Discourse-Structure Driven Disambiguation of Underspecified Semantic Representations: a case-study of the Alemannic *Perfekt*[1]

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Abstract: We propose here a treatment of the Alemannic *Perfekt*, a preterit-like tense, in which rhetorical relations eliminate unwanted readings among those produced by an underspecified semantic representation. It illustrates how semantic underspecification can be reduced at the semantics/pragmatics interface within the SDRT framework.

1. Introducing aspectual issues: the semantic underspecification of the *Perfekt*

The notion of 'viewpoint aspect' has been proposed by Smith (1991) in order to explain the aspectual behaviour of tenses. The core idea behind this notion is that a speaker renders a certain part of an event visible by focusing on it though a 'linguistic lens' so to speak, namely the aspectual content of a tense. We consider events to consist in at least two subevents or *stages*, namely an inner and a result stage (a resultant state in the sense of Parsons, 1990). Tenses endowed with a imperfective viewpoint aspect focus on a part of the inner stage of an event (1), while perfective viewpoint tenses focus on the totality of the inner stage (2).

(1) Le piéton **traversait** la rue. (imperfective viewpoint tense)
(2) Le piéton **traversa** la rue. (perfective viewpoint tense)

In the Germanic languages, the class of tenses traditionally called 'preterits' possess an aspectual viewpoint of their own, which is neither properly perfective or imperfective, but rather seems to waver between these two aspectual readings. We will try and model here the versatile aspectual behaviour of the Alemannic *Perfekt*, a preterit-like perfect.

1.1. The data: the Alemannic[2] *Perfekt*

The Alemannic *Perfekt* is the only past tense available in this German dialect, and like preterits, displays both perfective and imperfective viewpoint readings. Thus, while sentences describing atelic events are always compatible with an imperfective viewpoint reading, cf. (3)-(4), sentences describing telic events are always compatible with a perfective viewpoint reading (at least out of context)[3], cf. (5) vs. (6). The latter contrast also reveals that atomic[4] telic events block the imperfective viewpoint reading, while non-atomic telic events don't.

(3) viᵉ d anna inɛᵉku iʃ, **iʃ eᵉ krank gsi** (imperfective reading OK, perfective *)
'When Anna came in, he was sick.'
(4) viᵉ d anna inɛᵉku iʃ, **hɔt eᵉ øpfl gɛᵉsɐ** (imperfective reading OK, perfective ??)
'When Anna came in, he was eating apples.'
(5) viᵉ d anna inɛᵉku iʃ, **hɔt eᵉ an kuᵉxɐ gɛᵉsɐ** (perfective and imperfective readings OK)
'When Anna came in, he ate/was eating a cake.'
(6) viᵉ d anna inɛᵉku iʃ, **iʃ eᵉ gaŋɐ** . (perfective reading OK, imperfective reading *)

[1] We thank Antje Rossdeutscher and two anonymous reviewers for they helpful comments.
[2] A dialect of Upper German; the samples studied here are taken from the Bregenz area in Austria.
[3] Such sentences can also receive a perfective viewpoint reading if the event described is interpreted inchoatively (for instance, if rather than 'he was sick', *iʃ eᵉ krank gsi* in (3) meant 'he became sick').
[4] A telic event is atomic when it does not admit any proper subpart (cf. Moens & Steedman, 1988). This aspectual property can be tested e.g., with *finish* and adverbials such as *completely* / *halfway*. Cf. Caudal (2005).

'When Anna came in, he left/*was leaving.'

Note that this inherent aspectual ambiguity of sentences in the *Perfekt* describing non-atomic telic events can be lifted in context, as shown in (7a) vs. (7b).

(7) a. dɐ hans hɔt dɐ kuᵉxɐ gɛᵉsɐ, und dɛnn hɔt ma ɛᵉm gseit das dɔ a giftige kiᵉʃɐ din iʃ
'Hans ate the pie, and then he was told that there was a poisoned cherry in it.'
b. dɐ hans hɔt dɐ kuᵉxɐ gɛᵉsɐ wiᵉ ma ɛᵉm gseit hɔt das dɔ a giftige kiᵉʃɐ din iʃ.
'Hans was eating the pie when he was told that there was a poisoned cherry in it.'

Finally, on top of this preterit-style semantics, the *Perfekt* has retained its original resultative semantics, which is illustrated e.g., by the present relevance of the described result states in (8)-(10). When combined with a future denoting temporal adverbial, this resultative reading can even extend to the future, thus yielding a 'futurate resultative' reading, (11)[5].

