Temporal Information and Discourse Relations in Narratives: the role of French connectives *puis* and *un peu plus tard*

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Abstract

This paper deals with the way temporal connectives affect Temporal Structure as well as Discourse Structure in Narratives. It presents a contrastive study of French connectives *puis (then, afterwards)* and *un peu plus tard (a bit later)* within the framework of Segmented Discourse Representation Theory. It shows that *puis* is a marker of the Narration discourse relation, whereas *un peu plus tard* blocks Narration and licenses only a weaker discourse relation, that can be considered as a "weak Narration" involving only temporal succession. In addition, *puis* blocks Result, while *un peu plus tard* does not.

1 Introduction

It is well known that tense, grammatical and predicational aspect are very important clues in the process of temporal interpretation of sentences, and of texts (see (Kamp and Rohrer, 1983) among others). As far as discourse level is concerned, it has been shown that world knowledge and knowledge about discourse structure play a role in determining the text global temporal structure (Lascarides and Asher, 1993; Caenepeel and Moens, 1994). In this paper we want to focus on the role of connectives and their intersentential semantics. We want to give an account of the way some temporal connectives in French interact with discourse relations. We will examine differences in the behavior of two connectives, namely *puis (then, afterwards)* and *un peu plus tard (a bit later)*, when different discourse relations hold. At first sight, the temporal contribution of these two connectives should show little or no difference. We will see that matters are not so simple.

This direction of work is inspired by a study of *puis* showing differences in behaviour according to the discourse relation at stake (Bras et al., 2001). It is also grounded on previous studies of adverbials of temporal location and adverbials of spatial location and of their role to build the spatio-temporal structure of discourse (Asher et al., 1994; Asher et al., 1995a; Asher et al., 1995b; Asher et al., 2001). We showed that, in the context of trajectories, relational adverbials like *un peu plus tard* and its spatial counterpart *un peu plus loin (a bit further)* had symetric roles in the process of locating the eventualities in space and time, and could both be given the same spatio-temporal interpretation.

We will tackle a comparative analysis of connectives within the framework of a theory of discourse structure and discourse relations. We have chosen Segmented Discourse Representation Theory (SDRT) for its effective methodology in investigating and formalizing how different linguistic clues interact at the semantic/pragmatic interface to recover the discourse structure of a text.

We will first briefly present SDRT (section 2), and the Discourse Relations (section 3) that we will use for our contrastive analysis of *puis* and *un peu plus tard* with respect to Discourse Structure (section 4).

2 SDRT

We first present the theorical framework that we chose to account for this interaction, namely SDRT. SDRT is a non trivial extension of DRT that takes discourse structure into account and offers a theory of the semantics/pragmatics interface. We give a brief outline of SDRT (see (Asher, 1993; Lascarides and Asher, 1993; Asher, 1996; Busquets et al., 2001) for a thorough presentation).

In SDRT a discourse is represented by an SDRS. An SDRS is a recursive structure consisting of elementary DRSs (i.e., DRSs representing a single clause) and sub-SDRSs linked together by Discourse Relations, such as Narration, Elaboration, Background, Continuation, Result, Contrast, Explanation... These elementary DRSs and the sub-SDRSs corresponding to complex discourse segments are the *constituents* of the SDRS representing the discourse. We use Greek letters as variables for constituents, and K_i as constants.

SDRSs are built up incrementally. SDRT defines a "Glue Logic" and an "Update Function" that together determine a new SDRS for a given SDRS τ representing the context (the discourse already processed), and a new constituent α representing the information to be integrated into that context. The Glue Logic is embedded in the framework of "Commonsense Entailment" (Asher and Morreau, 1991), a logic that exploits both monotonic ($\rightarrow$) and non-monotonic ($>$)[1] conditionals. The Glue Logic is specified by:

- definitions characterizing which constituents in τ are open for attaching α,
- axioms detailing what discourse relations may be inferred, on the basis of a variety of linguistic and common knowledge clues, in order to actualize the attachment of α to some open constituent of τ,
- axioms specifying the semantic effects of those discourse relations.

