Maier, E. and Hovy, E. (1993), Organizing Discourse Structure relations using metafunctions. In: Horacek and Zock (eds.), **New Concepts in Natural Language Generation**. Pp. 69-86.

Martin, J.R. (1992), **English Text, system and structure**. John Benjamins, Philadelphia/Amsterdam.

McTaggart, J.M.E. (1927), The Unreality of time. In: **Mind 17**.

Moens, M. & M. Steedman (1986), **Temporal Information and natural language processing**. Edinburgh Research Paper in Cognitive Science/ RP2

Moens, M. (1987), **Tense and Aspect and Temporal reference**. PhD. thesis, University of Edinburgh.

Mourelatos, A.P.D. (1978), Events, Processes and States. In : **Lingistics and Philosophy 2**. Pp. 415-434.

Oversteegen, E. (1989), **Tracking Time - a proposal for the Representation of Temporal expressions in Dutch**. Diss. University of Utrecht.

Oversteegen, E. (1992), Tense and Temporal structure. In: **Think 1**. University of Tilburg. Pp. 46-59.

Oversteegen, E. (to appear), The relation between semantic and pragmatic coherence relations.

Partee, B. (1984), Nominal and Temporal Anaphora. In: **Linguistics and Philosophy** 7, nr. 3. Pp. 243-286.

Platzack, Ch. (1979), **The semantic interpretation of aspect and Aktionsarten** Foris, Dordrecht

Poesio, M. & M. Kameyama (1992), **Temporal Centering** (in press).

Pustejovski, J. (1991), The Syntax of event structure. In: **Cognition 41**. Pp 47-81.

Reichenbach, H. (1947), **Elements of Symbolic Logic**. McMillan: New York/ London.

Röper, P. (1980), Intervals and Tenses. In: **Journal of Philosophical Logic**, 9. Reidel: Dordrecht.Pp. 451-469.

Sanders, T.J.M., W.P.M. Spooren & L.G.M. Noordman (1993), Coherence relations in a cognitive theory of discourse representations. In : **Cognitive Linguistics 4** nr. 2. Pp 93-133.

Sandstrøm, G. (1990), **Temporal Adverbial Clauses in narrative discourse**. Thesis, University of Umeå.

Spooren, W.P.M.S. (1989), **Some aspects of the Form and Interpretation of Global Contrastive Coherence relations.** Diss. University of Nijmegen.

Verkuyl H.J. (1972), **On the Compositional nature of the Aspects**. Foundations of Language Supplementary series 15. Reidel: Dordrecht.

Vet, J.P. (1980), Some arguments against the Division of Time into Past, Present and Future. **Antwerp Papers in Linguistics**, 23.

Webber, B. (1988), Tense as Discourse Anaphor. In: **Computational Linguistics**, 14

Farkas, D.F. & Sugioka (1983), Restrictive *if/when* clauses. In: **Linguistics & Philosophy** 6. Pp. 225-258.

Fraassen, B.C. van (1969), Presuppositions, Supervaluation and Logic. In: **The Logical way of doing Things**. New Haven, Yale. Pp. 69-91

Galton, A. (1984), **The logic of aspect; an axiomatic approach**. Oxford: Clarendon Press.

Halliday, M.A.K. (1985), **An Introduction to Functional Grammar**. Edward Arnold, London.

Halliday, M.A.K. & R. Hasan (1976), **Cohesion in English**, English Language series 9, Longman, London.

Hamann, C. (1991), Semantics and Pragmatics - the case of temporal conjunctions. In: **Linguistische Berichte 136**. Pp 403-437.

Heinåmåki, O. (1978), **Semantics of English Temporal Connectives**. University of Texas. Diss.

Hinrichs, E. (1981), **Temporale Anaphora im Englishen**. Zulassungsarbeit, Universität Tübingen.

Hornstein, N. (1977), Towards a theory of Tense. In: **Linguistic Inquiry 8**. Pp.521-557.

Hovy, E., J. Lavid, E. Maier, V. Mittal and C. Paris (1992), Employing Knowledge Resources in a new Text Planner Architecture. In: **Proceedings of the 6th International Workshop on Natural Language Generation**. Trento, Italy.

Janssen,T. A. J. M. (1983), Het temporele systeem van het Nederlands: drie Tijden en twee Tijdscomposities. In: **GLOT** 6. Pp 45-104.

Kamp, H. (1979), Events, Instants and temporal reference. In: Bäuerle, Egli & Von Stechow (eds.), **Meaning, use and interpretation of Language**. Berlin/New York. Pp 250-269.

Kamp, H. (1981), **Discourse Representation and Temporal Reference** (Stuttgart lecture).

Kamp, H. and U. Reyle (1993), **From Discourse to Logic**. Kluwer, Amsterdam.

König, E. and E. C. Traugott (1988), Pragmatic strengthening and Semantic change: the Conventionalizing of Conversational Implicature. In: Hülllen, W. and Schulze, R. (eds.) **Understanding the Lexicon: Meaning, Sense and World Knowledge in Lexical Semantics**. Niemeyer, Tübingen. Pp. 110-124.

Lascarides, A. & N. Asher (1991), Temporal interpretation, Discourse relations and Common sense entailment. To appear in: **Linguistics and Philosophy**

Lascarides, A. & J. Oberlander (1992), Temporal coherence and defeasible knowledge. **Theoretical linguistics**, 18.

Lavid, L. and E. Maier (1992), **Text Relations: their usefulness for a dynamic account of discourse structure in a text planning system.** Technical Report. GMD, Darmstadt.

BIBLIOGRAPHY

Abraham, W. (1979), But. In: *Studia Linguistica 33*, Pp 89-119

Allen, J. (1983), Maintaining Knowledge about Temporal Intervals. In: Waltz, D. (ed.), **Communications of the ACM**, Vol. 26, nr. 11. Pp. 832-843

Carlson, G.N. (1979), Generics and Atemporal *when*. In: **Linguistics & Philosophy** 3. Pp. 49-98.

Bach, E. (1986), The Algebra of events. In: *Linguistics and Philosophy 9* Pp 5-16.

Berry, M. (1981), Systemic Linguistics and Discourse analysis: a multi-layered approach to exchange structure. In: Coulthard and Montgomery (eds.), **Studies in Discourse Analysis**. Routledge and Kegan Paul, London.

Caenepeel, M. (1989), **Aspect, Temporal Ordering and Perspective in Narrative Fiction**. PhD. thesis, University of Edinburgh.

Caenepeel, M. (1991), Event structure versus discourse structure. In: Proceedings of the Workshop on Discourse Coherence, April 4-6, 1991, Edinburgh.

Caenepeel, M. and M. Moens (1993), Temporal structure and Discourse structure. In: Vet, C. & Vetters (eds.), **Tense and Aspect in Discourse**. De Gruyter, Berlin. (forthcoming)

Caenepeel, M. and E. Oversteegen (1993), **Aspect and Textstructure** (Part I and Part II). DANDELION Report, R1.3.1

Caenepeel, M. and G. Sandström (1992), A Discourse level approach to the Past Perfect. In: **Proceedings of the International Workshop on the Semantics of Time, Space and Movement**.

Couper-Kuhlen, E. (1987), On the temporal interpretation of postposed *when*-clauses in narrative discourse. In:Matthews and Schmole-Rostosky (eds.), **Papers on Language and Mediaeval Studies presented to A. Schopf on the occasion of his 65th birthday.** Peter Lang, Frankfurt.

Dahl, O. (1990), Desiderata for a temporal semantics. Paper presented at the Workshop on the temporal interpretation of discourse, June 18-21, 1990. University of Umeå.

Declerck, R. (1988), Restrictive *when*-clauses. In: **Linguistics and Philosophy**, Vol. 11, nr 2. Pp 131-168.

Dowty, D. R. (1979), **Word Meaning and Montague Grammar**. The semantics of Verbs and Times in Generative Semantics and in Montagues PTQ. Reidel: Dordrecht/ London.
(1986), The effects of aspectual Class on the Temporal structure of Discourse; Semantics or Pragmatics. In: **Linguistics and Philosophy** 9. Pp. 37-61.

Dijk, T.A. van, (1977), Connectives in text grammar and text logic. In: van Dijk and Petöfi (eds) **Grammars and Descriptions: studies in text theory and text analysis.** De Gruyter, Berlin. Pp. 11-63

In the end, these types of conditions were united in a system. This means of representation warrants a contribution to the language-interpretation and -generation workbench aimed at in the DANDELION project, of which this paper is a part.

path (18) • E_s is presupposed
either: • E_s is process/state
• E_s has an inchoative marker or:
E_m expresses time measurement or:
E_s is put in Perfect
or: • E_s is terminative
• E_m is process/state

The conditions attributed to a path may be formulated in terms of inquiries. They may be distributed over the system more efficiently: note that path (1) through (6) have the condition "E_s is presupposed". All simtultaneous TCs being purely temporal, this nicely matches the claim that purely temporal interpretations of TCs co-occur with presupposed subsentence events! Consequently, the condition can be lifted to a higher node in the system: the choice for a simultaneous connective can only be made if this condition is satisfied.[67]

The relation between a presupposed subsentence event and temporality of the TC is also supported by successive purely temporal TCs, whether they be anterior or posterior. A result that should be explained by further research concerns the difference between anterior and posterior consequential TCs with respect to presuppositions. The latter category is homogeneous: all TCs are presupposing. The former category is heterogeneous in this respect.

Of course the usefulness of this system should not be restricted to TTT, which seems to be the case since typical TTT notions occur in the condition. These notions should be seen as abbreviations which can easily be put in other (more elaborate) terms. Take, for example, the condition "$\lozenge S_m$ and S_s^{max} are comparable". It might be replaced by "Main sentence event and subsentence event are comparable and the latter is not in (Plu)perfect". Consequently, the system is not confined to a TTT environment.

10. Conclusion

At this point the paper has accomplished what it promised: it presented an analysis of a set of Dutch temporal connectives including both context independent characterizations of TCs (in terms of TTT) and specific context conditions on specific temporal and not purely temporal interpretations of these TCs. The conditions on the use of TC interpretations appear to be of a variety of types. Some conditions concern the semantics of the sentence in which the TC occurs, others are stated at the level of the discourse, e.g. conditions on information status or contextual inferences. In many cases they can be defined on the discourse itself (ideationally) but sometimes, in case of not primarily temporal TCs, they concern the relation between speaker/writer and discourse (interpersonally), for example when speakers believes or expectations are involved.

[67] Similar "condition raising" is possible at other places in the system

• E_s is process/state
• E_s is perspectivized
• E_s contains an (implicit) agent
• deictic constraint

path (8)
• E_s presupposed
• context/speech situation -> final boundary E_m
• constraint: S_s < **s**

path (9)
• E_s presupposed
• E_m is terminative
• context/speech situation -> final boundary E_m
• constraint: S_s < **s**

path (10)
• E_s presupposed
• E_s is a process
• context/speech situation -> final boundary E_m
• constraint: S_s < **s**

path (11)
• E_s presupposed
• E_m is terminative
• context/speech situation -> final boundary E_m
• constraint: S_s < **s**

path (12)
• E_s is presupposed
• If E_s or E_m are process/state, the subsentence is in Pluperfect

path (13)
• E_s is presupposed
• E_m leads to E_s
• E_m contains deontic marker

path (14)
• E_s is not presupposed
• E_s is expected (default from context) or intended
• E_s is evaluated (positively or negatively)
• E_s does not occur
• E_s contains epistemic marker (or it can be added)
• E_m is new

path (15)
• E_s is not presupposed
• E_s is expected (default from context) or intended
• E_s is evaluated (positively or negatively)
• negative polarity marker present

path (16) [66]
• E_s is presupposed
• context/speech situation -> initial boundary E_m

path (17)
• E_s is presupposed
voordat • terminative E_s
toen • E_s usually is a terminative event and E_m usually is a state or process
• strict ordering main sentence < subsentence
• deictic constraint

[66] The iterative option is not represented in the scheme but it is available

difference of opinion but rather a different point of view from which the relations are described. The strategy followed all through this paper is to define a temporal subsentence as an instrument create a temporal domain for the main sentence event. So *voordat*, for example, would have to be anterior instead of posterior because it locates a main sentence event **before** the subsentence event. Thirdly, entirely non-temporal interpretations (like contrastive and additional *terwijl* interpretations) are not incorporated in the system.

In (134) the sets of conditions on the choice of a path in (133) are specified. They have all been argued for extensively in the preceding sections - therefore they wil be presented without further comment.