(8) Speaker A: hɔʃ an huŋɐ ? 'Are you hungry?'
Speaker B: na, i hɔb ʃɔ gɛᵉsɐ. 'No, I've already eaten.'

(9) eᵉ hɔt dɐ kuᵉxɐ (ʃɔ) sit tsvoj ʃtundɐ gɛᵉsɐ.
'He ate the cake two hours ago'. (litt. 'he has eaten the cake for two hours')

(10) eᵉ hɔt dɐ ʃats sit tsvoj ʃtundɐ fɐʃtekt. (he hid the treasure two hours ago)
(litt. 'He has hidden the treasure for two hours')

(11) Morgɐ/hyt ɔbɐd hɔt eᵉ dɐ kuᵉxɐ gɛᵉsɐ. 'Tomorrow/tonight, he will have eaten the cake'

Like other 'aoristic' perfects, i.e., for example, the French *passé composé*, the German *Perfekt* or the latin *perfectum*, the Alemannic *Perfekt* can also describe events which are temporally located in the past by means of an adverbial, cf. (12). This ability is shared by *bona fide* perfective viewpoint tenses and aoristic perfects; cf. Caudal & Vetters (to appear) and Caudal & Roussarie (2004) for a diachronic and theoretical discussion.

(12) eᵉ hɔt dɐ kuᵉxɐ um tsvølfe gɛᵉsɐ. 'He ate the cake at twelve.'

Somewhat unsurprisingly, the *Perfekt* excludes past resultative readings – it isn't a pluperfect. A sentence like (5) cannot mean that the event of eating a cake is terminated when Anna comes in. In order to express this, one has to use a double-compound *Perfekt*, cf. (13):

(13) viᵉ d anna inɛᵉku iʃ, hɔt eᵉ dɐ kuᵉxɐ ʃɔ gɛᵉsɐ khet. (resultative only)
'When Anna came in, he had already eaten the cake.' (lit.: 'he has already had eaten')

1.2. Some elements for a formal model of aspect: stage structure

In order to implement an analysis of this data, we assume with Caudal (2005) that the aspectual contribution of each (disambiguated) verb consists in a *stage structure*. Informally speaking, the idea is that lexical aspectual entries shouldn't be associated with only one event descriptor, but with a more complex structure relating several distinct event descriptors, each of them corresponding to a distinct stage (i.e., subevents ; see Higginbotham (2000) for a related approach to event semantics).

Formally speaking (cf. Figure 1 for an illustration), stage structures are lists containing :

[5] It is worthwhile noting that the resultative reading is the only available reading with such adverbials.

(i) a set of stages, modelled by sub-DRSs; for the purpose of the present paper, it is enough to distinguish between *result stages* (*RStages*), which correspond to resultant states (focused on by resultative viewpoints, see e.g. the English perfect; we note them e_R, instead of *s*, the standard DRT notation), and *inner stages* (*IStages*), which correspond to the 'core' subevent (focused on, e.g., by imperfective viewpoints) ;

(ii) a set of aspectuo-temporal stage relations (e.g., *Conseq_Telic* connects the *IStage* DRS to the *RStage* DRS of a telic stage structure; if e_I and e_R are the event referents respectively underlying the IStage and the RStage, then e_I immediately precedes e_R) ;

(iii) a set of 'salience' ascriptions to stages (*via* function ς) which will not be discussed here as they are irrelevant to the present issue.

Figure 1: Stage structure for *leave*

$$\left\langle \left\{ \begin{array}{l} K_I : \lambda e_I \lambda y \lambda x \quad \boxed{IStage\_\text{leave}(e_I, x, y)} \; ; \\ K_R : \lambda e_R \lambda y \lambda x \quad \boxed{RStage\_\text{leave}(e_R, x, y)} \end{array} \right\}, \; \left\{ Conseq\_Telic\ (\hat{}K_I, \hat{}K_R) \right\}, \left\{ \varsigma(K_I, 2) \; ; \; \varsigma(K_R, 1) \right\} \right\rangle \text{leave}_{\text{STS}}$$

Aspectual viewpoints are represented as functions applying to stage structures; they introduce one or two 'focused' stages within the compositional semantics of a clause, as we will see.

1.3. A UDRT treatment of the Alemannic *Perfekt*

Our account of the underspecified aspectual semantics of the *Perfekt* is couched within the UDRT (*Underspecified Discourse Representation Theory*, Kamp & al., 2005) framework. It makes extensive use of the UDRT ambiguity operator, i.e. $\Vdash$. To put it short, an U(nderspecified) DRS $\boxed{K_1 \Vdash K_2}$ remains unresolved until some co(n)textual information makes either K_1 or K_2 contradictory, thereby eliminating the ambiguity.