We will see some of these two kinds of axioms below. The Update Function is in charge of the proper hierachization of the structure and of the resolution of the possibly existing underspecifications (e.g., anaphora and ellipses).

[1] $\phi > \psi$ means "if ϕ then normally ψ". From $\phi > \psi$ and ϕ, Commonsense Entailment entails ψ "by default", that is, defeasibly, in the absence of further information regarding the truth value of ψ. From $\phi > \psi$, ϕ and $\neg\psi$, Commonsense Entailment no longer entails ψ, but $\neg\psi$.

3 Discourse Relations

In the following, we only present the discourse relations used in SDRT that will be helpful to analyse our data: Narration and Result. One important aspect of SDRT that is worth emphasizing at this point is that several discourse relations may simultaneously link the same two constituents.

3.1 Narration

Narration is a relation which is based on the Gricean pragmatic constraint of orderliness. When two clauses are linked by Narration, they describe in sequence two successive events "of the same story".

Let us first see more precisely what the semantics effects of Narration on discourse content are. Building on the previous analyses of (Lascarides and Asher, 1993), we showed in (Asher et al., 1995a) that a relation of Narration between two constituents α and β entails a temporal overlap between the resulting state of the main eventuality of α (noted e_α[2]), $post(e_\alpha)$, and the preceding state of e_β, $pre(e_\beta)$, in the absence of locating adverbials. This is what axiom (A1) expresses:

A 1 $\mathit{Narration}(\alpha, \beta) \rightarrow \mathit{post}(e_\alpha) \circ \mathit{pre}(e_\beta)$

(A1) aims at capturing the fact that narratives must cohere in the sense that the events linked together by Narration must fit consistently and without significant spatio-temporal gaps as expressed in (Asher, 1996) and observed in earlier work on temporal order in narratives (see for example (Caenepeel, 1989)). This doesn't mean that there should be no interval of time between the two events e_α and e_β, but rather that no relevant event can occur during this interval. From (A1) and uncontroversial ordering assumptions on events and their pre- and post-states[3], we can deduce a relation of temporal precedence between

[2] As regards the ontology of eventualities, SDRT keeps building on DRT, and assumes the same Davidsonian approach. Two basic aspectual classes are distinguished among eventualities: events and states.

[3] $Event(e) \rightarrow pre(e) \supset\subset e \supset\subset post(e)$, where $\supset\subset$ denotes temporal abutment, as used in DRT, or the "meets" relation as used in Allen's theory (Allen, 1984).

the events e_α and e_β: $e_\alpha \prec e_\beta$. Actually, to fully capture the "no-significant-gap" constraint, a temporal overlap is too weak. As we will see in Section 4.1, we should guarantee that $post(e_\alpha)$ persists (at least) up to the beginning of e_β, and, conversely, that $pre(e_\beta)$ starts when (or before) e_α ends. So we propose here an improved version of (A1), where $\sqcap$ denotes the "intersection" operator[4]:

A 2 *Narration*$(\alpha, \beta) \rightarrow$
$e_\alpha \supset\subset$ (*post*$(e_\alpha) \sqcap$ *pre*$(e_\beta)) \supset\subset e_\beta$

Narration has another semantic effect. It is motivated by the intuition that the elements of a Narration must belong to the "same story", i.e., they must have some common subject matter. To this effect, axiom (A3) expresses that the constituents connected together by Narration must have a common *Topic*. A topic is a simple constituent which is contingent (i.e., not vacuous, not contradictory, not tautologic), and subsumes the constituents of a sub-SDRS, in this case, the constituents linked by Narration. If not already present in the context, it has to be added to the SDRS during the update. (A3) and the rules of the underlying logic actually imply that Narration can be non-monotonically inferred only if such a topic exists or can be built.

A 3 $(\langle \tau, \alpha, \beta \rangle \wedge$ *Narration*$(\alpha, \beta)) \rightarrow$
$\exists \gamma$ (*Contingent*$(\gamma) \wedge \gamma \Downarrow \alpha \wedge \gamma \Downarrow \beta)$

where $\langle \tau, \alpha, \beta \rangle$ means that β is to be attached to α in the SDRS τ, and $\Downarrow$ is a subordinating discourse relation whose semantics essentially involves subsumption between the topic and the elements of the narrative it summarizes.