(134)

path (1)
- E_s is presupposed
- E_s and E_m are terminative events
- deictic constraint

path (2): for *toen*
- E_s is presupposed
- E_s and E_m are processes/states
- deictic constraint

for *terwijl*
- $\Diamond S_m$ and S_s^{max} are comparable
- E_s is presupposed
- S_s^{max} bears no relation to **s**
- **s** may not be located between $\Diamond S_m$ and S_s^{max}

path (3):
- E_s is presupposed
- E_s is a process/state and E_m is a terminative event
- S_s^{max} bears no relation to **s**
- **s** may not be located between $\Diamond S_m$ and S_s^{max}

path (4): for *toen*
- E_s is presupposed
- E_s is a process/state and E_m is terminative event
- deictic constraint

for *terwijl*
- $\Diamond S_m$ and S_s^{max} are comparable
- E_s is presupposed
- E_s is a process/state
- S_s^{max} bears no relation to **s**
- **s** may not be located between $\Diamond S_m$ and S_s^{max}

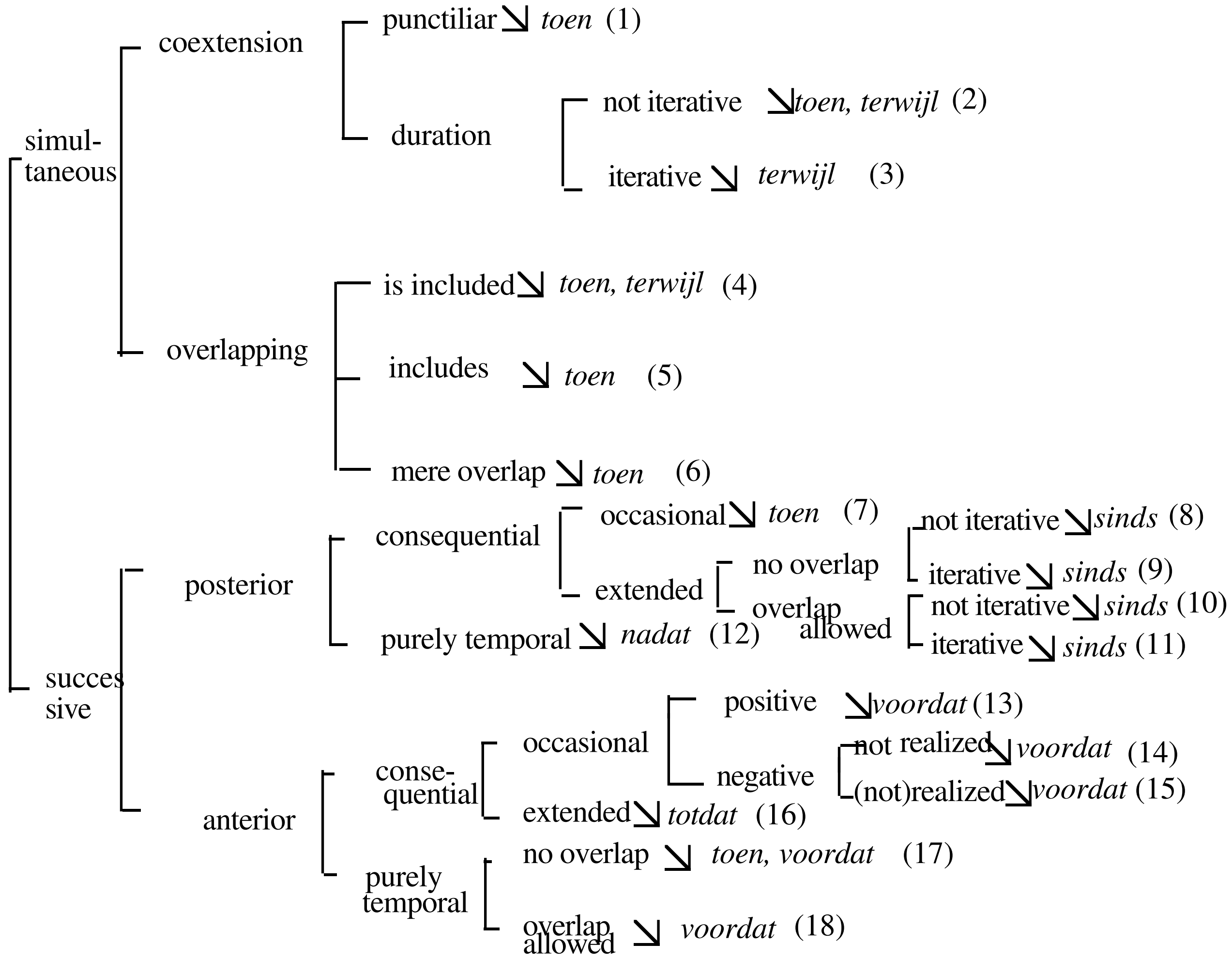
path (5)
- E_s is presupposed
- E_s is a terminative event and E_m is a process/states
- deictic constraint

path (6)
- E_s is presupposed
- E_s is a process/state and E_m is a process/state
- deictic constraint

path (7)
- E_s is presupposed

Secondly, some characteristics come out as exactly the opposite of the characteristics found in Martin (1992) as cited in section 1.2. This apparent contrast does not indicate a fundamental difference of opinion but rather a different point of view from which the relations are described. The strategy followed all through this paper is to define a temporal subsentence as an instrument create a temporal domain for the main sentence event. So *voordat*, for example, would have to be anterior instead of posterior because it locates a main sentence event **before** the subsentence event. Thirdly, entirely non-temporal interpretations (like contrastive and additional *terwijl* interpretations) are not incorporated in the system.

(133)



Two remarks will be made before the conditions defined on (133) will be presented. First, note that the fact that TCs like *toen* and *terwijl* occur as the endpoints of several paths is consistent with their TTT definitions: since these definitions are put in terms of (potential) evaluation points they don't specify one unique relation between events. A certain relation between sets of S-points may still allow for several E-relations.

Secondly, some characteristics come out as exactly the opposite of the characteristics found in Martin (1992) as cited in section 1.2. This apparent contrast does not indicate a fundamental

$$TC_a: \quad \begin{array}{l} \left([\text{interpretation}_1] \quad \left\{ \begin{array}{c} (\ x\ ) \\ (\ y\ ) \\ (\ z\ ) \end{array} \right\} \right) \\[1em] \left([\text{interpretation}_2] \quad \left\{ \begin{array}{c} (\ u\ ) \\ (\ v\ ) \\ (\ w\ ) \end{array} \right\} \right) \\[1em] \left([\text{interpretation}_3] \quad \left\{ \begin{array}{c} (\ l\ ) \\ (\ m\ ) \\ (\ n\ ) \end{array} \right\} \right) \end{array}$$

Each TC corresponds to a set of ordered pairs, where the first member gives a specific interpretation and the second member consists of a set of set of properties. So if TCa would be *terwijl* and Interpretation 1 is denied expectation, the x would stand for a set of co-occurring properties, some on them on the local and some on the global level.[65] The disadvantage of this format consists in the obscure status of the elements of the set of properties. Some of the TC characteristics described in the previous sections are meaning aspects of the TC itself, other characteristics are conditions the context has to live up to in order to make the relevant interpretation available.

The format of a system network as described in 1.2 offers the opportunity to distinguish between the co-occurring characteristics. The characteristics which determine the interpretation of a certain TC together should occur in the system, on the path leading to the name of the TC. This name is the realization of the concept determined by the sum of characteristics met along the path. From left to right these characteristics are increasingly delicate. But, apart from our intentions to express a relation with a certain meaning and not some other, there are restrictions on the options to follow a certain path. The context imposes those restrictions. Both the tense and event type requirements, which were referred to as local matters, and the information status requirements, syntactic requirements and perspective and evaluation requirements, referred to as global matters, fall under this heading. The system proposed is given in (133).

Two remarks will be made before the conditions defined on (133) will be presented. First, note that the fact that TCs like *toen* and *terwijl* occur as the endpoints of several paths is consistent with their TTT definitions: since these definitions are put in terms of (potential) evaluation points they don't specify one unique relation between events. A certain relation between sets of S-points may still allow for several E-relations.

---

65 Usually it will not be necessary to distinguish more than one set corresponding to a specific interpretation of a TC, but theoretically it may be.

have a non-ideational (interpersonal) interpretation - and on those interpretations the semantic component called Tenor is appealed to. Other TCs were characterized bas involving expectation or evaluation, e.g. the denied expectation interpretation of *terwijl* and counterfactual and non-committal *voordat*. These properties concern relations between the speaker/writer and the discourse, and as such belong to Tenor. Again, only not purely temporal interpretations of TCs are characterized by these properties. Since only not purely temporal interpretations of TCs belong to the realm of Tenor, the strong connection between temporal relations as expressed by TCs and Field remains intact. [64]

The corpus used contained only news reports. As was argued in 1.2, this type of text may be expected to be mainly informative. Accordingly, we would not expect the language used to be very subjective. Since Tenor expresses the relation of the speaker/writer to the discourse, it is employed for expressing subjective meaning more than Field is. Temporal interpretations of TCs were argued to be purely ideational so we would expect them to occur in this corpus more frequently than the not purely temporal interpretations. Indeed, they did. Four observations may substantiate this statement.

- sequential *toen* was argued to be consequential as well whereas *nadat* is purely sequential. The corpus had more occurrences of *nadat* than of sequential *toen*.
- almost all occurrences of *voordat* were purely temporal - none were counterfactual.
- there were as many additional occurrences of *terwijl* as contrastive. Furthermore, a substantial percentage of the contrastive occurrences were semantic oppositions (no perspective, argumentatively neutral).
- very little occurrences of *sinds* and *totdat* were found - both were claimed to be mixed sequential/consequential.

The only observation that is not in line with the statement is the rather frequent use of *terwijl* on its denial of expectation interpretation. Comparison with other text types could make clear whether it is used even more in more subjective discourse - and it could in general underpin or weaken the relation between TC interpretations and text type found here.

At this stage the correspondences between text properties, both local semantic (like tense and event type) and global (like information status and expectedness), and TC interpretations can be presented. In fact, it is easy now to formulate the sets of ordered pairs announced in the section 1.1. One might present the data obtained in the following format:

(132)

[64] The external temporal system in Martin (1992) consists exclusively of adverbials

she [Leon decided not to call her until she returned his car by herself. And if would not do it he would call in the police]

The acceptability of the second sentence in (130) seems to suggest that the event in the *totdat* sentence is not presupposed to occur. But this seems due to the intricate relation between future and modality rather than to the semantic properties of the TC at hand.

Like *sinds*, *totdat* only evokes one of the boundaries that should create the temporal domain for the main sentence event. And similarly, the second boundary is contributed by the context or the point of speech (i.e. the speech situation). Consider (131) below.

(131) Na zijn premierschap heeft Mendez-France nog een zekere invloed op het politiek leven gehad totdat in 1958 De Gaulle aan het bewind kwam
[after his premiership Mendez-France still had a certain political influence until De Gaulle came to power in 1958]

The final boundary of the main sentence event is given by the subsentence - but the initial boundary is given by context: the ending of the premierschip constitutes the beginning of E_m. Resuming, the characteristics of *totdat* are:

- E_s is presupposed
- context or speech situation determines the initial boundary of E_m
- E_m extended (truth for an S-interval)
- if E_m is a terminative event it should get an iterative interpretation (otherwise: *).

9.0 Results

In this paper some Dutch connectives with a temporal interpretation have been analyzed in context. An inventory was made of properties - some of them on the local semantic level, some of them on the global text-level . These properties serve on the one hand to characterize the TC as a whole and on the other hand explain the nature of distinct interpretations and their interactions with context. Some of these interpretations are not (purely) temporal. Still it was felt that these interpretations should be incorporated here since their relations to temporal interpretations of a TC cannot be thought of as accidental.

Some regularities arise if we consider the entire set of TC-analyses. Firstly, there appears to be a relation between presupposing and temporality: if a TC clause is presupposing, it has has a temporal interpretation; if not, the TC expresses another coherence relation. Secondly, tense and event type put constraints on possible TC interpretations. Sometimes a kind of "coërcion" takes place : a terminative event may receive an iterative/habitual interpretation in certain contexts which require processes or states.

Thirdly, temporal TCs are ideational on the whole, and as such they belong to the component of the semantic system that was called Field (see section 1.2). It appeared that some of these TCs

The two universal quantifiers in the definition represent the fact that *totdat*, in contrast to *sinds*, cannot connect two overlapping events. As the example below demonstrates, even two processes / states connected by *totdat* are strictly ordered with respect to each other.