For a simple ambiguous sentence in the *Perfekt* (14), we propose the representation (15). The bottom UDRS $l_\perp$ combines the stage structure information derived from *eat* and its complements, with the aspectual viewpoint function *Preterit_Atom_Res* contributed by the *Perfekt*. $l_\perp$ is repeated on the right of (15) to show that *Preterit_Atom_Res* is in fact applied to the stage structure of *eat* (eat_{STS}) together with the individuals *u* and *v*.

Following the treatment proposed by Caudal & Roussarie (2004) for 'aoristic' perfects, we assume that such perfects can describe two subevents, at two different times: they can locate the inner stage event in the past, and can require the result stage event to overlap with the 'now' interval – that is, to have present relevance. The latter condition must be relaxed though in the case of the Alemannic *Perfekt*, notably because of its futurate reading.

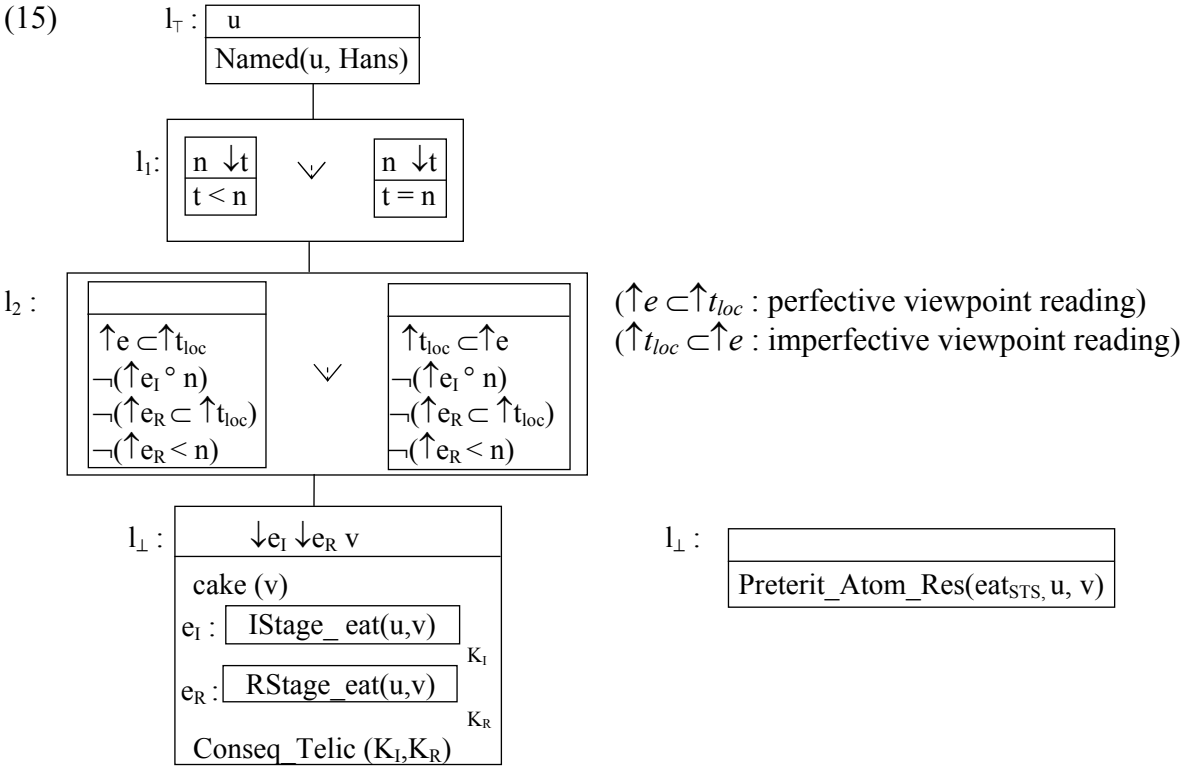
As a consequence, we define the *Preterit_Atom_Res* as a viewpoint function applying to a stage structure and some individual entities (i.e., $east_{STS}$, *u* and *v* in (15)) such as (i) it picks up two stages within this stage structure, namely the inner and result stages (respectively, the sub-DRSs K_1 and K_R in $l_\perp$), and (ii) it uses them as event descriptors within the (bottom) aspectual UDRS $l_\perp$. Specific conditions within other UDRSs, namely l_1 and l_2, convey respectively the temporal (*n* / *t* order) and aspectuo-temporal content of the *Perfekt*, and make sure that each stage gets a correct temporal location and ordering. ° indicates temporal overlap, and < strict temporal anteriority (i.e., $e<e'$ implies $\neg(e \circ e')$).