Now, how do we infer Narration? Since (Lascarides and Asher, 1993), the triggering axioms for Narration have changed to reflect the fact that Narration is not always a default in narratives (Asher, 1996). It is only a default if no other relation can be inferred, that is, if in the discourse there are no clues that other axioms could exploit to infer other discourse relations:

A 4 $(\langle \tau, \alpha, \beta \rangle \wedge \neg$*Clues_*$R_1(\tau, \alpha, \beta) \wedge$
$\neg$*Clues_*$R_2(\tau, \alpha, \beta) \wedge \ldots \wedge$
$\neg$*Clues_*$R_n(\tau, \alpha, \beta)) >$ *Narration*(α, β)

where $R_1 \ldots R_n$ are all the discourse relations used in SDRT[5] but Narration, and *Clues_*$R_i(\tau, \alpha, \beta)$ holds whenever the propositional content of α and β and the discourse structure of τ contain clues that could be exploited for inferring $R_i(\alpha, \beta)$.

In addition, Narration can be non-monotonically inferred if the predicate *Occasion* holds between the clauses to be related:

A 5 $(\langle \tau, \alpha, \beta \rangle \wedge$ *Occasion*$(\alpha, \beta)) >$
Narration(α, β)

Occasion holds if the two clauses contain clues indicating that their main eventualities are of types that may belong to "the same story". In other words, Occasion exploits lexical semantics and shared knowledge in terms of scripts connecting certain event types in sequences in which one event "naturally" leads to the next. For instance, (1) is an example of Narration where Occasion holds, since there is clearly in the shared knowledge a script in which, before entering, people knock at the door.

(1) Paul frappa à la porte. Il entra. *(Paul knocked at the door. He entered.)*

We can assume this kind of script to be encoded in the following axiom:

A 6 $([$*knock*$(e_\alpha, x, y) \wedge$ *door-of*$(y, z)]\alpha$[6] $\wedge$
$[$*enter*$(e_\beta, x, z)]\beta) \rightarrow$ *Occasion*(α, β)

In this case, the sequence of events is only typical, i.e., "natural": knocking isn't a necessary precondition to enter, and it doesn't cause the entering. Obviously, stronger dependence links between event types like precondition and cause also give rise to Occasion (and by non-monotonic inference, Narration), but some of them are also exploited to infer more specific discourse relations, like the next one to be presented here, Result.

[4] We assume that $s_1 \sqcap s_2$, when applicable, yields a new state lasting the maximum interval of time during which both s_1 and s_2 hold, and whose propositional contents is the conjunction of s_1 and s_2's propositional contents.

[5] SDRT explicit states that there should be a finite number of discourse relations, even though what these are precisely is not a settled matter yet. For the purposes of the present work, we will consider that these relations are: Narration, Background, Elaboration, Continuation, $\Downarrow$ (i.e., "Topic"), Result, Explanation, Contrast and Parallel, for which an SDRT account can be found in the literature.

[6] $[\phi]\alpha$ means that the condition ϕ appears in the constituent α.

3.2 Result

The Result relation has the semantic effect of implying a causal link between the main eventualities of the constituents it relates:

A 7 $\textit{Result}(\alpha, \beta) \rightarrow \textit{Cause}(e_\alpha, e_\beta)$

The predicate $\textit{Cause}(e_1, e_2)$ implies, among other things, that if e_1 and e_2 are events, the first temporally precedes the second:

A 8 $(\textit{Cause}(e_1, e_2) \wedge \textit{event}(e_1) \wedge \textit{event}(e_2)) \rightarrow e_1 \prec e_2$

Result may be monotonically inferred on the basis of the presence in β of an explicit marker of causation as e.g., the conjunct *donc* (*therefore*) or the verb *to result*:

A 9 $(\langle \tau, \alpha, \beta \rangle \wedge [\textit{donc}]\beta) \rightarrow \textit{Result}(\alpha, \beta)$

Result can also be non-monotonically inferred on the basis of lexical semantics or of some shared knowledge on the types of eventualities in α and β, as in the following two famous examples:

(2) Max poussa John. Il tomba. *(Max pushed John. He fell.)*

(3) Paul éteignit la lumière. Il faisait nuit noire autour de lui. *(Paul turned off the light. It was pitch dark around him.)*

In (2) and (3), it is again generic script-like information on pushing and falling event types, and on switching off the light event types and being dark state types that enables the reader to recover the causal links that the narrator most likely wanted to express. The presence of such clues indicating a possible causal link is expressed by the predicate *D-Permissible-Cause*. For instance, we assume that the following axiom encodes a plausible piece of shared knowledge:

A 10 $([\textit{push}(e_\alpha, x, y)]\alpha \wedge [\textit{fall}(e_\beta, y)]\beta) \rightarrow \textit{D-Permissible-Cause}(\alpha, \beta)$

which is in turn exploited by (A11) to infer Result:

A 11 $(\langle \tau, \alpha, \beta \rangle \wedge \textit{D-Permissible-Cause}(\alpha, \beta)) > \textit{Result}(\alpha, \beta)$

4 Connectives and Discourse Structure

In this section, we want to compare the behaviour of connectives *puis* and *un peu plus tard*[7] in combination with *Passé Simple* sentences in order to find out to what extent they affect Discourse Structure. We are first going to present series of examples and give the intuitions that native speakers may have about their interpretation. Let us first compare the examples in (4) :

(4) a. L'acide tomba dans le mélange. Une explosion se produisit. *(The acid fell into the mixture. An explosion happened.)*
b. L'acide tomba dans le mélange. **Puis** une explosion se produisit.
c. L'acide tomba dans le mélange. **Un peu plus tard** une explosion se produisit.

The three examples are good. They all express a relation of temporal sucession between the events. But we feel that another issue is at stake. In (4-a), the explosion event is not only interpreted as posterior to, but also as a result of, the acid falling event. This interpretation is still valid for (4-c), but it is lost in (4-b). With *puis*, it seems that the events are presented from an external, objective, point of view, as if the speaker did not intend to express any kind of resultative link.

Let us now look at (5) :

(5) a. La petite fille s'endormit. Il se mit à pleuvoir. *(The little girl fell asleep. It began to rain.)*
b. La petite fille s'endormit. **Puis** il se mit à pleuvoir.
c. La petite fille s'endormit. **Un peu plus tard**, il se mit à pleuvoir.

[7] *Un peu plus tard* is to be considered as representing a class of adverbials which have the same syntactic schema *NP plus tard/après* and the same semantic function, i.e. adverbials setting a temporal relation between two temporal referents. Such relational adverbials introduce themselves a new time referent by coercion only in contexts requiring a temporal anchorage as in: *Paul entra dans la pièce. Cinq minutes plus tard, Marie pleurait. (Paul entered the room. Five minutes later, Mary was crying.)*. Notice that *puis* cannot be coerced this way: *Paul entra dans la pièce. *Puis Marie pleurait*. We here compare a whole class of adverbials to the single adverb *puis*.

We feel that the use of *puis* in (5-b) is not as straightforward as the use of *un peu plus tard* in (5-c). In order to interpret (5-b) —and (5-a) to a lesser extent— it seems that we have to imagine a specific context, for example "the story of a little girl lost in the woods", in which the contribution of each sentence to the coherence of the discourse is obvious. *Un peu plus tard* does not require this kind of constraint.

The difference is less important when there is already a link between the events, as in (6) :

(6) a. Marie écrivit une longue lettre à son cousin. Elle alla la poster au village voisin. *(Marie wrote a letter to her cousin. She went and post it to the next village.)*
b. Marie écrivit une longue lettre à son cousin. **Puis** elle alla la poster au village voisin.
c. Marie écrivit une longue lettre à son cousin. **Un peu plus tard**, elle alla la poster au village voisin.

Here we do not need a particular context to interpret (6-b) —nor (6-a). Nevertheless, the events seem to be more disconnected in (6-c) than in (6-b) or (6-a). Now we want to examine how the intuitions described above may be accounted for in the SDRT framework.