(127) De politie liet de demonstranten ongemoeid totdat er vuilnisemmers in het bad werden leeggegooid
[the police didn't interfere with the protesters until garbage cans were emptied in the pool]

But like *sinds*, *totdat* expects its main sentence event to be a process or state. And like *sinds*, *totdat* may enforce an iterative interpretation upon a terminative event. The following sentence from the corpus is strange because it implies that the people from Rotterdam kept falling asleep all the time. In fact a sentence is omitted: before the *totdat* sentence the sentence "and they slept" should be inserted. This is in agreement with the last sentence.

(128) Hierna zijn de Rotterdammers in slaap gesukkeld (...) todat G. den Butter een voorzet van Meyer met de hand onderschepte. Dit deed de thuisclub even ontwaken
[afterwards the Rotterdam people fell asleep (..) until G. den Butter intercepted a cross pass by hand. This awoke the home team for a while]

Another difference between *since* and *totdat* concerns being deicticly constrained. Whereas *since* was subject to the constraint S_S < **s**, *totdat* can occur with any tense; there is no such constraint.

8.2 Information status of a *totdat* clause

In terms of information status *totdat* resembles the other TCs with a temporal interpretation. For each of these the event they combine with is presupposed. For *sinds* this was demonstrated in section 7.2, for *totdat* compare the sentence below.

(129) Het is niet zo dat Mendez-France na zijn premierschap nog een zekere invloed op het politiek leven heeft gehad totdat in 1958 De Gaulle aan het bewind kwam
....Mendez-France keerde zich onmiddelijk van de politiek af
...?De Gaulle trok zich in 1958 terug
[It is not the case that Mendez-France still had a certain political influence after his premiership, until De Gaulle came to power in 1958
....Mendez-France turned his back on politics immediately
....De Gaulle retired in 1958]

A special complication obscures the presuppositional behavior of *totdat*. Because this TC can be combined with future events - and they do not necessarily have to come true. Compare (130) below.

(130) Leon besloot haar niet te bellen totdat ze zijn auto zelf terugbracht. En deed ze dat niet dan zou hij de politie inschakelen

Resuming, a *sinds* clause does not adhere to a deictic entity and it does not autonomously create the temporal domain for the main sentence event. Because the creation of a temporal domain and the presuppositional status of a TC clause have been treated as two connected phenomena, the expectation with respect to *sinds*'s expressing a presupposition is tempered. Maybe the intuitions with respect to *sinds* are somewhat weak, but a subsentence introduced by this TC does carry a presupposition according to (125).

(125) Het is niet zo dat hij zich slecht concentreert sinds hij een meisje ontmoet heeft
...Hij is nog altijd even allert
?..hij heeft geen meisje ontmoet
[It is not the case that he is badly concentrating since he has met a girl
....he is as quick as ever
....he did not meet a girl

In section 6.2 a regularity was formulated to the effect that a TC, if it presupposes the actual happening of the event expressed in the subsentence, has a temporal interpretation. If it does not presuppose the actual happening of the subsentence event, is interpreted consequential, contrastive or counterfactual. *Sinds* was argued to have a mixed temporal/consequential interpretation. That is: the regularity has not found a counterexample in the (global) behavior of *sinds.*

A summary follows of the properties relevant for characterizing *sinds* :

- constraint: S_s < **s**
- relation between S_s and S_m (-> a more direct relation between E_s and E_m)
- all interpretations to some degree (immediately) sequential ànd consequential
  - if E_s is terminative event: $E_s < E_m$
  - if E_s is a process: $E_s < E_m$ or E_s 0 E_m
    - if E_m is a terminative event: iterative/habitual interpretation
- E_m extended (truth for an S-interval)
- context/speech situation -> final boundary E_m
- E_s presupposed

8.0 *Totdat* [until]

8.1 *Totdat* with tense and event type

In many respects *totdat* can be seen as the mirror image of *sinds* - but it is not quite. The definition given for *totdat* is repeated below.

(126) "x**e** S "y**e** S_s^{max} : x<y -> x **e** ◊S_m

---

does not claim that it does; it merely claims that the main sentence event holds until **s**.

It must be said that there are sentences with *sinds* that allow for a terminative event in the main sentence. As a rule these sentences contain a form of quantification (cf. Heinåmåki, 1978, p.86, Kamp & Reyle, 1993, p.661 (5.264)):

(122)a De vijand heeft 200 vliegtuigen verloren sinds de gevechten begonnen
[the enemy has lost 200 airplanes since the fighting started]
b Het dak is twee keer ingestort sinds ze met repareren zijn begonnen
[the roof has collapsed twice since they started the repairs]

Overt quantification over terminative events apparently is allowed in the main sentence that goes with a *sinds* TC.

In the system given in Martin (1992) *since* was characterized as "deictic" and "extension to present" (see section 1.2). This will be confusing since it was argued in section 7.0 that *sinds* has a weak deictic force. The apparent controversion can be reduced to a different use of the concept of deixis. For the same reason that *toen* may be called deictic because it obeys a deictic constraint, *sinds* is deictic because it cannot connect two events which are both entirely in the future. Martin's second characterization is not quite correct but the next section will make clear why Martin chose it.

7.2 Information status of a *sinds*-clause

The main sentence event has two be located between two boundaries - so far only the origin of one of them, the initial boundary, was identified. From where does the information about the final boundary come? According to the corpus used, the answer has to be: from the context. Compare the sentences in (123) and (124).

(123) Violet kwam om 10 uur thuis. Het kind had gehuild sinds ze de deur uitging.
[Violet arrived at home at 10 PM. The child had been crying since she left]
(124) Duizenden Franse ouders bezinnen zich op die vraag sinds kort geleden in Frankrijk weer een dreumes werd ontvoerd
[Thousands of French parents are reflecting on that question since another toddler was kidnapped in France recently]

The initial boundary for the crying in (123) is determined by the subsentence event. The final boundary is given by the preceding sentence: the implicit moment of evaluation (S_m^{max}) is fixed at 10 PM, the moment of Violets homecoming. If the main sentence is in Past tense (often Pluperfect), the final boundary will always be derivable from the context (mostly as the "current reference point"). If it is in Present tense (often Present Perfect) the final boundary is given by the speech situation: it is the point of speech **s** itself.[63]

[63] The main sentence event in such configurations may extend beyond the pointt of speech. But the sentence

7.1 *Sinds* with tense and event type

The definition in (116) allows for some predictions. It may be expected that a *sinds* sequence is unproblematic if 1. the subsentence event expresses a terminative event; and 2. the main sentence event expresses a process/state. The first prediction should be contrasted with the problems that we have seen when a final (or initial) boundary of an interval could not easily be identified. Only if the subsentence expresses a terminative event a sequential interpretation of events is warranted - if not, overlap cannot be prohibited. [62]The second prediction is inspired by the fact that processes and states - but not terminative events - have non-singleton sets of evaluation points and are cumulative. The first prediction is born out by (119) and (120).

(119) Duizenden Franse ouders bezinnen zich op die vraag sinds kort geleden in Frankrijk weer een dreumes werd ontvoerd
[Thousands of French parents are reflecting on that question since another toddler was kidnapped in France recently]

(120)a De smurfen zijn volgens Hans ook minder populair geworden sinds ze een merk benzine aanprijzen
[The smurfs have grown to be less popular since they are recommending a brand of fuel]

b Sinds Peter meespeelt met het hockey team hebben ze nog geen doelpunt gemaakt
[since Peter is joining the hockey team they have not made any goals yet]

Whereas in (119) both events are sequentially ordered, in (120) the smurfs might be less and less popular while they are doing their advertisement work. One might expect problems with *sinds* sentences having a terminative event as E_m. The sentences in (121) below illustrate what may happen in those cases.

(121)a Het Westfriese Zwaag haalde verlicht adem sinds het nieuws zich als een lopend vuurtje door het dorp verspreidde
[The Westfries place Zwaag was able to breathe again since the news spread through the village]

b Sinds het paard te zwak is geweest om op zijn benen te staan geeft Theresia hem een halve schep krachtvoer extra
[since the horse has been too weak to stand on its own legs, Theresia gives him half a scoop extra of concentrate]

c *Sinds er een conferentie over was in 1985 is er toestemming is gegeven voor de bouw van een speciale school
[Since a conference was held about it in 1985, permission is given for building a special school]

Since a singleton set is not acceptable as $\Diamond S_m$, the event in (121a) is interpreted as if it were repeated: as an iterative. Something similar happens in (121b); the main sentence is interpreted as expressing a habit. The iterative and the habitual interpretations are two "ways out" for a main sentence with a terminative event to fit the definition. In (121c) this is not possible by force of the nature of the event expressed: it does not seem to be repeatable. Therefore (121c) is awkward.

---

[62] Kamp & Reyle (1993) signal problems involved in non-terminative subsentence events as well (p. 660).

itself: it only contributes one boundary: the initial boundary from which on the event is claimed to hold. Section 7.2 will describe how the final boundary comes about.

The fact that the main sentence event holds for the length of the interval introduced by the subsentence, is reflected by universal quantification over S-points in the relevant interval. For all these S-points the main sentence event is said to hold.

(116) **sinds**: $\exists x \in \Diamond S_s \ \forall y \in S: x < y \rightarrow y \in \Diamond S_m$

There is yet another deviation in this definition as compared to the other definitions of TCs: instead of defining a relation between S_s^{max} and $\Diamond S_m$ *sinds* defines a relation between $\Diamond S_s$ and $\Diamond S_m$. Two reasons for this choice can be given here. Firstly, *sinds* has a very weak deictic force. Unlike the other TCs, it can function as a preposition.

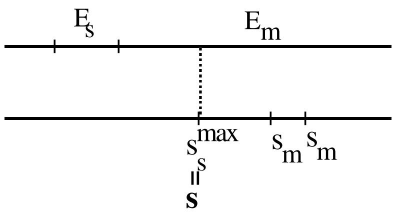
(117)a sinds het feestje; sinds het verbreken van hun relatie; sinds Pasen
[since the party; since the breaking up of their relationship; since Easter]
b *voordat het feestje; *nadat het verbreken van hun relatie; *toen/terwijl Pasen
[before the party; after the breaking up of their relationship; when/while Easter]

So this TC may adhere to a non-deictic semantic entity, unlike *toen, terwijl, voordat* en *nadat* which were oriented towards a deictic center: S_s^{max} .

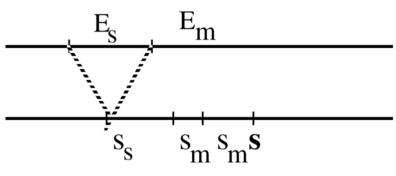
The second reason for using $\Diamond S_s$ as a relatum in (116) is the frequent use of Present Perfect in a *sinds* clause. As the TTS in (118a) demonstrates, a sentence like (118) would mean something other than it actually does if S_s^{max} were chosen as a relatum instead of $\Diamond S_m$; in (118a) the sleeping problems start at the point of speech - and they should not. In (118b) the correct TTS based on (116) is given.

(118) Sinds Petra Peter heeft gezien slaapt ze slecht
[Since Petra saw Peter she is sleeping badly]

(118a)



(118b)



Moreover, granted that *sinds* is a consequential TC, E_m will have to be located in the immediate future of E. In (118a) a relation between HAVE(E_s) and (E_m) is unlikely - in (118b) it is natural. From now on *sinds* will be assumed to define a relation between the potential evaluation points of the subsentence event and those of the main sentence event; this implies a more direct relation between events than we found for the other TCs.

subsentence event (and its temporal location) it will have a temporal interpretation. If it does not presuppose the actual happening of the subsentence event (and its temporal location), it is interpreted otherwise (consequential, contrastive, counterfactual, etc.). This regularity reflects the function of a temporal frame phrase (sentential or adverbial): to locate the main sentence event in time.

As could be expected, in a complex sentence connected by *nadat* the subsentence expresses a presupposition. Consider the sentences in (115)

(115) Het is niet zo dat de koersen omlaagschoten nadat de Dow Jones index kelderde
....De koersen bleven stabiel
....De koersen waren toen al erg gezakt
....?De Dow Jones index bleef stabiel
[It is not the case that the currents fell after the Dow Jones index went down
....The currents were stable
....The currents had already fallen by then
....The Dow Jones index was stable]

Consequently, *nadat* has the properties of a true temporal TC - and nothing else.