Because of the presence of the UDRT ambiguity operator in l_1 and l_2, multiple aspectuo-temporal ambiguities arise. Thus, l_1 is ambiguous between a past ($t < n$) and a present ($t = n$) interpretation, while l_2 is ambiguous between two possible readings – one ($\uparrow e \subset \uparrow t_{loc}$) corresponding to the perfective viewpoint reading, and the other ($\uparrow t_{loc} \subset \uparrow e$)

corresponding to the imperfective viewpoint reading. Last but not least, one should bear in mind that (14) is indeed a very simple sentence; quantifier scope-ambiguities might easily leave us with well over twenty UDRT representations. However, for want of space to address them, we must leave these issues aside, and refer the interested reader to Kamp et al. (2005).

(14) dɐ hans hɔt dɐ kuᵉxɐ gɛᵉsɐ. 'Hans ate/was eating the cake'

(15)



It is essential to note that due to the presence of a strict partial order operator in condition $\uparrow t_{loc} \subset \uparrow e$, atomic events are predicted to be incompatible with an imperfective reading. This effectively captures the contrast between (5) and (6).

By applying the UDRT linearization and update mechanisms, (15) can produce eight DRSs (given under (16)-(23)): first, $\uparrow e$ can unify either with e_R (resultative reading of the perfect) or e_I (preterit reading) in l_2; second, due to the presence of $\vee$ operators, l_1 can yield either $t < n$ or $t = n$, and l_2 can yield either $\uparrow e \subset \uparrow t_{loc}$ or $\uparrow t_{loc} \subset \uparrow e$.

Only three unifications are clearly coherent[6], namely (16), (18) and (17).

(16) represents the perfective viewpoint reading (with $e_I \subset t$ and $t < n$), (18) the imperfective viewpoint reading ($t \subset e_I$ and $t < n$), and (17) the present resultative reading ($t \subset e_R$ and $t = n$).

Four unifications are incoherent: (19) (conditions $t \subset e_I$, $t = n$ and $\neg(e_I \circ n)$ are contradictory), (21) ($e_R \subset t$ contradicts $\neg(e_R \subset t)$), (22) ($e_I \subset t$, $t = n$ and $\neg(e_I \circ n)$ are contradictory), and (23) ($t \subset e_I$, $t = n$ and $\neg(e_I \circ n)$ are contradictory). Finally, while (20) seems incoherent too,

[6] Following a suggestion by Antje Rossdeutscher, we put aside the futurate resultative reading, for this it is unambiguously produced by the adjunction of a future time adverbial such as *morgɐ*. This choice is reflected by UDRS l_1 – it contains only a double temporal ambiguity. See Kamp et al. (2005) for a UDRT treatment of the impact of temporal adverbials on an underspecified representation of the German present tense morpheme.

it is not so clearly contradictory: conditions $t \subset e_R$, $t<n$ and $\neg(e_R<n)$ are contradictory only in certain models, although K_5 represents a 'past perfect' reading which should be ruled out.[7]

(16) K_1 =

u v e_I e_R

Named(u,Hans)
cake(v)
$e_I \subset t$ $t < n$
$\neg(e_R \subset t)$ $\neg(e_R < n)$ $\neg(e_I \circ n)$
e_I : IStage_ eat(u,v) K_I
e_R : RStage_eat(u,v) K_R
Conseq_Telic (K_I,K_R)

(17) K_3 =

u v e_I e_R

Named(u,Hans)
cake(v)
$t \subset e_R$ $t = n$
$\neg(e_R \subset t)$ $\neg(e_R < n)$ $\neg(e_I \circ n)$
e_I : IStage_ eat(u,v) K_I
e_R : RStage_eat(u,v) K_R
Conseq_Telic (K_I,K_R)

(18) K_2 =

u v e_I e_R

Named(u,Hans)
cake(v)
$t \subset e_I$ $t < n$
$\neg(e_R \subset t)$ $\neg(e_R < n)$ $\neg(e_I \circ n)$
e_I : IStage_ eat(u,v) K_I
e_R : RStage_eat(u,v) K_R
Conseq_Telic (K_I,K_R)