4.1 *Puis* and *un peu plus tard* with Narration

In (Bras et al., 2001), we argue that *puis* is a rhetorical marker which introduces a relation of Narration:

A 12 $(\langle \tau, \alpha, \beta \rangle \wedge [\textit{puis}]\beta) \rightarrow \textit{Narration}(\alpha, \beta)$

In both (5-a) and (5-b), Narration will be inferred, by default with (A4) for (5-a), thanks to *puis* with (A12) for (5-b). Our hypothesis to account for the different interpretation in (5-c), is that *un peu plus tard* blocks Narration. But let us explain further. Let us first consider the temporal effect of Narration described in (A2), setting that the intersection of the poststate of e_α and the prestate of e_β exists and fills the interval between the two events. Again, this means that the events must fit consistently and without significant spatio-temporal gaps. A way to test the possibility of a relevant spatio-temporal gap between the two events is to try to insert a third event between e_α and e_β such that it terminates $post(e_\alpha)$, i.e, an event whose poststate is incompatible with $post(e_\alpha)$, for instance the event of the little girl's waking up: [8]

(7) a. La petite fille s'endormit. Il se mit à pleuvoir. *Elle venait juste de se réveiller. *(She had just woken up.)* / *Entretemps elle s'était réveillée. *(Meanwhile she had woken up.)*
b. La petite fille s'endormit. **Puis** il se mit à pleuvoir.*Elle venait juste de se réveiller. / *Entretemps elle s'était réveillée.
c. La petite fille s'endormit. **Un peu plus tard**, il se mit à pleuvoir. Elle venait juste de se réveiller. / Entretemps elle s'était réveillée.

The test on the temporal effect of Narration only fails in (7-c). It is successful in (7-a) and (7-b), as the insertion of an intermediate event appears to be very difficult. Let us insist that our examples are built in such a way that the intermediate events actually implies the end of post(e_α), hence a temporal gap between e_α and e_β. If not so, the adding of another event with *entretemps* poses no problem. For instance:

(8) La petite fille s'endormit. **Puis** il se mit à pleuvoir. Entretemps la nuit était tombée. *(Meanwhile the night had fallen.)*

is perfectly acceptable, since the falling of the night does not imply that the little girl is no longer asleep. Let us also note that it might be possible to improve (7-a) and (7-b), by introducing the third event with something like *Ajoutons/précisons que, entretemps, la petite fille s'était réveillée* (*Let's add / point out that, meanwhile, the little girl had woken up*). In such a case, however, there is an explicit phenomenon of correction (of the way the events have been narrated), and so it is not surprising that the temporal effects of Narration should be revised.

We come now to the second semantic effet of Narration, topic requirement (A3). As we said

[8] See (Caenepeel, 1995) that investigates the conditions for the insertion intermediate events in a narrative sequence.

above, we do not need any special context to interpret (5-c). On the contrary, a link seems to be required between the two events in (5-a) and (5-b), which corresponds to (A3) topic requirement. Let us note that this requirement seems to be stronger in (5-b). This is an indication that *puis* is more demanding on topic than a simple Narration. We leave this apart for now, and turn to the difference between *puis* and *un peu plus tard*.

At this point, we need to address the issue of the relation between the sentence β introduced by *un peu plus tard* and the sentence α. Of course, *un peu plus tard* contributes a temporal relation of succession between the events. But apart from this contribution, the relation between α and β does not match the semantic effects of Narration. This leads us to claim that with the temporal indication contributed by *un peu plus tard*, the relation of Narration does not hold. Now, (7-c) being a coherent discourse, what discourse relation holds? We hypothesize that it should be a relation that only supports temporal precedence, that could be viewed as a kind of weak Narration. To account for this, we propose to view Narration as a gradual relation that normally occurs under its strong form, and always at least under its weak form:

A 13 *Narration*$(\alpha, \beta) >$ *Strong-Narration*(α, β)

A 14 *Narration*$(\alpha, \beta) \rightarrow$ *Weak-Narration*(α, β)