A summary of the properties characterizing the interpretation of *nadat* follows:

- temporal precedence between E_s and E_m
- If E_s and E_m are terminative: tense choice free
- If E_s or E_m are process/state, the subsentence is in Pluperfect
- E_s is presupposed

7.0 Sinds [since]

Sinds differs from the TCs discussed so far and it differs from the English *since*. First, the latter difference will be illuminated. English *since* is ambiguous between a temporal and a causal interpretation. [60] Dutch *sinds* does not express a relation as strong as causality - and it always expresses a temporal relation. In *sinds* a temporal and a consequential dimension are entwined. The consequential dimension may be strong or very weak (even almost absent) - the temporal dimension is always present.

Each of the TC-clauses discussed so far appears to function as a creator of a temporal domain for the main sentence event: it introduces temporal boundaries with respect to which the main sentence event should be located. One boundary in case of *voordat* and *nadat*; two boundaries in case of *toen* and *terwijl*. The main sentence event should be placed **somewhere** between the boundaries. A *sinds* clause contributes to establishing an interval **for** which the main sentence event is supposed to hold instead of merely **at**. [61] The *sinds* clause does not create this interval by

[60] Heinåmåki convincingly argues that there really are two distinct meanings with a different behaviour in interaction with negation and modality (Heinåmåki, 1978, p. 94).

[61] Truth **in**, **at** or **for** an interval as defined in Bach (1986)

fits in with (110); 2. one of the relata is a process/state and the subsentence event is put in Pluperfect. Examples of both types are given below in (111) and (112) respectively.

(111)a Er is opheldering nodig over wat er is gebeurd nadat de onderhandelingen van het havenschap overgingen naar het ministerie van ecomnomische zaken
[Clarification is required concerning what happened after the negotiations of the harbour were passed on to the ministery of economy]
b Het Englandspiel wordt in de kranten van die dagen weer eens breed uitgemeten, nadat een parlementaire commissie zich over de zaak heeft gebogen
[The Englandspiel is extensively discussed again in the newspapers of those days, after a parliamentay committee has been occupied with the case]
(112)a Vier Rotterdamse leerlingen zijn vannacht omstreeks één uur in een hooiberg in Helvoirt teruggevonden nadat zij sinds één uur gistermiddag vermist waren geweest
[Four pupils from Rotterdam have been found in a haystack in Helvoirt this night around one o'clock AM after they had been missing since yesterday one o'clock PM]
b Nadat ze tevergeefs hadden getracht de tekst van het Lutherlied aan de kerkdeuren te bevestigen hieven zij het Wilhelmus aan
[After they had tried unsucessfully to fasten the text of the Lutherlied to the church doors, they started singing the Wilhelmus]

As I argued in section 3.2, *nadat* does not have a consequential interpretation. Of course we may decide on the grounds of real world knowledge, after having interpreted the temporal sequence of events, that they must have a causal connection too (cf. (111b)). But unlike consequential *toen*, *nadat* does not invite this interpretation. Below, the sentences demonstrating this contrast are repeated.

(113) b ?Toen Nikki Miguel op het feestje tegenkwam, kwam ze nog drie bekenden tegen
[When Nikki met Miguel at the party, she met three other acquaintences (as well)]
c Nadat Nikki Miguel op het feestje tegenkwam, kwam ze nog drie bekenden tegen
[after Nikki met Miguel at the party, she met three other acquaintences (as well)]
(114) a Toen het regende besloot Nikki thuis te blijven
[when it rained (was raining) she decided to stay home]
b ?Nadat het regende besloot Nikki thuis te blijven
[after it rained (was raining) Nikki decided to stay home]

Actually, the fact that *nadat* is not to be interpreted consequentially, supposedly explains why relatively many occurrences of the TC were found in the corpus (much more than occurrences of *voordat* !). If sequential *toen* is always consequential it cannot be used in case a speaker does not mean to suggest any form of causality. In news reports, for example, one might want to present a sequence of events without hinting at causal links. In those cases *nadat* is the correct option.

6.2 Information status of *nadat*

The purely temporal nature of this TC suggests something about its information status. Up till now we have seen the following regularity: if a TC presupposes the actual happening of the

- E_s is evaluated (positively or negatively)

  counterfactual interpretation of *voordat*:
  - E_s does not occur
  - E_s contains epistemic marker
  - E_m <-/-> $\neg E_s$
  - E_m is new

  non-committal interpretation of *voordat*:
  - E_s does or does not occur
  - negative polarity marker present

6.0 Nadat [after]

6.1 *Nadat* with tense and event type

In comparison to *voordat*, *nadat* [after] is a simple TC, both from the local semantic and from the global contextual perspective. To start with the first perspective, *nadat* is also simple compared to English *after*: whereas the latter allows for the main sentence event to happen immediately after the start of the subsentence event, Dutch *nadat* does not (cf. (108) and (109) below).

(108)a	After the grass was dry we went outside
b	After the horses were running we tried to place a bet
(109)a	*Nadat het gras droog was gingen we naar buiten
b	*Nadat de paarden renden probeerden we een gok te wagen

Sentence (109b) is odd for reasons of world knowledge since it has us placing a bet after the horses reached the finish. So all potential evaluation points for the main sentence event have to follow all evaluation points for the subsentence event:

(110) **nadat**: $\forall x \in \Diamond S_m \; \forall y \in S^{max} : y < x$

However, even for a TTS that obeys (110) overlap of the events themselves is not excluded. There may be two causes: a process/state in the subsentence and a process/state in the main sentence.[58] The corpus makes clear how this problem is encountered: the relevant configurations with *nadat* combine with a subsentence in Pluperfect. [59] This is logical since all Perfect forms define their own final boundary (cf. section 2.1). So two main types of complex sentences with *nadat* can be found: 1. the relata are both terminative events and the tense choice is relatively free (as long as it

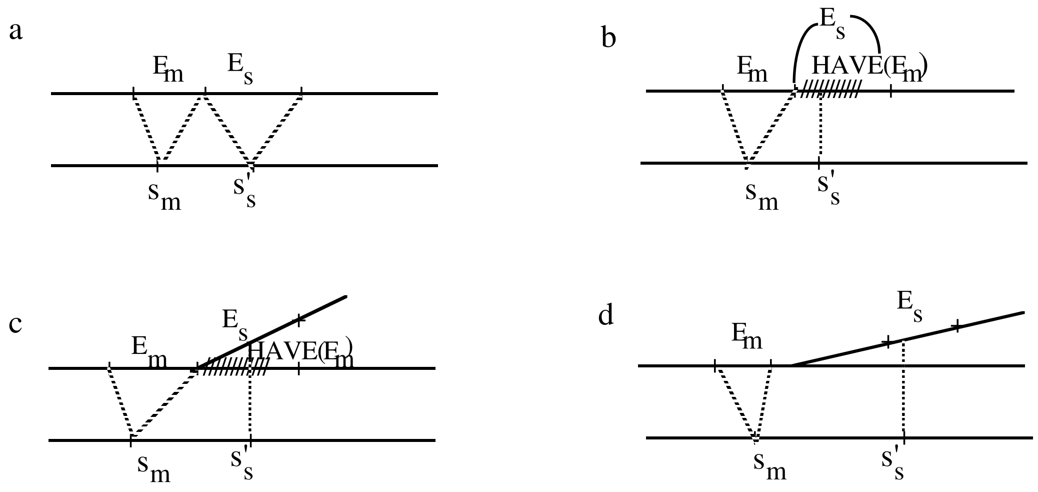
---

[58] Again, the reason is that another partitioning might give potential evaluation points that are respectively after and before the ones rendered by the actual partitioning.

[59] The main sentence event does not have to be provided with an initial boundary: in some cases part of the main sentence event may be located before the subsentence event is closed off, as long as it is true that some other (relevant) part is located after.

and non-committal (107d). If consequentiality is involved, then so is HAVE(E) (cf. (107b) and (107c)), if counterfactive meaning is involved, then the counterfactual event is not located on the realized E-branch but on some other branch (cf. (107c) and (107d)). All representations have a basic pattern of temporal ordering in common.

(107)



The TTS in (107c) has the consequential phase of the main sentence event on the realized E-branch and the subsentence event on another branch. Consequently, the main sentence is represented as counterfactual. In (107d) it is undetermined whether the subsentence event will be realized or not because it is unclear which branch is going to be realized. But apart from the mutual differences, all TTSs in (107) have a pattern in common.

A summary of the properties characterizing the individual interpretations of *voordat* follows:

all interpretations:

- at least one $\Diamond S_m$ precedes all S_s^{max}
- the point of speech is not between the sets $\Diamond S_m$ and S_s^{max}

temporal interpretations of *voordat*:

- terminative E_s and E_m leads to pure precedence interpretation
- terminative E_s and process E_m leads to pure precedence or overlap interpretation
- process/state E_s and terminative E_m require - inchoative marker in E_s
  - measurement in E_m
  - subsentence in Perfect

strict temporal interpretation of *voordat*:

- E_s is presupposed

mixed temporal/conditional interpretation of *voordat*:

- E_m leads to E_s
- E_m contains deontic marker

non-factual interpretations of *voordat*:

- E_s is expected (default from context) or intended

(103)	characteristics	type of *before* clause			
		factual		non-factual	non-committal
		1	2		
1.	Before clause is true	yes	yes	no	not-known
2.	takes modifiers such as **just right** and temporal measure phrases	yes	no	no	no
3.	causal relation between the clauses	no	yes	yes	no
a.	main clause prevents the *before* clause	--	no	yes	--
b.	main clause makes the *before* clause possible	--	yes	no	--

Both the subdivision of four interpretations and their characteristics on the whole apply to Dutch *voordat* as well, as will be apparent from the examples. But there are differences between *before* and *voordat* as well. With respect to the local properties of the counterfactual type, English and Dutch differ. *Before* does only allow for terminative events in its main sentence whereas *voordat* does not have any restriction here: (104b) has a state as E_m and (105) has a process. Both are fine.

(104)a ?John was dead before he managed to set a new record in the high jump
b John was dood voordat het hem lukte een nieuw record hoogspringen te vestigen
(105) De kinderen aten van de taart voordat iemand het hen kon verbieden
[the children were eating from the cake before anyone could forbid them to]

Heinåmåki tentatively attributes the English facts to the lack of action expressed in the main sentence. If the main sentence even is to **prevent** the subsentence event, then some action must be undertaken in the main sentence to accomplish that. The following sentence is given by Heinåmåki to prove her point. [57]

(106)a ?There was a heavy snow on the ground before flowers appeared
b Er lag een pak sneeuw voordat er bloemen opkwamen

For Dutch this requirement of agentivity appears to be less strong. The Dutch sentence becomes better if we add a preceding context like "The weather forecast was pessimistic: the spring temperatures would not last. And indeed...". Thus the expectation of flowers is created (by spring temperatures). Furthermore this context anticipates on less good weather. Another context predicting fine weather is less good. This may suggest that the main sentence event (or some part of it) must be topical - a suggestion that needs further research.

To conclude this section, I would like to point out that essentially all interpretations of *voordat* can be treated on a par in TTT - just as Heinåmåki wanted. In (107) four TTSs are given reflecting the quintessence of the four interpretations: factual 1 (107a), factual 2 (107b), non-factual (107c)

[57] An additional problem with this example is that the flowers may be obstructed, but they will come anyway. Consequently the subsentence is not really false.

Apart from the interpretation discussed so far, Heinåmåki distinguishes a second temporal interpretation of *before*. It is not purely temporal: it is partly causal. In fact "the main clause makes it possible for the *before* clause to become true later" (Heinåmåki, 1978, p. 61). In Dutch, we have the same relation.

(101)a We had to install a new battery before the car started
b We moesten een nieuwe accu installeren voordat de auto startte

The relation between both events is temporally identical to the "root" meaning I discussed before, but a consequential relation is added. In terms of TTT the subsentence event must be located in the consequential HAVE(E_m) interval. Or more accurately: HAVE(E_m) must be built around E_s. In all cases encountered the main sentence had a deontic expression like *had to* in English or *moesten* in Dutch.

The third category consists of counterfactuals. Heinåmåki (1978) argues that in sentences connected by counterfactual *before* the truth of the main sentence (together with some assumed facts, e.g. real world knowledge) is both a sufficient and a necessary condition for the subsentence event not to be true - and the same applies to *voordat*. The context should be consistent, it should not imply the truth or falsehood of the main sentence (i.e. the latter should contain new information). Moreover, it should not make the subsentence false. Of course this must be right: it is the main sentence that causes the subsentence to be false. But it should be remarked that the context does have a function with respect to the content of the subsentence: it is responsible somehow for the expectation that the subsentence would have been true at some stage if the main sentence event had not prevented this).