(19) K_4 =

u v e_I e_R

Named(u,Hans)
cake(v)
$t \subset e_I$ $t = n$
$\neg(e_R \subset t)$ $\neg(e_R < n)$ $\neg(e_I \circ n)$
e_I : IStage_ eat(u,v) K_I
e_R : RStage_eat(u,v) K_R
Conseq_Telic (K_I,K_R)

(20) K_5 =

u v e_I e_R

Named(u,Hans)
cake(v)
$t \subset e_R$ $t < n$
$\neg(e_R \subset t)$ $\neg(e_R < n)$ $\neg(e_I \circ n)$
e_I : IStage_ eat(u,v) K_I
e_R : RStage_eat(u,v) K_R
Conseq_Telic (K_I,K_R)

(21) K_6 =

u v e_I e_R

Named(u,Hans)
cake(v)
$e_R \subset t$ $t < n$
$\neg(e_R \subset t)$ $\neg(e_R < n)$ $\neg(e_I \circ n)$
e_I : IStage_ eat(u,v) K_I
e_R : RStage_eat(u,v) K_R
Conseq_Telic (K_I,K_R)

[7] Thus, K_5 is non contradictory with one kind of model, such as $e_I < t$, $t<n$, $t \subset e_R$, and e_R begins before n but overlaps with it. However, with such a model, the kind of 'past perfect' reading represented by K_5 could well be blocked on pragmatic grounds: the speakers seems to be informatively non-cooperative by concealing that the result stage event e_R is in fact presently relevant (i.e., by viewing it as past, because of $t<n$).

(22) K_7 =

u v e_I e_R
Named(u,Hans) cake(v) $e_I \subset t$ t = n $\neg(e_R \subset t)$ $\neg(e_R < n)$ $\neg(e_I \circ n)$ e_I : IStage_ eat(u,v) K_I e_R : RStage_eat(u,v) K_R Conseq_Telic (K_I,K_R)

(23) K_8 =

u v e_I e_R
Named(u,Hans) cake(v) $t \subset e_I$ t = n $\neg(e_R \subset t)$ $\neg(e_R < n)$ $\neg(e_I \circ n)$ e_I : IStage_ eat(u,v) K_I e_R : RStage_eat(u,v) K_R Conseq_Telic (K_I,K_R)

One caveat should be mentionned at this point: although the result stage event appears to be part of the semantics of the imperfective viewpoint reading in (18), it nevertheless falls outside the scope of the aspectual focus interval *t*, because of the stage relation *Conseq_Telic*, which imposes $e_I \prec e_R$, from which follows $\neg(t \circ e_R)$ (absence of temporal overlap). Indeed, with the imperfective viewpoint, the speaker does not assert the existence of a transition in the sense of Pustejovsky (1995) – i.e., she does not assert an inner stage event plus (at least) the left part of a result stage event. The semantics/pragmatics interface can then capitalize on this fact to 'filter out' irrelevant aspectual information, for instance by making sure that only stages overlapping with *t* will be used to establish certain discourse relations.[8] In sharp contrast, because of $e_I \subset t$, the perfective viewpoint reading imposes some temporal overlap between *t* and the result stage (i.e., $e_R \circ t$), thus causing the left part of the result stage to be part of the asserted aspectual information, and constituting a transition.

2. Accounting for the *Perfekt* at the semantics/pragmatics interface

Now given the multiple correct semantic outputs listed above and a precise context, one should be able to rule out those which are unfelicitous at the discourse level – i.e., of narrowing down the interpretation of the *Perfekt* in context. The SDRT framework will provide us with the formal means to achieve this at the semantics/pragmatics interface. To implement our analysis of the *Perfekt* within this theory, we will capitalize on the division of the SDRT framework into two main components, i.e., the *Logic of Information Content* (LIC), which is roughly equivalent to a DRT-style semantics semantics plus some extensions, and the *Logic of Information Packaging* (LIP), which builds logical forms for discourse.

2.1. Objectives of an account at the semantics/pragmatics interface

Our SDRT implementation at the semantics/pragmatics interface should make it possible to :

(i) Disambiguate the underspecified output of the compositional semantics component, cf. the imperfective reading of '*dɐ hans hɔt…gɛᵉsɐ*' in (24a) vs. perfective in (24b) ;

(24) a. dɐ hans hɔt dɐ kuᵉxɐ gɛᵉsɐ wiᵉ ma ɛᵉm gseit hɔt das dɔ a giftige kiᵉʃɐ din iʃ.
'Hans was eating the cake when someone told him there was a poisonous cherry in it'
b. dɐ hans hɔt dɐ kuᵉxɐ gɛᵉsɐ, und dɛnn hɔt ma ɛᵉm gseit das dɔ a giftige kiᵉʃɐ din iʃ
'Hans ate the cake and then someone told him there was a poisonous cherry in it'

