (1)). In all cases, the second step of each co-item has to be related with its original item. This is inferred on the ground of (i) the unambiguous identification of the item concerned by the development (for example, by proper noun designation like *At Vrin, At Beaubourg*), (ii) the *Parallel* relation inferred between the complex constituents corresponding to the different steps of the enumerative structure.

4.1 Topic content

Our solution relies on the semantic content of the topic that dominates the whole two-step enumerative structure. We have seen that this topic should include the co-items of the enumeration. Moreover the co-items have to be organized according to the potential discourse adverbials they are associated with. Such structure allows for reference through sophisticated means such as anaphoric correlates presented above. These structured topics also explain the semantic grouping of the different bits of information under a given topic. This suggests that all the information concerning one topic is retrieved rather easily. On the other hand, we propose that such semantic content do not directly reflect the coherence structure of the text which is provided in general by more explicit structuring clues. When such explicit cues are lacking the deep semantic structure supports more strikingly the discourse coherence and therefore should correspond more directly to the discourse structure.

4.2 The semantic contribution of the second step co-item markers

We now go back to the identification of frame introducers in the second step of enumerative structures. The plural entity of the introducing sentence is developed into its different constituting elements. They correspond to the co-items and are apparently available, at least for definite reference. However, they are both equally accessible leading to an ambiguity. The semantic contribution of the second step co-item markers is therefore crucial. They allow unambiguous identification of the elements that will be developed in the second step. This ambiguity can be resolved either by using adjectives like *the former, the later* as illustrated in example (2), by frame introducers repetitions like in example (1) or by proper nouns designation (similarly to example (3)).

(Schnedecker, 2007) studied the first case in details and distinguished between *'l'un / l'autre' (opaque anaphoric correlates)* being potentially ambiguous and *'le premier / le second' (identifying anaphoric correlates)* resolving the ambiguity. In order to tackle these subtleties, the topic must include some information about the order in which the elements that constitute the topic have been introduced in the discourse. Anaphoric correlates like *'le premier, dans le permier cas'* requires an ordered set (a kind of list) in which the anaphoric correlate will pick the first element. It introduces a further constraint on the attachment of the discourse segment. The attachment point must include a list in its semantic content. The solution lies therefore in a sophisticated content for the discourse topic (see previous section) and in the semantics of each anaphoric correlate.

In the second case, the frame introducer rule can be applied (Vieu et al., 2005) and results in the addition of a specific semi-explicit constituent. The only satisfactory attachment point available is the introducing sentence since the corresponding more specific, suggested by the repetition, item is not situated on the right frontier.

Finally, we leave out the third case for now as it requires a complete treatment of definites which is out of the scope of this paper. Moreover in this case the several-step enumerative structure is less clear than in the two first cases. However, we believe that there should be some intermediate solution between the strong constraints on definite constructions proposed in (Asher and Lascarides, 2003) and the no-constraint solution about definites proposed in (Danlos, 2008).

4.3 An illustration, the spatio-temporal information of (1)

Concerning semantic representation and interpretation, we follow (Vieu et al., 2005; Asher et al., 2008) by postulating a semi-implicit constituent for each co-item frame introducer that need to be created and updated. In the case of example (1), it is a spatial frame introducer. Following the same proposal, this constituent has the following content: $\exists e \exists P \exists \phi \; P(e) \wedge \phi(e)$.[4] This proposition is

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[4] In this formula, P corresponds to the predicate describing the eventuality concerned by the frame and ϕ correspond to the information brought by the frame and has in example (1) a spatial nature.

instantiated for example in (1) for (b) with $\exists e_b \exists P\ P(e_b) \wedge chezVrin(e_b)$, where P would a generalization of *'what happened'* further localized by *'chez Vrin'*, as described in the first step. Similarly, to the second step will correspond a constituent $\exists e_h \exists P'\ P'(e_h) \wedge chezVrin(e_h)$. This information has then to be exploited in order to infer the precise temporal structure. More precisely, the interpretation of example (1) runs as in the following.

- (a) : the temporal adverbial *twice* introduces an event e_a composed of two underspecified sub-events: $e_1 \subset_t e_a$, $e_2 \subset_t e_a$.[5] Moreover this event is partially specified by *'crut sombrer dans le gouffre'* that announces the two steps. However, this two-step announcement relies on very thin clues, difficult to take into account in a systematic way.