The fourth category of interpretations of this TC is called non-committal by Heinåmåki (1978): it does not convey whether the subsentence is used factually or counterfactually. An example would be (102) below.

(102)a I left the country before anything happened
b Ik verliet het land voordat er iets gebeurde

Understanding (102) does not mean knowing whether anything happened **after** "I left the country". This type of interpretation deviates in my opinion from the other types. Whereas temporal *voordat* indicates presupposition of the occurrence of the event expressed in the subsentence and counterfactual *voordat* indicates its expectedness, non-committal *voordat* is very vague with respect to both occurrence and temporal location of the subsentence event. An observation in line with this vagueness would be that this type requires a negative polarity item like *anything* or *anyone* in English and *iets* or *iemand* in Dutch. These expressions lend a not individuated, not localized air to the subsentence event.

Heinåmåki (1978) summarizes the important characteristics of these four types of interpretation of the TC as follows:

ordinary temporal cases.

the implication that the subsentence is true. So the apparent parallelism between (98) and (99) does not indicate that the subsentence in (99) expresses a presupposition.

If the negation is applied to he main sentence, there is a striking effect on the interpretation of the subsentence event: it cannot be counterfactual anymore. In fact this is predictable: if the default course of events regarding the subsentence event is interrupted by the occurrence of the event described in the main sentence, the non-occurrence of the main sentence event reestablishes the default course of events.[54] And in the default course of events the subsentence event is realized.[55] It may be concluded from this that the occurrence of the main sentence event must be the only reason for the subsentence event to be blocked.

At this stage it suffices to conclude that temporal and counterfactual sentences with *voordat* differ with respect to information status: in the former case the subsentence expresses a presupposition, in the latter case it merely expresses expectation with respect to the default course of events. A question that remains to be answered is: is the expectedness of the subsentence event connected to a certain moment in time? The following example suggests that the answer should be negative:

(100) ?Ze hield op met boxen voordat het de tijd was dat ze haar neus zou hebben gebroken
[she stopped boxing before the time at which she would have broken her nose]

The expectation seems to consist in a fear, that may well be exaggerated, and of which the effectuation is not tied to any specific moment.

Again, the conclusion at this stage may be that there is a difference between temporal and not primarily temporal interpretation of a TC in terms of information status:

temporal *voordat*:

- E_S is presupposed

counterfactual *voordat*:

- E_S is not presupposed

5.3 Four types of *voordat*

In this section the ideas of Heinåmåki regarding *before* will be discussed. Her typology will be commented on and where necessary altered, and also adapted for the Dutch TC *voordat*.[56]

---

54 Translating "expectation" as "default course of events" stresses the fact that expectation is founded on the history. The default course of events is the extention of the past history that is most consistent with it.

55 In other words: if the truth of the subsentence is prevented by the fact that the main sentence is evaluated as being true, the fact that it is evaluated as not being true removes the barrier for the subsentence event to become true.

56 I will acknowledge only four categories instead of five - as Heinåmåki does. I do not consider *voordat* sentences with an overt counterfactual form in the subsentence to form a category on its own. They behave like

- **s** may not be located between $\Diamond S_m$ and S_s^{max}
- the local context must aid in individuating the initial point of a process/state E_s

Now global properties will be addressed, both of the temporal interpretation of *voordat* and of its mixed temporal/counterfactual counterpart .

5.2 Information status of a *voordat*-clause

Just like English *before*, Dutch *voordat* has a counterfactual interpretation. The most conspicuous effect of this *voordat* on its relata, is an (implicit) denial of the truth of the subsentence. Sentence (97) is an example of this interpretation of the TC.

(97) Mathilda stopte met boxen voordat ze bij een match haar neus brak
[Mathilda stopped boxing before she broke her nose in a match]

If Mathilda stopped boxing, she couldn't have broken her nose in a boxing match. According to (97) she did not break her nose **because** she stopped boxing.

Two conclusions can be drawn from this example: a. the content of the subsentence cannot be presupposed to be true because the complex sentence implies that it is **not** true; b. the content is **expected** to become true - if the main sentence event would not have happened. The default course of events is thereby disturbed. To the second property I will return in the next section - the first property can be employed to contrast temporal and counterfactual interpretation of the TC. As was the case with the temporal interpretation of *toen* en *terwijl*, the temporal interpretation of *voordat* is characterized by a presupposition with respect to the truth of the subsentence (cf. (98). The counterfactual *voordat* behaves quite different. Superficially, the effect of negation on a counterfactual *voordat* sentence may seem to be the same (cf. (99)) - in fact it is not.

(98) Het is niet zo dat hij opgeruimd had voordat zijn tante binnenkwam
.....hij had niets gedaan
*....zijn tante kwam niet binnen
[It is not the case that he had cleared the mess before his aunt came
.....he hadn't lifted a finger
.....his aunt did not come in]

(99) Het is niet zo dat zij met boxen ophield voordat ze haar neus in een match brak
....ze hield niet op met boxen (en ze brak haar neus wel)
*....ze brak haar neus niet in een match
....ze had haar neus toen al gebroken
[It is not the case that she stopped boxing before she broke her nose in a match
....she did not stop boxing (and she did break her nose)
....she did not break her nose in a match
....she had already broken her nose by then

In order to interpret (99) correctly it has to be compared to (97). The sequence in (97) carries the implication that the subsentence is not true - consequently (99), being the negation of (97), carries

potential evaluation point has to precede. Whereas the equally difficult identification of a **last** evaluation point of a process/state main sentence event does not matter (as we saw in (93) overlap is allowed), the vagueness of the initial point is a problem for the subsentence as can be seen in (94) below.

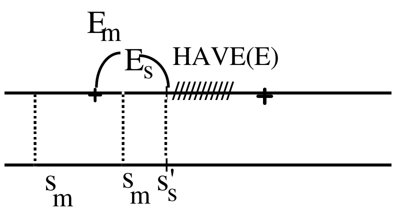
(94)a *Vele verongelukten geven toe dat ze moe waren voordat ze skieden
[Many of the injured admit that they were tired before they were skiing]

In the corpus used here no regularities in terms of agentivity and perspective could explain when a process/state in the subsentence is acceptable and when it is not (as was the case for *toen*(cf., section 3.3.1)). It is remarkable though that three cicumstances lead to acceptability: a. there is an explicit marker of inchoation, e.g. *gingen* [went], *begonnen te* [started to]; b. the content of the main sentence is a measurement of the time before the subsentence event takes place; and: c. the subsentence is in Present Perfect. The second option is exemplified in (95) below.

(95)a Het zal nog wel en tijd duren voordat de grote, sterke (..) karper in de verenigings-wateren kan worden uitgezet [276]
[It will take quite some time before the big, strong carp can be set out in the waters of the union]
b Hij had uitgerekend dat het circa een uur zou duren voordat ze klaar zouden zijn met het graafwerk (..) [2910]
[He had calculated that it would take about an hour before they would be ready digging]

The third option has the subsentence in Present Perfect. In section 2.4 is was suggested that TCs do not combine with Present Perfect. [53] This is not a rule without exceptions: sentence (96) is quite all right - its corresponding TTS is given below. The range were the negative main sentence event is said to hold is limited by the subsentence evaluation point at which the consequent phase of the subsentence event starts.

(96) De minister mag niet over een aangelegenheid van algemeen belang voor de militairen beslissen, voordat overleg is gepleegd met het orgaan
(96) [The minister is not allowed to decide upon a matter of general importance to the military, before it has been discussed with the committee]
(96)a



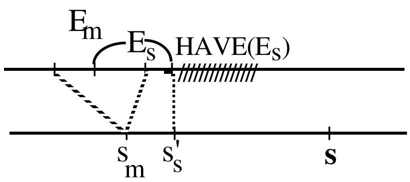
Summarizing, the local semantic properties of temporal *voordat* are reasonably well covered by (85) if we add:

[53] In section 2.3 the behaviour of TCs with Present Perfect was employed as an argument in favour of my choice of relata: specific sets of S-points. This argument was not the only ground for this choice though: several alternative relata were tried and all of them with less success in predictive power.

(88) Dat betekent dat het lang zal duren voordat de eerste leningen verstrekt zullen worden
[This implies that it will take a long time before the first loans will be issued]
(89) *De trein arriveerde daarom vijf minuten voordat de reizigers het perron zullen bereiken
[Therefore the train arrived five minutes before the travelers will reach the platform]

Heinåmåki (1978) and Hamann (1991) remark that the English *before* could be interpreted as being defined with respect to the final point of the subsentence event. This would imply that the universal quantifier in (85) had to be altered. However, the Dutch TC *voordat* does not have this problematic interpretation: (90) below would be translated as (91b) not as (91a). The TTS of the latter is added. As I said before in section 2.4, *voordat* connecting two sentences in Pluperfect requires the HAVE(E) interpretation of the subsentence event under the double Perfect assumption.

(90) Marc built a sailboat before he wrote a novel
(91)a Marc bouwde een zeilboot voordat hij een roman schreef
(91)b Marc had een zeilboot gebouwd voordat hij een roman geschreven had



The definition is less unequivocal in its prediction with respect to a TC connecting a main sentence containing a process/state and a subsentence containing a terminative event. Since the definition allows for a situation in which only the first $\Diamond S_m$ point(s) precede S^{max}, there may be overlap. This too is born out by the facts. Sentence (92) expresses sequencing of events while (93a) and (91b) express overlap.

(92) Ik vraag altijd aan mijn patiënten of ze iets aan hun conditie hebben gedaan voordat ze gingen skieën.
[I always ask my patients whether they (have) worked on their condition before they took up skiing]
(93)a Vele verongelukten geven toe dat ze moe waren voordat ze de skies onderbonden
[Many of the injured admit that they were tired before they put on their skis]
b Morgen kan de atmosfeer al weer een of twee graden meer verdragen voordat er zich buien in ontwikkelen
[Tomorrow the atmosphere can endure one or two degrees more before it develops rains]

In fact, the only configuration that may cause trouble is the one with a process/state in the subsentence.[52] The problem is the lack of identification of a **first** evaluation point which some

[52] This is predicted by the definition: even if all evaluation points, the images of a partitioning plus an injection, follow a certain s_m it is not excluded that another partitioning would have resulted in evaluation points preceding this s_m. Or in other words: under definition (85) a process/state subevent may partly precede (part of the) main sentence event!

5. Voordat [before]

Voordat is the first TC to be discussed here that expresses primarily a temporal precedence relation and not some form of overlap. Although *voordat* does not exclusively express temporal precedence, this property is constant in the sets of properties of each of the interpretations of this TC that can be discerned.

First the temporal interpretation of *voordat* will be discussed - again with the help of the TTS contribution formulated before (5.1). The local semantic properties of the TC, its interaction with tense and event type, will be discussed. After this, not exclusively temporal interpretations of *voordat* will be discussed and compared with the temporal one on information status (5.2). In section 5.3, a "typology" of interpretations of *voordat* will be given. It takes Heinåmåki (1972, 1978) as a starting point. Her conviction that all uses of a TC must have a common core is entirely in line with the position taken here. The English and the Dutch facts are not similar though.

5.1 *Voordat* with tense and event type

The preliminary definition of *voordat* stipulates a precedence relation between **at least** one potential evaluation point contributed by the main sentence event and **all** evaluation points contributed by the subsentence event. A demonstration of the correctness of this choice is called for. The definition is repeated here for convenience.

(85) **voordat**: $\$x\mathbf{e}\ \Diamond S_m\ "y\mathbf{e}\ \ S^{max} : x < y$

This definition is unequivocal when two terminative events are connected by the TC; since both $\Diamond S_m$ and S^{max} are singleton sets in that case, the evaluation points of both events are strictly ordered by (85) - and so are their corresponding events. Sentence (86), (87) and (88) below confirm that this is correct. Moreover, they show that *voordat* isn't subject to deictic restrictions with respect to tense: it may connect sentences in Past tense, Present tense or Future. Apart from the tense combinations excluded by (85), e.g. a subsentence in Past and a main sentence in Future, there is one additional constraint: the main sentence cannot be in Past tense while the subsentence is in future Present - compare (89).

(86) Het ongeluk gebeurde vlak voordat de trein van 11.18 uur (...) passeerde
[the accident occurred just before the 11.18 hours train (...) passed by]

(87) De partjes sinaasappel moeten met een scherp mesje uit het vlies gesneden worden voordat u ze gebruikt [51]
[The segments of the orange have to be cut from the membranes with a sharp knife before you use them]

[51] This example serves still another purpose: it demonstrates that modal auxilaries like "moeten" do not always turn an event into a state as is often claimed in the literature: one cannot add here "urenlang" [for hours].