[8] For want of space, we cannot detail how discourse relation axioms should be restated to incorporate this insight. However, suppose we call *Perfekt_IVP* the illocutionary viewpoint associated with the Alemmanic *Perfekt*; it would be part of SDRSs representing sentences in the *Perfekt*. Then, for instance, $Perfekt\_IVP(\pi) \wedge t_\pi \circ e_{R\pi}$ should appear within certain axioms on *Explanation*, if t_π notes the aspectual focus interval associated with DRS *K* such that $\pi : K$, and if $e_{R\pi}$ notes the result stage event underlying *K*.

(ii) Prevent unfelicitous discourse structures from being computed; compositional semantic information in its turn predetermines what kind of discourse relations can be established within the LIP. Thus, while (25) can be attached to the current context by the rhetorical relations *Narration* or *Background*[9], (26) blocks *Background* because it describes an atomic telic eventuality, and is perfectively interpreted (cf. also (6)).

(25) eᵉ hɔt dɐ kuᵉxɐ gɛᵉsɐ (non-atomic event : imperfective+perfective OK)
'He ate/was eating the cake'

(26) eᵉ iʃ gaŋɐ / kummɐ (atomic event : perfective OK, imperfective *)
'He left / came'

2.2. Towards the contextual disambiguation of sentences in the *Perfekt*

Let us turn to objective (i), namely the contextual disambiguation of sentences in the *Perfekt*. From the point of view of a clause-level compositional semantics, the issue of disambiguating between perfective vs. imperfective readings amounts to determining whether the described eventuality e is such that $e \subset t$ or that $t \subset e$ (in DRT terms). Therefore, we pose the following equivalences :

(27) a. $perfective(e) \leftrightarrow e \subset t$
b. $imperfective(e) \leftrightarrow t \subset e$.[10]

From the discourse semantics point of view, the crucial distinction is one between temporally overlapping events (which implies an imperfective reading (24a)) and temporally successive events (which implies a perfective reading (24b)).

Under both views, when a clause is aspectually ambiguous out of context, one must resort to discourse reasoning in order to specify further its interpretation. As is well known since at least e.g., Asher & Lascarides (1993) and Caenepeel (1994), scriptal knowledge about the world (i.e., about the way events are causo-temporally connected through typical 'scripts') is crucial when calculating the temporal ordering of events. This is formally implemented in SDRT within the LIP component e.g., by means of axioms such as (28) (cf. Bras et al., 2001). As an illustration, in the case of (29), the corresponding **`Falling and Helping`** axiom appears under (30): it tells us that when an event e_α of falling and an event e_β of helping-up underlie two connected speech act terms α and β, then α stands in an *Occasion* relation to speech act term β. $Occasion(\alpha,\beta)$ expresses a scriptal relation, under which β somehow follows from α, without being caused by it. Note that > represents non-monotonic inference (as opposed to →, i.e., monotonic inference).

(28) **Occasion I:** $(\langle \tau,\alpha,\beta,l\rangle \wedge [\phi(e_\alpha)]\alpha \wedge [\psi(e_\beta)]\beta) > Occasion(\alpha,\beta)$[11]

(29) *Max fell*. (π_1). *John helped him up.* (π_2) (cf. Asher & Lascarides 2003)

(30) **`Falling and Helping`:** $(\langle \tau,\alpha,\beta,l\rangle \wedge [fall(e_1, x)]\alpha \wedge [help\text{-}up(e_2, y, x)]\beta) > Occasion(\alpha,\beta)$

[9] We take the reader to be familiar with some standard SDRT rhetorical relations, cf. Asher & Lascarides (2003). Informally, $Background(\alpha,\beta)$ connects two discourse referents α and β involving two events e_α and e_β such that $e_\alpha \circ e_\beta$, e_β serving as the 'background' of e_α (cf. *John opened the door. The room was pitch dark.*), while $Narration(\alpha,\beta)$ connects two discourse referents α and β involving two events e_α and e_β such that $e_\alpha < e_\beta$ (cf. *John opened the door. He walked into an empty room*).

[10] Rather than $imperfective \leftrightarrow t \subset e$, as is proposed in many works about imperfective viewpoint tenses. The move from the large inclusion to strict inclusion is motivated by the fact that in the Alemannic *Perfekt*, we need to exclude atomic telic events from being compatible with imperfective viewpoint aspect.