This change implies updating the axioms given in the previous sections: Narration has to be substituted by Strong-Narration in the axioms (A2), (A3), (A5) and (A12). In (A4), the general Narration relation remains. Weak-Narration has no requirement on topic nor does it have the "no gap constraint". The only semantic effects of Weak-Narration is temporal precedence:

A 15 *Weak-Narration*$(\alpha, \beta) \rightarrow e_\alpha \prec e_\beta$

With such limited semantic effects, *un peu plus tard* is obviously compatible with Weak-Narration. It must be noted though, that here we do not claim that adverbials of this kind should be considered as rhetorical markers of this relation. Unlike *puis*, syntactically they do not behave as conjuncts. Moreover, their main semantic contribution materializes compositionally within the constituent itself, specifying not only temporal succession between two temporal referents, but also the length of the temporal interval between these referents.

Let us now come back to example (6) in the light of these considerations on the role of *un peu plus tard*. In both (6-a) and (6-b), a Strong-Narration relation will be inferred, because Occasion holds and (A5) is triggered for (6-a), by (A12) for (6-b). Unlike for example (5) just analysed, Occasion holds in both cases, and thus we can assume it is easy to buid a common topic to both sentences. The example in (6-c) is perfectly all right, but bears a slightly different interpretation: here the strong link between the two events is lost. It is indeed quite possible to introduce an intervening event, as (9-c) shows, while this is not possible for the two other examples, viz. (9-a) and (9-b):

(9) a. Marie écrivit une longue lettre à son cousin. Elle alla la poster au village voisin. *Entretemps, elle l'avait retouchée à plusieurs reprises. *(Meanwhile she had altered it several times.)*

b. Marie écrivit une longue lettre à son cousin. **Puis** elle alla la poster au village voisin. *Entretemps, elle l'avait retouchée à plusieurs reprises.

c. Marie écrivit une longue lettre à son cousin. **Un peu plus tard**, elle alla la poster au village voisin. Entretemps, elle l'avait retouchée à plusieurs reprises.

Therefore, *un peu plus tard* blocks Strong-Narration not only when it could have been inferred by default, but also when Occasion holds. In order to account for this blocking, we introduce the following axioms:

A 16 $(\langle\tau, \alpha, \beta\rangle \wedge$ [*un peu plus tard*]$\beta \wedge$ $Narration(\alpha, \beta)) >$ ¬*Strong-Narration*(α, β)

A 17 $(\langle\tau, \alpha, \beta\rangle \wedge$ *Occasion*$(\alpha, \beta) \wedge$ [*un peu plus tard*]$\beta) >$ ¬*Strong-Narration*(α, β)

(A16) will block the inference of Strong-Narration in absence of other relations (i.e., a Strong-Narration that could have been inferred with (A4) and (A13)). (A17) is needed as well for the cases in which Occasion holds. Apply-

ing the Penguin Principle, it circumvents a Nixon Diamond schema between (A5) and (A16) that precludes the inference of any relation at all[9].

Let us come back again to (6) to add that the perception of difference between (6-a) and (6-b) on the one hand, and (6-c) on the other hand, is certainly also due to a particularity of *un peu plus tard* concerning plans. As a matter of fact, it seems that the presence of *un peu plus tard* has the effect of blocking the interpretation that events e_α and e_β are part of a plan (a plan in which e_α is intended to lead to e_β). The difference in terms of planning is more obvious on examples like (10) :

(10) Marie rejoignit son ami, **puis** lui glissa à l'oreille qu'elle voulait partir. *(Marie rejoined her friend, then she whispered in his ear that she wanted to leave.)*

This example lends itself to an interpretation in which Marie reaches her friend in order to tell him something. But the plan interpretation seems to be suspended when *puis* is replaced with *un peu plus tard*[10]:

(11) Marie rejoignit son ami ; **un peu plus tard**, elle lui glissa à l'oreille qu'elle voulait partir.

It seems to us that the difference in behaviour evidenced here should be explained once more at the rhetorical level. It would probably require in some contexts the use of a relation of Enablement (Sandström, 1993), allowed by *puis*, and again, blocked by *un peu plus tard*. We leave this for further research since how exactly Enablement is to be accounted for in SDRT has not yet been investigated in the literature.