(84) Rasa heeft zich destijds aan een bod van 200% verbonden terwijl Crane een bod van 260 % had gedaan
[Rasa has committed itself to an offer of 200% while Crane had offered 260%.]

In (82) there is a tense clash: the $\Diamond S_m$ points of an event in Past tense (<**s**) cannot be included in the set S_s^{max} points of an event in Present tense. The result is a denied expectation: the speaker is incensed about the bad quality of the vegetables offered in the shops - especially since it is not necessary.

In (83) the main sentence expresses a non-iterative, terminative event that is of a very short duration ("started"). Again the temporal interpretation should be blocked. Indeed, the result is a semantic opposition: two distinct subjects are predicated with two distinct activities.

Since the subsentence in (84) is in Pluperfect, the $\Diamond S_m$ points contributed by the main sentence have to be included in a singleton set of S_s^{max} points. So the temporal interpretation is blocked. The result is an additional relation: the offers of both companies are summed up.

A summary of the properties characterizing the individual interpretations of *terwijl* follows:

all interpretations:

- S_s^{max} bears no relation to **s**

  temporal *terwijl*:

  - $\Diamond S_m$ is included in S_s^{max}
  - $\Diamond S_m$ and S_s^{max} are comparable
  - the E_s of a temporal *terwijl* is presupposed

  non-temporal *terwijl*:

  - $\Diamond S_m$ does not have to be included in S_s^{max}
  - $\Diamond S_m$ and S_s^{max} don't have to be comparable
  - the E_s of a temporal *terwijl* is not presupposed

    additive *terwijl*:

    - expresses no incompatibility between E_s and E_m

    contrastive *terwijl* :

    - expresses incompatibility between E_s and E_m

      semantic opposition interpretation of *terwijl* :

      - parallel structure main sentence and subsentence (two subjects)
      - in context: not both E_s and E_m
      - no inherent preference for either E_s or E_m, no perspective

      denied expectation interpretation of *terwijl*:

      - no parallel structure main sentence and subsentence (same subject)
      - E_s leads to expectation; E_m denies content of expectation
      - from perspective of speaker E_s is preferred

(81)a (Bij de burgemeester en bij de leiding van de politie blijft de grote zorg het tekort aan personeel.) Nu is de sterkte van het corps 2102 man terwijl de sterkte 2310 mag zijn. [1698]
[(The mayor and the police top mainly worry about the shortage of men.)
Now the corps consists of 2102 men while it may consist of 2301 men]

b Het Amerikaans bedrijf Monsanto heeft voor de vestiging van een acrylvezelfabriek zijn keuze niet laten vallen op Delfzijl, terwijl de noordelijke havenstad aan alle daarvoor gestelde eisen kon voldoen
[The American company Monsanto did not choose Delfzijl as a site for a factory of acrylic fiber, while this northern harbor could satisfy all demands made]

The differences between the possible non-temporal interpretations of the TC at hand can be put in terms of speakers intention. In case of a semantic opposition the speaker intends to enumerate alternatives that are not in se incompatible (cf. (80)). [50]

In case of a denied expectation the speaker intends to stress the content of the subsentence (cf. (81)). The main sentence gives a fact. But the subsentence would have the negation of the main sentence as an implicature, and the speaker has committed himself to the importance of the subsentence event. Consequently, the speaker expresses indirectly a dissatisfaction with the status quo: he thinks that there are reasons according to which this status quo should be different.

In case of an additive interpretation, the speaker does not intend to express any incompatibility or tension between the relata. It is the weakest interpretation of this TC, though frequently used, and this interpretation puts little constraints on the context.

4.4 A characterization of the interpretations of *terwijl*

Several kinds of properties have been discerned for non-temporal interpretations of *terwijl*, both on the local semantic level and on the global level. As a test case I will try out whether an instantiation of this TC that cannot be temporal according to its tense or according to the principle of comparable duration, indeed can be recognized as one of the non-temporal types of the TC described above.

(82) De kostelijke ladingen werden allemaal afgekeurd terwijl in de etalages van de groente-winkels vergeelde komkommers en gekneusde tomaten "pronken"
[the precious loads were all dismissed while yellowish cucumbers and bruised tomatoes "glitter" in the windows of greengrocers] [83]

(83) Op een zitbank begon meneer poema behaaglijk zijn nagels te scherpen terwijl mevrouw poema aandachtig naar haar gemaal opkeek
[Mister puma started to sharpen his nails on a sofa while lady puma was watching her husband intently] [6598]

[50] Still the speaker is aware one of the options has to be chosen given a certain speech situation. This situation is either given by context or by conventions, being a special part of real world knowledge. Sequence (80b) suggests that one purpose has to be strived after in the bilateral talks - not both, and (80b) suggests immorality of the combination of occupations.

subsentences tend to have a parallel structure. Sentences expressing denial of expectation may have only one shared subject and their structure in general is less determined.

Secondly, in semantic oppositions the relata are "argumentatively neutral" as Spooren puts it (Spooren, 1989, p.50). The speaker does not seem to favor one of the relata as an argument over the other. If (76) is uttered as a reaction to the question: "who writes most?" it is not easy to decide from (76) what the answer should be according to the speaker. In case of a denial of expectation, on the contrary, the speakers perspective inspires one of the subsentences. However, *but* and *terwijl* clearly differ in their denial of expectation interpretation. In case of *but* as a connective the second sentence is to be understood as representing the speakers view - in case of *terwijl* the subsentence seems to express the facts that are important to the eyes of the speaker. In case of *but* the main sentence triggers an expectation that is "denied" by the second sentence from speakers perspective - in case of *terwijl* the subsentence triggers an expectation (post hoc) that is denied by the main sentence.[48] Perhaps, we should therefore speak of "denied expectation". This mirror image structure of expectation and denial explains why (78c) and not (78b) is a good paraphrase of (78a).

In complex sentences with *but* it is the second relatum that has the strongest effect on a reader/hearer. As a central hypothesis, Spooren (1989) defends the following statement: if a *but*-coordination is used, the information related to the second conjunct stands a better chance of percolating to the higher perspective than the information related to he first conjunct (Spooren, 1989, p. 41).[49] In case of a denial of expectation, this seems straightforward: there is an association of speakers perspective to the second conjunct. One would expect something similar for *terwijl* on the denied expectation interpretation: the subsentence part should present the strongest argument or statement. In order to check this expectation sentences (80)/(81), expressing semantic oppositions (80) and denied expectations (81), will be compared.

(80)a Terwijl Cousty rustig naar de televisie keek, stierf zijn vrouw na twee uur
[while Cousty was peacefully watching the television, his wife died after two hours]

b De Chinezen willen voor alles een terugtrekking van de Russische troepencon-centraties aan de grens en een herstel van de status quo ante bereiken terwijl de Russen graag alle hangende politieke problemen willen bespreken
[The Chinese mostly want to accomplish a withdrawal of the Russian troops at the border and a repair of the status quo ante while he Russians would like to discuss all current political problems]

[48] In a sense this interpretation of *terwijl* behaves as if it derives from temporal *terwijl* immediately: it sets up a domain -not in time but in "a world", namely an expected world - and determines the position of the main sentence event with respect to that world.

[49] Spooren argues that this hypothesis holds for all types of contrastive *but* relations. It has been assumed here that it holds for *terwijl* on the denied expectation interpretation. Whether it holds for other types of relations should be investigated by means of experiments - as was done by Spooren for *but*.

property only holds for a subset of all contrastive relations. Additive *terwijl* will be discussed after some more has been said about contrastive *terwijl* .

4.3.1 Contrastive *terwijl*

Several kinds of contrastive relations have been distinguished in the literature. There is (at least) semantic opposition, denial of expectation and concession. The following descriptions of these three types are given in Spooren (1989, p. 31):

• *Semantic opposition*: A relation between two conjuncts each having different subjects, to which properties are attributed that are mutually exclusive in the given context.
• *Denial of expectation*: On the basis of the first conjunct one expects a certain state of affairs to be true, which is denied by the second conjunct.
• *Concessive opposition*: The first conjunct gives an argument in favor of a certain conclusion, the second conjunct gives an argument against this conclusion

In order to be able to decide what kind of contrastive relations can be found among the non-temporal *terwijl* interpretations, I will try a paraphrase of examples with *but* of the above relations as given in Spooren (1989); (77) exemplifies a semantic opposition, (78) a denial of expectation and (79) a concession.

(77)a	John writes a book but Charles writes an article
b	-> Jan schrijft een boek terwijl Charles een artikel schrijft
c	-> Charles schrijft een artikel terwijl Jan een boek schrijft
(78)a	John is small, but he plays basketball
b	-> ?Jan is klein terwijl hij basketball speelt
c	-> Jan speelt basketball terwijl hij klein is
(79)a	John is small, but he took karate lessons
b	-> ?Jan is klein terwijl hij karateles heeft gehad
c	-> ?Jan heeft karateles gehad terwijl hij klein is

The conclusions from (77)/(79) must be that: a. semantic oppositions can be expressed by means of *terwijl* - and as it seems either of the relata can occur in the subsentence; b. denial of expectation can be expressed with the help of *terwijl* - but only if the first relatum of the *but* sentence occurs in the subsentence; c. concessions cannot be expressed by means of *terwijl* both paraphrases under (78) are odd.[47]

The structure and function of semantic opposition and those of denial of expectation are different. As we saw, a structural indication (though not a sharp criterion) for semantic oppositions is the realization of the subject position in main sentence and subsentence. In a sentence expressing semantic opposition usually distinct entities function as subject in the subsentences. In general, the

[47] Evidently, the behaviour of *terwijl* in this respect differs from *while*. According to Abraham (1979), *while* does not go well with denial of expectation - especially if the subjects of both subsentences are the same.

For temporal *terwijl* a principle was formulated that prohibits the connection of two events which are incomparable in duration. This principle does not apply to non-temporal interpretations of this TC as may be obvious from (74) and (75). The former has a relatively short lasting event in the subsentence and the latter has such an event in the main sentence.

(74) Terwijl jij zeurt om een klein pijntje lijdt de derde wereld al decennia werkelijk
[while you moan about a little ailment the third world has been suffering for decades already]

(75) Terwijl de faam van het eerste optreden van Chicago (...) nog naechoot, heeft de zeven man sterke formatie al weer een nieuwe cassette uitgebracht
[while the succes of Chicago's first performance is still echoing, the seven-men band has produced a new tape already]

Sentence (74) is odd if interpreted temporally - but the non-temporal interpretation is entirely acceptable and consequently we will have to drop the comparability principle here. The more so, since the second motivation for it doesn't work either: timeless properties do combine with non-temporal *terwijl* as can be seen in (76). Sentence (76a) contains a temporal TC; (76b) contains a non-temporal TC.

(76)a ?Terwijl grootvader professor/oud was vroeg hij vaak om assistentie
[while grandfather was professor/old he often asked for assistence]

b Terwijl grootvader professor/oud was moest hij zelf het bord schoonvegen
[while grandfather was professor/old he had to wipe the blackboard himself]

It may be concluded here that non-temporal *terwijl* does not involve inclusion of evaluation points nor does it employ the comparability principle. Consequently, non-temporal *terwijl* does not fit the description made for temporal *terwijl* in any way. Two questions suggest themselves: 1. what exactly does non-temporal *terwijl* express ? and 2. why is this meaning expressed by *terwijl* ?

As was said, *terwijl* may express some kind of contrast or alternatively it may express addition. The crucial difference between additive and contrastive interpretations of *terwijl* sequences seems to be located in the evaluation of the speaker: in case of an additive TC the speaker does not convey surprise or awe or happiness about the fact that both the main sentence and the subsentence are true. By means of a contrastive TC the speaker can demonstrate such feelings.[46] Still, both non-temporal interpretations seem to have a lot in common, both being "derived" from simple co-occurrence (cf. König & Traugott, 1988): their interaction with tense and event type, as we saw above; their connecting two structurally similar propositions (cf. (72)/(74)). But the latter

[46] The contrast between additive and contrastive interpretation of the TC is not as sharp as is suggested here: replacing additive *terwijl* with *and* would also lead to a little loss of information: *terwijl* often seems to indicate that the truth of both relata is a little better or worse then was expected.