[11] $[\phi(e_\alpha)]\alpha$ means that condition $\phi(e_\alpha)$ is part of the propositional content of term α.

Such scriptal knowledge can in turn help establish the *Narration* discourse relation within the LIP in a non-monotonic fashion (following Asher & Lascarides, 2003), thanks to axiom (36):

(31) **Narration I :** $(\langle \tau,\alpha,\beta,l\rangle \wedge \mathit{Occasion}(\alpha,\beta)) > \mathit{Narration}(\alpha,\beta,l)$[12]

This however, is unsufficient to account for sequences such as (32), where scriptal knowledge does not seem to play any role. We believe that it is rather a specific instanciation of a general law about 'event incompatibility' that makes us interpret (32) as involving temporal succession : John cannot stop smiling AND take a bite of his sandwich at the same time.

(32) John stopped smiling (e_α). He took one more bite of his sandwich (e_α).

We name *Sequence* this sort of 'bare-bone' succession relation, and define it in (33) in terms of two events e_α and e_β being incapable of overlapping because they appear within two descriptions sharing a certain common participant x (see (35) for an attempt at defining this kind of 'event exclusion'). *Sequence* monotically implies the absence of any causal link between these events, cf. (34) (so as to prevent *Sequence* to hold whenever stronger, causally grounded relations should hold). We can now propose another axiom for *Narration* under (36), so as to non-monotonically infer this discourse relation from *Sequence* (on top of inferring *Narration* from *Occasion*, cf. (31)).

(33) **Sequence:** $(\langle \tau,\alpha,\beta,l\rangle \wedge [\phi(e_\alpha, x)]\alpha \wedge [\psi(e_\beta, x)]\beta \wedge \mathit{E\text{-}Exclude}(\phi, \psi, x)) > \mathit{Sequence}(\alpha, \beta)$

(34) $\varphi_{\mathit{Sequence}}(\alpha,\beta) \Rightarrow (\neg \mathit{cause}(e_\alpha, e_\beta) \wedge \neg \mathit{cause}(e_\beta, e_\alpha))$

(35) $\mathit{E\text{-}Exclude}(\phi, \psi, x) \leftrightarrow (\forall e,e'(\phi(e,x) \wedge \psi(e',x)) \rightarrow \neg e \circ e')$

(36) **Narration II:** $(\langle \tau,\alpha,\beta,l\rangle \wedge \mathit{Sequence}(\alpha, \beta)) > \mathit{Narration}(\alpha,\beta,l)$

Of course, as was shown by Bras et al. (2001) cue phrases such as *und dɛnn* ('and then') monotonically impose the *Narration* relation, cf. (38). This gives the additional axiom (37), which reflects a stronger brand of *Narration* (as opposed to the *Occasion*-based *Narration*; see Bras et al. (2001) for a discussion):

(37) **Narration III:** $(\langle \tau,\alpha,\beta,l\rangle \wedge \mathit{Cue\text{-}Phrase}(\beta)) \rightarrow \mathit{Narration}(\alpha,\beta,l)$
ex. : $(\langle \tau,\alpha,\beta,l\rangle \wedge \mathit{und\text{-}dɛnn}(\beta)) \rightarrow \mathit{Narration}(\alpha,\beta,l)$

(38) dɐ hans iʃ huigangɐ . und dɛnn hɔt eᵉ sin hunt gfuᵉttɐrɐt.
'Hans went home and then he fed his dog.'

Now the crucial point is that once *Narration* has been established, we know for sure that the two event descriptions involved should be interpreted as perfectively viewed (cf. (24b)).[13] The following axiom about the interpretation of *Narration* implements this in terms of information content (it complements the compositional semantics of the clauses at stake):

(39) **Axiom on the interpretation of *Narration*:**
$\varphi_{\mathit{Narration}(\alpha,\beta)} \Rightarrow (e_\alpha < e_\beta \wedge \mathit{perfective}(e_\alpha) \wedge \mathit{perfective}(e_\beta))$

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[12] This means that β is to be attached to α with the *Narration* relation, α being an available site within context τ, and that the discourse relation is to be incorporated into the logical form as a conjunct on the formula labelled l.

[13] Putting aside the intervention of comparative temporal modifiers such as (*x time*) *later*, or *the day after*. These modifiers allow imperfective event descriptions to be involved in narrative discourses.