- (b) : As we explained above, framing adverbials introduce underspecified events. However, as explained in (Asher et al., 2008), in order to avoid a profusion of unnecessary representation levels we look for already existing introduced eventualities and check whether they correspond to the eventuality newly introduced. Here, e_1 and e_2 are already underspecified events awaiting to be specified. Therefore, we get $e_b = e_1$. However the *'Vrin'* story is developed in two steps; (b) and (h).[6] The relation between these eventualities is therefore $e_b \sqcup e_h = e_1$

- (c-d) : Aspectual information (state-event alternation) together with temporal marker *'when'* lead us to infer the background-foreground structure and the corresponding temporal relation: $s_c O_t e_d$, and, by temporal reasoning, $s_c \subset_t e_b, e_d \subset_t e_b$

- (e) : Similarly to (b), we get $e_e = e_2$. Moreover, *then* triggers the inference of Narration between the two constituents (b) and (e), resulting at the semantic level in the following temporal relations: $e_b <_t e_e$.

- (f-g) : Consistently with (c-d), we get $s_f O_t e_g, s_f \subset_t e_e, e_g \subset_t e_e$

- (h) : The new frame introducer matches with the previous one in (b), e_b and e_h correspond to the same spatial frame. This helps us to consider the temporal relations between sub-eventualities described under (b) and under (h).

- (i-j) : On one side, *'as soon as'* triggers Narration between (i) and (j), leading to $e_i <_t e_j$. On the other side, two clues point toward looking at potential links between e_i and preceding discourse: the co-reference between e_h and e_b; and 'pluperfect' use (*French plus-que-parfait*) instead of the preterit (French *passé composé* or *passé simple*). Pluperfect tense signals a specific temporal structure positioning the event e_i some time earlier than an other event available. Moreover, a combination of lexical semantics and world knowledge lead us to infer a link similar to the one expressed by *Occasion* between the event types of *Laure entered* and *Nil had seen Laure*. Our position here is to take this link between eventualities into account only for deep spatio-temporal interpretation but not at the rhetorical level where the prominent organization is given by the spatial frames. In other words, we have sufficient semantic information to infer temporal ordering between (d) and (i), but the question of their attachment does not even arise because of the discourse construction rules. Therefore the Narration relation is not inferred here.

- (k) : Similar reasoning about lexical semantics and world knowledge than the one we did for (i) can be applied to identify the same kind of *occasion* link between *escape* and *re-appear*. However in this case the attachment of (j) and (k) is considered and Narration is inferred. Finally the *'after'* construction gives the *flashback* order between k and l ($e_j <_t e_l <_t e_k$) to

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[5]Notation: $\subset_t, <_t, O_t$ respectively stands for temporal inclusion, temporal precedence and temporal overlap.
[6]The introducing sentence hints this two-steps structure.

temporal ordering between (j) and (k,l), while the *'after'* construction gives the order between k and l.

- (l) : As for (b) and (h), we can identify the spatial frame for (e) and (m)

- (m-n) : The eventualities introduced in (n) and (o) have a stative nature, they overlap completely and both are included in e_m. Thanks to this inclusion, we check the potential temporal relationship with the other eventuality of the 'Beaubourg' story. Here again, we get a kind of *occasion* link between *Anne-Geneviève appeared* and *Anne-Geneviève stayed for a second*. Therefore we infer the corresponding temporal relation $e_g <_t e_n$.

4.4   Comparison with other approaches

Several approaches to discourse structure already have accounted for cases of interleaved structures : Wolf and Gibson (2005), Egg and Redeker (2008) and Danlos (2008). In this section we compare our proposal with these approaches.

Wolf and Gibson (2005) (hereafter W&G) attempt to take into account all the relations in discourse, i.e. relations given by surface level as well as relations given by deep semantic structure. Contrarily to us, they do not consider that a frame introducer *(e.g 'At Beaubourg')* constitutes a discourse segment. These frame introduces have to be part of the subsequent segment.

In their set of coherence relations, W&G distinguish between asymmetrical (or directed) relations and symmetrical (or undirected) relations. Similarity (termed Parallel in SDRT) and Contrast are symmetrical relations. Elaboration and Temporal sequence (Narration in SDRT) are asymmetrical relations. W&G's definition of directionality is closed to the notions of nucleus and satellite nodes of (Mann and Thompson, 1987). Asymmetric relations hold between a nucleus and a satellite and symmetric relations hold between two nuclei. This seems slightly different from subordinating and coordinating relations of SDRT (See (Busquets et al., 2001)). Subordinating and coordinating relations impose constraints on the structure of the following discourse while W&G's structures don't impose any constraints. Example (1) illustrates their "crossed dependencies". More precisely, W&G would have a 'Temporal Sequence' relation between (d) and (i), and a 'Temporal Sequence' between (g) and (n).

Egg and Redeker (2008) (hereafter, E&R) disagree with W&G's analysis because it fails to take the surface constraints into account. E&R give priority to surface level markers. In example (1), surface structure is given by the frame introducers that are creating a strong coherence and signal the Parallel relation. E&R give priority to the surface level and somewhat disregard the deep semantic structure.