4.2 *Puis* and *un peu plus tard* with Result

Let us now come back to (4). We want to account for the different interpretations of (4-a) and (4-c) on the one hand, and of (4-b) on the other hand. Assuming that there is most probably some piece of shared knowledge on chemicals implying that D-Permissible-Cause holds between the two constituents representing the two clauses, SDRT non-monotonically concludes Result with (A11). As was shown in (Bras et al., 2001), *puis* blocks the non-monotonic inference to Result. Notice that (4-b) remains neutral regarding the truth value of $Cause(e_\alpha, e_\beta)$ and it could still be that the two events described are actually causally connected. Simply, the narrator doesn't commit himself. *Puis* directly blocks the rhetorical relation of Result, and not the factual relation of Cause. Hence we need as an additional axiom:

A 18 $(\langle\tau, \alpha, \beta\rangle \wedge [\textit{puis}]\beta) \rightarrow \neg \textit{Result}(\alpha, \beta)$

For its part, *un peu plus tard* doesn't seem to directly interfere with the Result relation. In (4-c) we get the reading of a mere "delayed" result, which the theory accounts for by inferring Result just like for (4-a). However, in some contexts, *un peu plus tard* also appears to block Result:

(12) a. Max trébucha. Il tomba et se cassa la jambe. *(Max stumbled. He fell and broke his leg.)*
b. Max trébucha. **Puis** il tomba et se cassa la jambe.
c. Max trébucha. **Un peu plus tard**, il tomba et se cassa la jambe.

In both (12-b) and (12-c), the causal reading of (12-a) is lost. The preferred reading is not that the narrator doesn't want to commit himself regarding the causal connection, but rather that he is describing two unrelated, temporally separated, occasions on which Max lost his balance. A Cause relation between two events may entail a more precise temporal relation than temporal succession. Shared knowledge may stipulate that some kinds of events causally related occur in a single flow, without any temporal gap at all between them. This stronger temporal relation corresponds to the $\supset\subset$ relation, and is clearly incompatible with any indication that there exists a (non-null) temporal interval between the two events. In (12-a), it seems indeed that as soon as the stumbling ends, the falling has started. With this piece of knowledge, both *puis* and *un peu plus tard* prevent $Cause(e_\alpha, e_\beta)$ to hold, since they both specify the existence of a temporal interval between e_α and e_β.

[9] From $\phi > \psi$, $\zeta > \neg\psi$, $\phi \rightarrow \zeta$, ϕ and ζ, ψ (and not $\neg\psi$) is inferred (Penguin principle). From $\phi > \psi$, $\zeta > \neg\psi$, ϕ and ζ, if ϕ and ζ are logically independent, CE cannot conclude ψ nor $\neg\psi$ (Nixon Diamond).

[10] Or, for that matter, another adverbial indicating an even shorter temporal separation like *immédiatement après*

We here again see the usefulness of theoretically separating the rhetorical level of the discourse relations from the level of the description of the facts, to which the temporal relations belong.

5 Conclusion

We wanted to compare two connectives and the way they affect Temporal and Discourse Structures. From the temporal point of view, we have observed that both *puis* and *un peu plus tard* express temporal succession, but that *puis* has a stronger temporal semantics contents ($e_\alpha \supset\subset (\text{post}(e_\alpha) \sqcap \text{pre}(e_\beta)) \supset\subset e_\beta$). From the Discourse Structure point of view, we have shown that *puis* is a marker of Strong-Narration, involving the notion of telling the "same story" (topic), whereas *un peu plus tard* blocks Strong-Narration and licences Weak-Narration, involving no more semantic effects than temporal succession. In addition, *puis* blocks Result, while *un peu plus tard* doesn't. We believe it particularly interesting to notice that a priori temporally equivalent adverbials may have so different effects on Discourse Structure. On the one hand, *puis* has an important role at the rhetorical level, which is no surprise given its conjunct character. On the other hand, *un peu plus tard* is not the purely temporal adverbial that one could expect, since it is capable of blocking some discourse relations, among which Strong-Narration, the usual case of Narration. And this is certainly not an obvious fact for an adverbial primarily indicating temporal succession.

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