...Ellen begeert niemand
...Allart kan Mieke niet uitstaan
[it is not he case that Ellen wants Allart while Allart wants Mieke
....Ellen doesn't want anybody
....Allart hates Mieke]

Again, relatively speaking, the non-temporal interpretation is the one with the less presupposing interpretation; the temporal interpretation has a presuppostion attached to the effect that the event expressed in the subsentence must hold:

- the E_S of a temporal *terwijl* is presupposed
- the E_S of a non-temporal *terwijl* is not presupposed

Consequently, the interpretations of this TC differ on the global level - in the next section they will be shown to differ strongly on the local semantic level. Moreover, several non-temporal interpretations will be shown to differ among each other. From a quantitative perspective, it is worthwhile to study non-temporal interpretations in more detail: the corpus contained ten times as much non-temporal interpretations as purely temporal interpretations of this TC.

4.3 Non-temporal *terwijl*

The non-temporal interpretations of *terwijl* can be approached efficiently by being subjected to the regularities formulated for their temporal counterpart. The first question would be whether there is an inclusion of the set of potential evaluation points contributed by the main sentence event in the set of evaluation points contributed by the subsentence event. If this would be the case, for a complex sentence in simple Past, for example, there should at least be temporal overlap between the main sentence event and the subsentence event. It can easily be shown that the non-temporal interpretation of *terwijl* does not imply temporal overlap at all. The sentences in (72) are instantiations of a contrastive *terwijl*. Sentence (73) gives another interpretation of this TC: additivity. Both (72) and (73) illustrate the point.

(72)a Terwijl ik jou gisteren hielp weiger jij nu iets voor mij te doen
[while I gave you a hand yesterday, you refuse to do something for me now]
b Terwijl Martha haar rijbewijs in één keer haalde, zou David eerst drie keer zakken
[while Martha passed her driving test the first time, David would fail three times]

(73) De vertegenwoordigers van het gas- en electriciteitsbedrijf zouden vandaag en die van de mijnwerkers overmorgen hun stakingsplannen bekend maken, terwijl die van de PTT een voorbericht hebben gegeven voor een staking op 2 oktober.
[the representatives of the gas company and the electricity company would announce their plans for a strike today and the miners tomorrow, while those of the PTT have issued a premise for a strike on October 2]

The deictic adverbial specifying the evaluation points over the events in (72a) and the tenses used in (72b) make it clear that non-temporal *terwijl* cannot be defined in terms of temporal overlap.

In case of a subsentence event in Pluperfect, the "temporal domain" formed by the S_s^{max} -points equals a singleton set, and so will be the set $\Diamond S_m$. Again, the set $\Diamond S_m$ is not comparable to the set $\Diamond S_S$. Consequently, no extra principles or rules have to be invoked to explain the oddity of (69) - or in general, a Pluperfect in a temporal *terwijl* sentence.

Concluding, in order to interpret a complex sentence connected by *terwijl* temporally, must be possible to **conceive** of the main sentence event as lying within the temporal domain created by the subsentence event. In other words: the set of potential evaluation points for the main sentence event should be included in the set of evaluation points for the subsentence event. Furthermore, there is a principle that says that the two events should be comparable qua duration according to our real world knowledge. And lastly, there is no special relation to the speech point, i.e. no deictic constraints:

- $\Diamond S_m$ is included in S_s^{max}
- $\Diamond S_m$ and S_s^{max} are comparable
- S_s^{max} bears no relation to **s**

4.2 Information status of a *terwijl* -clause

In section 3 it was argued that *toen* has several interpretations and that with these interpretations various types of presuppositions are connected. Temporal *toen* appeared to be strongly localizing - *terwijl* is less so. When a temporal interpretation of *toen* is not prepared by the context, it becomes inevitable to search for another coherent relation between the two related events. According to the corpus, *terwijl* events need not be localizable with the help of (real world, context or linguistic) knowledge. Their temporal interpretation is more relational and less deictic than the temporal interpretation of *toen* ; these characteristics are accentuated by *toen* having a constraint on tense choice whereas *terwijl* has no constraints.

Although the information status of events in a temporal *terwijl* sentence differs from the information status in a temporal *toen* sentence, there is a relative difference in this respect between temporal and not primarily temporal interpretations of *terwijl* like there was for *toen*. *Terwijl* has a non-temporal interpretation, as comparable expressions in many languages do. A rough approximation of the meaning of this use of *terwijl* is: some kind of contrast. Compare the following two sequences testing the presuppositional behavior of temporal (70) and non-temporal (71) *terwijl*.

(70) Het is niet zo dat de kinderen zich vermaakten op zolder terwijl het regende
....ze verveelden zich
?...het was eigenlijk wel mooi weer
[It is not the case that the children enjoyed themselves in the loft while it was raining
....they were bored
....actually the weather was quite nice]

(71) Het is niet zo dat Ellen Allart begeert terwijl Allart Mieke wil

doctorate. The duration of the states expressed will not easily be conceived as comparable to some terminative event or process. [45]

The difference between (66a) and (66b) could be explained by the same principle: reading a magazine may take some time whereas throwing a ball simply doesn't. It has often been noted that terminative events in the main sentence of this configuration may get an iterative interpretation. This is not surprising given the principle formulated above. The principle is satisfied, but by some form of 'coercion': the evaluation points of the main sentence event $\Diamond S_m$ have been multiplied in order to satisfy the principle - and the events are multiplied accordingly. Sentence (66c) has a main sentence event that can easily be repeated: the ball bounces back - but it will not do so in (66b).

(66)c Minte gooide haar bal tegen de muur terwijl Peter ziek in bed lag
[Minte bounced her ball against the wall while Peter was down with the flu]

The event described in (66b) cannot easily be interpreted iteratively. As I will argue soon, these less felicitous cases with *terwijl* can easily be interpreted not-temporally.

In sentence (65) both events generate one sole potential evaluation point. The definition does not exclude this situation; theoretically, the difference with *toen* vanishes, however. And indeed, in sentences following this pattern *terwijl* can often be substituted with *toen*:

(68) Een bestelauto (....) maaide hen eind december van de weg, terwijl/toen zij met drie andere kinderen (...) naar huis fietsten [6327]
[A van (..) bumped them off the road while/when they rode/were riding home on their bicycle with three other children]

In general, the TTS definition for *terwijl* appears to agree with the facts, if the comparability principle is added. Evidently, it is only real world knowledge which can inform us about this comparability. Consequently, at this point real world knowledge should be allowed to play a part.

Studying the interaction of *terwijl* with **tense**, one observes a striking difference with *toen* : whereas the latter requests its immediate environment to be in some Past tense, the former puts no other restrictions on tense use than relational restrictions. That is: if the subsentence has a certain tense, of course, the tense of the main sentence is not free anymore given the inclusion of (potential) evaluation points required by (63). But the relation may hold between events expressed with the help of Future tense or events with a Present tense or events with a Past tense.

At first sight, sentence (69) might seem to indicate that *terwijl* does not agree with Past tense. Of course, this cannot be the case witness (64)/(67) above.

(69) ?Terwijl het geregend had, speelden de kinderen op zolder
[while it had been raining, the children were playing in the loft]

[45] Studies on the English *while* describe a slightly different situation: a terminative event doesn't ever occur in a *while* sentence. Heinåmåki (1978) excludes this case and so does Moens (1987) by demanding that only processes combine with *while*. The configurations exemplified by the sentences under (65), (66) and (67) would be incorrect in English.

Furthermore, it suggests that a subsentence process/state connected to a main sentence terminative event will cause no problem: a process by definition produces a set of evaluation points. The singleton potential evaluation point coming from a terminative event can be included in this set. Sentence (66a) confirms this hypothesis - but sentence (66b) does not. A subsentence with a terminative event and a main sentence with a process/state is expected to be problematic: the singleton set should now include the other set - which leaves only one option: a vacuous partitioning of the process/state interval. Examples are given in (67a) and (67b).

(64) De kinderen vermaakten zich op zolder terwijl het regende
[The children enjoyed themselves in the loft while it was raining]

(65) In Frankfurt ontplofte de brandbom terwijl hij samen met de andere bagage op een karretje naar het vliegtuig werd gereden.
[In Frankfurt the bomb exploded while it was transported to the airplane on a chart with the other luggage]

(66)a Nikki las een tijdschrift terwijl Peter ziek in bed lag
[Nikki read/was reading a magazine while Peter was down with the flu]

b ? Sarah gooide haar bal over de schutting terwijl Peter ziek in bed lag
[Sarah threw her ball over the fence while Peter was down with the flu]

(67)a De auto wachtte om de hoek terwijl Bill de deur openmaakte
[The car waited/was waiting around the corner while Bill opened the door]

b *Peter lag ziek in bed terwijl Bill de deur openmaakte
[Peter was down with the flu while Bill opened the door]

What is the crucial difference between (67a) and (67b)? There is a linkage between the events in (67a) that is absent in (67b): since the car will probably wait for Bill's opening the door - the events in (67a) are allowed to overlap entirely. Consequently, their evaluation points may coincide. This linkage of events is not accomplished by *terwijl* ('while') but inferable independently from the meaning of the main sentence predicate. In (67b) it is not plausible that Peter is ill for the duration of Bills opening the door. These events cannot be of equal duration: one evaluation point will not suffice for the main sentence event .

How can we prohibit (67b)? Partitioning and injection is unrestricted (as long as the atomic level is not surpassed) - there is no way as yet to demand a certain amount of evaluation points for a durative main sentence event. We need an additional principle to the effect that *both events are conceivable as comparable in length*. I do not intend to say that they should have almost the same duration; "comparable" is meant to indicate that both events can be thought of in the same temporal proportions. In TTT terms the principle would say that the set $\Diamond S_m$ should be comparable to the set $\Diamond S_s$.

The need for such a principle is underpinned by the observation that there is a class of states that cannot be used in a *terwijl* sentence. This class has been called temporary states of affairs (Heinåmåki, 1978, p33), unrestrictive lexical states (Caenepeel, 1989, p.127) or timeless properties (Oversteegen, 1989, p.52) and it consists of predicates like *be a mother, be old, have ones*

undesirable because it obscures the temporal relation between the events. Supposedly the first option generally holds true - and this makes the speech act vacuous: if no other than a temporal relation is expressed between E_s and $SA(E_m)$, and if the time of $SA(E_m)$ is identical to the time of E_m the speech act has no function in the temporal interpretation. Consequently, there is no use for a pragmatic/internal temporal connective.

To summarize, three separate interpretations of *toen* have been distinguished in this section. They differ in terms of both sentence semantic properties and more global discourse properties. All three are primarily ideational in meaning but the consequentiality interpretation also has a non-ideational use.

4 Terwijl [while]

4.1 Temporal *terwijl*

The length of the section on *toen* is partly due to the complexity of this TC, and partly caused by its position in a row: the very first one. Now that a frame has been set all sections on the other TCs discussed here will be less lengthy. This section will again handle both local and global properties of a TC for temporal and non-temporal interpretations. Starting with the temporal interpretation, its interaction with event type and tense will be described. By contrast, other interpretations of *terwijl* will be analyzed. Then information status and other discourse level properties will be discussed, especially their similarities and differences for several interpretations of *terwijl*.

Temporal *terwijl* [while] is similar to temporal *toen* in so far it indicates primarily some kind of temporal overlap. But *toen* and *terwijl* differ as well: *toen* **only** requires overlap of the evaluation points. In complex sentences connected by *terwijl*, the main sentence event is conceived as being contained in the subsentence event. The subsentence creates a temporal domain for the main sentence event to be located in.[43] The definition of *while* requires that the evaluation points provided by the subsentence event, (not strictly) include the potential evaluation points provided by the main sentence event. [44] The definition given in section 2.4 is repeated below.

(63) **terwijl** : $\forall x \in \Diamond S_m \; \exists y \in S^{max} : x=y$

This TTS contribution enhances some hypotheses about the interaction with event types. For one, it suggests that two similar event types in the main sentence and the subsentence should cause no problems (cf. footnote 41). The sentences (64) and (65) below confirm that this is correct.

---

[43] This does not mean that, for such a sentence to be true, the main sentence event itself must be included in the subsentence event. Given that TC definitions are put in terms of (potential) evaluation points, the relation between the event intervals will be a derived one.

[44] The fact that the inclusion is not strict makes identity of sets possible.

Both instantiations of *toen* indeed appear to be pragmatic/internal. This brings us to the question why *toen* (and as we shall see other TCs) may be used pragmatically/internally, but only in its not primarily temporal interpretation. I will give the argument in a nutshell.