Danlos and Hankach (2008) agree with E&G's analysis. Danlos and Hankach solution cannot represent the anaphoric links between frame introducers *'At Vrin'* and *'At Beaubourg'*. Indeed, according to Danlos and Hankach anaphoric links cannot systematically be represented in discourse structure.

5   Generalization

Although satisfactory for examples like (1), the treatment proposed in section 4.3 is slightly too specific to handle cases like (2). Both examples include:

- a plural discourse entity *twice (litt. two times), two options.* In both cases, developing the single entities forming this plural in a distributive way could lead to relatively new kind of discourse structure. The nature of these discourse entities allows them to be developed distributively on a same footing, even through a coordinating relation (*Narration* in (1), *Consequence* in (2)).

- Strong discourse clues (frame introducer repetitions, anaphoric correlates,...) that signal, together with significant parallelism within the structure of the complex constituents, higher level structures between complex constituents. The idea underlying the original *discourse subordination* surfaces here but we will attempt to tackle this idea in a more conservative way than the *discourse subordination* original proposal.

The idea is to look at what happens when complex constituents are related by content relations. In SDRT, complex constituents are more like information packages that do not play a direct role on semantic constraints. They are by-products of the structure created by semantic interpretation. Therefore, they are related to other constituents by dominance relation (the labeled frames around the structures in our figure) or by structural relations. Here we would like to allow these complex constituents to enter as argument of content relations.[7]. We propose that content relations between complex constituents can be verified through the satisfaction of the semantic constraints of the relation between the simple constituents forming the complex ones. More precisely, the constraints we propose are stated in formula (9).

$$R_1(\alpha, \beta, \lambda) \wedge R_1(\gamma, \delta, \mu) \wedge Parallel(\lambda, \mu, \nu) \wedge (\phi_{R_2}(\alpha, \gamma) \wedge \phi_{R_2}(\beta, \delta)) \rightarrow R_2(\lambda, \mu, \nu) \qquad (9)$$

The application of the constraint on the examples results in the following:

1. Example (1): $Narration(b, e, A) \wedge Narration(h, m, B) \wedge Parallel(A, B, 0) \wedge \phi_{Narration}(b, h) \wedge \phi_{Narration}(e, m) \rightarrow Narration(A, B, 0)$.

2. Example (2): $Alternative(b, c, A) \wedge Alternative(d, g, B) \wedge Parallel(A, B, 0) \wedge \phi_{consequence}(b, d) \wedge \phi_{consequence}(c, g) \rightarrow consequence(A, B, 0)$

As for the attachment of such structures to the introducer, there is Enumeration/Elaboration[8] between the introducer and the first step of the enumerative structure. The second step is only attach by Enumeration. It would be tempting to add the relation holding between the first step and the second step between the introducer and the second step. Indeed, the first step being an elaboration of the specified introducer, the semantic function of these elements wrt. to the second step are equivalent. However, we keep this point for future discussion.

6 Conclusion

To sum-up the benefits of our treatment: (i) it is a more conservative and standard treatment than the discourse subordination of (Asher, 1993) on the role and nature of RFC, for a topic that hasn't received much attention since this proposal, (ii) it is taking up detailed empirical observations from (Schnedecker, 2007) which we are considering to be essentially correct and (iii) it offers a framework that can be extended to more general cases (e.g frame accessibility without enumerative structures). Finally, on a more general level, by paying attention to enumerative structures that correspond more to a textual level, we hope to contribute to the study of the interaction between semantic and textual levels.

Several ideas mentioned in this paper require some further studies. A first important element is the tenuous but important semantic contribution of the introducing sentence. A closer look at this sentence signals some subtleties about the elements being developed in the enumerative structure. For instance in (1), a careful reader might expect a two-step development of the introducing sentence:

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[7]In (Asher and Lascarides, 2003), discourse relations have been classified in three categories: content relations (narration, explanation, result,...), cognitive relations (plan-elaboration, question-elaboration,...) and structural relations (parallel, contrast). Such classifications have been proposed at many occasions in discourse literature, see (Knott et al., 2002) for a survey on these issues.

[8]The notation Ra/Rb is introduced in (Danlos, 2008) and means that both relations hold between the constituents.

(i) why Nil thought that he was in big trouble; and (ii) why he *only thought* that he was but was not in the end. It seems that such sentences announcing a two-step event signal a coordination between the two steps. However when the introducing sentence does not present this 'two-step' flavor, a subordinating relation between the two steps might be more appropriate. At a more general level, we think that the kind of structure we are looking at constitutes a good field of study to determine how precisely deep semantic structure can replace surface based cohesion to ensure discourse coherence. We hope that our future work on the topic can bring some new elements on this aspect.

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