Let us apply this analysis to example (14) as in context (24b). Because of the cue-phrase (*und*) *dɛnn*, *Narration* is established by means of (37). Bearing in mind the equivalence between *perfective*(*e*) and $e \subset t$ (cf. (27a)), axiom (39) guarantees that whenever *Narration* is computed, the representation of (14) in (15) should be disambiguated so as to yield a perfective viewpoint reading. Therefore (15) is linearized as K_1 in (16)).

2.3. Controling discourse over-generation

Let us turn now to the second objective discussed in section 2.1, namely preventing incorrect discourse relations from being computed. The main candidate to this kind of overgeneration, is the *Background* relation. More specifically, in order to prevent atomic telic sentences in the *Perfekt* such as (6) from being attached to the discourse context by means of *Background*, it is necessary to add the following axiom about the interpretation of this rhetorical relation:

(40) **Axiom on the interpretation of *Background*:**
$\varphi_{Background(\alpha,\beta)} \Rightarrow imperfective(e_\beta)$

This axiom on the informative content of *Background* monotonically prevents it from being established with clauses describing perfectively viewed events. And since atomic telic events are only compatible with perfective viewpoints readings (cf. condition $\uparrow t_{loc} \subset \uparrow e$ in (15) and the equivalence given in (27b) between $t \subset e$ and *imperfective*(*e*)), the treatment of clauses describing such events cannot trigger the *Background* relation – otherwise, this would yield a contradiction within the compositional semantics.

To illustrate this, let us consider the treatment of e.g.,(6). Suppose the LIP attempted to establish the *Background* relation. Axiom (40) then imposes that the (inner stage) leaving event e_1 is such that *imperfective*(e_1), which in turn implies $t \subset e_1$. Clearly though, this is contradictory with the atomic nature of e_1, which is deprived of any proper part. Therefore, *Background* cannot hold. Interestingly, as far as event inclusion is concerned, *Background* contrasts sharply with *Elaboration* and generally with discourse relations involving some form of temporal encapsulation (rather than backgrounding). See for instance (41) :

(41) dɐ max hɔt sin teddy umbrɔxt (α). eᵉ hɔt m dɐ buːx ufgʃlitst (β). und dɛnn hɔt eᵉ ɛᵉm s hɛᵉts usɛᵉgrisɐ (γ).
'Max killed his Teddy bear. He ripped its belly open. And then he tore away its heart.'

Since *Narration*(β,γ) is established on top of *Elaboration* (α,β), this bit of discourse requires the inner stage event described by the second clause to be perfectively viewed. And indeed, this event is telic and atomic, and so is the event described by the first clause. Therefore, the content-level axiom about *Elaboration* given in (42) (taken from Asher & Lascarides 2003) cannot be about proper parts, contrary to the corresponding content-level axiom about the *Background* relation (cf. also (27b)), i.e., *Part-of*(e_β, e_α)) should be equivalent to $e_\beta \subseteq e_\alpha$.

(42) **Temporal consequence of Elaboration :**
$\varphi_{Elaboration(\alpha,\beta)} \Rightarrow Part\text{-}of(e_\beta, e_\alpha)$

3. Conclusion

To put it in a nutshell, the present paper aimed at spreading evenly the burden of interpretation between semantics and pragmatics in the case of the Alemannic *Perfekt*, by combining (i) an underspecified semantic account couched within the UDRT framework, with (ii) a formal treatment at the semantics/pragmatics interface within the SDRT framework.

It has been suggested here that this interface is of capital importance when resolving aspectual ambiguities originating from the underspecified semantics of preterit-like tenses, and that the architecture of the SDRT framework (notably its division between the LIP and LIC components) fitted well this brand of analysis. Moreover, the above machinery can also handle clauses which remain ambiguous even in context, cf. (43) – indeed, ambiguities need not be resolved, but they must be predicted and accounted for.

(43) dɐ max hɔt sine saxe tsɛmɐgrumt (π_1). sine muᵉtteᵉ hɔt n globt (π_2).
'Max cleaned up/was cleaning up his mess. His mother congratulated him.'

Since either *Narration* or *Background* can attach π_2 to π_1, the theory will assign an underspecified, preterit-like representation to the first clause of (43), encompassing both a perfective and an imperfective viewpoint interpretation.

These results complement in an interesting way the conclusions of e.g., Caudal & Roussarie (2004, 2005), and Caudal & Vetters (to appear): while the latter references showed that the semantics/pragmatics interface can help extending the interpretative range of certain tenses (such as e.g., the French *imparfait* under its so-called 'narrative' reading), it has been demonstrated here that it can also contribute to narrowing down the interpretation of other tenses, notably aspectually underspecified tenses such as preterits.

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