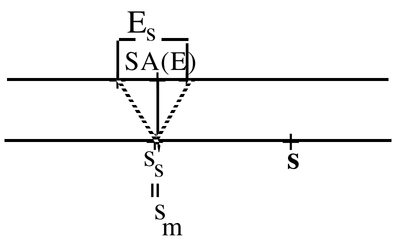
A semantic/external relation connects the contents of two propositions. In contrast, a pragmatic/internal relation is supposed to connect (two illocutions or) the content of the one proposition with the illocution of the other. This relation must imply a relation between the two propositions. It is simple common sense that leads to this conviction: if a speaker utters pragmatic/internal complex proposition that fits in the schema "(I say) p *connective* q", then it would be extremely odd if there was no relation whatsoever between p and q. Let me take as an example a sentence given by Sanders, Spooren & Noordman (1993):

(61) (I claim that) Theo was exhausted because he was gasping for breath

Some sort of causal relation holds between the relata in (61) and it is straightforward to expect a relation between gasping and being exhausted. In case of *because* this relation appears to be evidence: the truth of the proposition "Theo was gasping for breath" counts as evidence for the proposition "Theo was exhausted". Why would this be so? Because there is a causal relation between gasping and being exhausted: if one is exhausted one gasps. The fact that someone is gasping cannot be enough ground for concluding that that person is exhausted (this conclusion would be invalid) but is may count as evidence. As is argued elsewhere, the (semantic /external) causal relation between being exhausted and gasping, is presupposed by the pragmatic/internal relation in (61) (Oversteegen, to appear).

Generalizing, let us assume that for each pragmatic/internal relation a presupposed relation between propositions can be found, what would this imply for temporal connectives? A TTS for sentences like (59) is given in (62).

(62)



The main sentence event is wrapped in a speech act (SA): the temporal relation (derived from the S-points relation) holds between the event of performing this speech act and the subsentence event. Theoretically, there are two possibilities: either the temporal relation between the two events is given immediately by their tenses because the speech act is "temporally transparent", or no relation between the subsentence event and the main sentence event can be deduced from the relation in (62). In the latter case the TC acts as a kind of buffer between the propositions. This option is

a small amount of temporal "pragmatic" or "internal" relations expressed by means of connectives (Martin, 1992, p.224). Still, I would like to show hat the consequential interpretation of *toen* can be used pragmatically/internally. Consider (59) below:

(59)a De bus was opeens vol toen Shira mee wilde gaan
[suddenly the bus was full when Shira wanted to join]
b Toen Roger de chaos zelf gezien had was het (opeens) een dramatische situatie
[when Roger had personally witnessed the chaos, (all of a sudden) the situation was dramatic]

Clearly, in (59a) the fact of the bus being full cannot be a consequence of Shira's wish to be on that bus. The (partly covert) consequence of Shira's uttered wish is something like: the driver (or organizer or someone else) states that the bus is full. Probably the utterer of (59a) believes that a causal relation holds (one of the options within the concept of consequentiality), to the effect that the driver (or other spokesman) does not want Shira to join.

In (59b) something similar is going on, but the performer of the hidden speech act is mentioned here. The relation expressed in (59b) holds between Rogers witnessing the chaos and his spoken opinion that the situation is bad.

The test given by Martin (1992) for discriminating between internal and external relations is described as follows: "...change the dependency relationship between the messages in question (from hypotactic to paratactic or "cohesive" or vice versa); with internal relations this will commonly involve projecting one of the related messages with a verbal process" (p. 226).[42] In (60) the tests are applied to the sentences in (59):

(60)a Shira wilde met de bus meegaan **dus** *zei men haar* dat de bus vol was
[Shira wanted to join the bus **so** *they told her* that the bus was full]
b Martin had de chaos zelf gezien **en daarop** *verkondigde hij* dat het een dramatische situatie was
[Martin had personally witnessed the chaos, **and thereupon** *he proclaimed* the situation to be dramatic]

---

in the world described by the text. According to Sanders, Spooren and Noordman (1992), *pragmatic* relations always have an illocution as one (or both) of their relata. As we will see, something similar is presupposed by Martin (1992) in a criterion for internal relations - reason the more to believe that the distinctions are more or less parallel.

[41] Roughly speaking, I would say that the following correspondences hold between the labels of types of relations: *semantic* corresponds to *ideational*, *content* and *external*, whereas *pragmatic* corresponds to *speech act*, *textual* and *internal*. *Interpersonal* (address specific features about the reader and/or the writer (Lavid & Maier, 1992) and e*pistemic* (concerns emotional/psychological domain (Sweetser, 1990)) relations do not form a category of their own in the other theories; happily these categories are of little importance here since these categories do not seem to contain any temporal relations.

[42] Martin adds: "With consequential relations the paraphrase test may involve projection in the context of relational rather than a verbal or behavioural process" (Martin, 1992, p.22)

The list of properties characterizing the consequential interpretation of *toen* now becomes:

- $\Diamond S_m$ must be located after (at least one of) the S_s^{max} points
- a consequentiality relation between E_s and E_m ($\Diamond S_m$ is included in S_s^{max} over HAVE(E_s))
- If E_s is a process, it must be perspectivized and the main sentence must be agentive
- S_s^{max} over HAVE(E_s) < **s**

3.3.2 Narrative *toen*

Most of the special features of narrative *toen* have been discussed already. On the sentence semantic level we have:

- the S_s^{max} points must be located immediately after the $\Diamond S_m$ points [38]
- S_s^{max} < **s**
- E_s usually is a terminative event and E_m usually is a state or process

On the global level we have and information state property and a syntactic property:

- the E_s is new
- there is a strict ordering required: main sentence precedes subsentence

It is important to note that the relation between the set S_s^{max} and the set $\Diamond S_m$ differs for all three interpretations of toen. The consequence is that many sentences cannot get one (or more) of the three interpretations: there is a tense clash. This makes tense an important factor in the precise interpretation of a TC - but not by stipulation, as is the case in many theories. [39]

3.3.3 The non-ideational use of toen

Literature about connectives very often discerns between different uses of connectives from the perspective of their function in the communicative situation: to what component of the language system do they primarily contribute. The major opposition here have been studied under various names: semantic versus pragmatic (van Dijk, 1977; Sanders, Spooren & Noordman, 1992), content versus epistemic versus speech act (Sweetser, 1990), ideational versus interpersonal versus textual (Maier & Hovy, 1993; Hovy, Lavid, Maier, Mittal & Paris, 1992) and internal versus external (Halliday & Hasan, 1976; Martin, 1992).[40,41] The opinion found in the literature is that there is only

---

[38] I f we let S_s^{max} immediately follow all $\Diamond S_m$ points, we get the desired effect: the main sentence event is interrupted by the subsentence event.

[39] Cf. Hornstein,1977; Heinåmåki, 1978; Hinrichs, 1981; Hamann, 1991.

[40] According to Halliday and Hasan (1976, p. 239 vv.), *internal* relations concern the organisation of the text itself and not so much the organisation of the world that is being described. *External* relations bear on the situation

As a last remark on this subject it should be said that the difference between temporal and consequential interpretations of process *toen* sentences may become rather trivial. As the event intervals overlap in both cases, so the temporal relations are similar on both interpretations, the only difference is the strength of the causal link we attribute to the events in the real world. Sentence (57) may illustrate this point:

(57) Het kind (..) overleed vrijdagavond in het ziekenhuis. Het ongeluk gebeurde toen een loodgieter in het huis van de familie Oranje werkzaamheden verrichtte
[The child (...) died Friday night in the hospital. The accident occurred when a plumber was doing a job in the house of the Oranje family]

If one takes embedded perspective in S_s and agentivity in S_m as a criterion in such unclear cases, they become temporal.

There is another case in which it is hard to determine which interpretation of *toen* is selected. Or perhaps I should say: one case in which the two interpretations are conflated. This may happen when the subsentence and the main sentence are in fact different ways of describing the same event. Often, these descriptions are given from a different perspective (cf. (58c) tendency versus incident) or the one possesses more precision than the other (in (58a) the main sentence expresses the same as the subsentence plus a reason for it). Generalizing, there is some kind of part-whole relation between the main sentence and the subsentence events. Self-evidently, the part is in a way brought about by the whole, being part of it, and they also overlap temporally.

(58)a Toen David Goliath doodde deed hij dat om zijn volk te beschermen
[when David killed Goliath he did so in order to protect his people]
b Toen hij door een beroerte werd getroffen werd ook zijn niet-dominante hersenhelft lamgelegd
[when he was hit by a stroke his non-dominant hemisphere was paralyzed too]
c De moeilijkheden in Londonderry begonnen toen zes jongens (...) op weg waren naar hun katholieke buurt en plotseling door een bende jongelui werden overvallen in het zogenaamde niemandsland tussen school en bogside
[the trouble in Londonderry started when six boys (...) were on their way to their catholic neighbourhood and (they) were suddenly attacked in the so called no man's land between school and bogside]

The subsentence events in these examples are no processes and consequently the perspective/agentivity criterion does not apply. As far as I can see, there is no clear reason to opt for either the purely temporal or the consequential interpretation here; these sentences represent mixed cases.

De westduitse Atlantis werd vorig jaar van Schiphol geweerd toen bleek dat de Westduitse maatschappij op Schiphol leste [310]
[The West German Atlantis was barred last year from Schiphol when the West German company appeared to give lessons around Schiphol]
Toen een gekaapt Spaans vliegtuig vorige week in Zaragoza moest landen om benzine te tanken, werd het toestel onmiddellijk door de politie omsingeld [753]
[when a highjacked airplane from Spain had to land in Zaragoza to take fuel last week, the plane was immediately surrounded by police]

(52)a Toen het regende besloot Nikki thuis te blijven
[When it rained (was raining), Nikki decided to stay at home]
b De driehoofdige leiding van het ballet (...) heeft zich dan ook afgevraagd, toen impressario's na de première met aanbiedingen loskwamen, of het Nationaal Ballet zich met of zonder Noerejev moet presenteren [3095]
[The three-headed direction of the ballet (...) has put to itself the question, when impresario's came with offers after the premiere, whether the National Ballet should present themselves with or without Noerejev]
c Een man werd op heterdaad betrapt toen hij in een winkel in de Bredase binnenstad probeerde geld weg te halen [6457]
[A man was caught red-handed when he attempted to steal money from a shop in the inner city of Breda]

Apart from the information status of the subsentence, for which too little context is given to decide, what factors determine the kind of interpretation? In order to answer this question I would like to refer to Hamann (1991). While discussing *before* and *after* she remarks on the complexity of their definitions: (53) is not good in the face of (54) and (55). In the former the main sentence event is not located with respect to the initial point of the subsentence event and in the latter the main sentence event is located before the end of the subsentence event (cf. Heinåmåki, 1978):

(53)a before S = {t / $t<t_i$ and t_i is the initial (or only) point of the event interval of S}
b after S = {t / $t > t_f$ and t_f is the final (or only) point of the interval of S}

(54)a Marc built a sailboat before he wrote a novel
(55)a After the grass was dry we went outside
b After the horses were running we tried to place a bet

Apparently, in some cases an alternative initial point c.q.. final point is created. In fact the final point selected in (55) seems to be the initial point of the interval representing the subsentence event. Or at least, as Hamann says, an inchoative of the subsentence is evoked. When can a process get an inchoative interpretation? Hamanns answer is: if there is an agentive subject which initiates / causes the action volitionally. Hence the contrast in acceptability between (56a) and (56b)[36].

(56)a When I looked up, the mouse ran
b ?When I looked up the water ran

This seems to be a plausible answer given the examples given in (51) and (52): the latter all contain an acting agent in the main sentence and the former do not. But there is more: the agent in the consequential sequences is implicitly present as observer in the subsentence: because Nikki **sees** the rain, she decides to stay home (52a); the three-headed direction witnesses the impresario's arrivals, that is why they start to wonder (52b) and in (52c) there must be some actor cum observer of the attempt to steal, but he or she remains invisible. Consequently, the possibility of a consequential interpretation for process subsentences with *toen* seems to co-occur with a the result of embedded (hidden) a combination of perspective in the subsentence and (implicit or explicit) agentivity in the main sentence. [37]

---

36 A progressive in the main sentence would make (56b) all right - though temporal
37 The consequential *toen* sentences with states all appear to have some kind of modality in them:

is consequential. In sentence (49b) two terminative events are connected by *toen*; the resulting interpretation is either simultaneity or it is odd (so temporal sequence and consequentiality are connected for *toen* - I will return to this issue). But the same configuration with *nadat* is fine: *nadat* expresses temporal ordering but no consequentiality.

(49)a Toen Nikki Miguel op het feestje tegenkwam, wilde ze meteen naar huis
[when Nikki met Miguel at the party, she wanted to leave immediately]
b ?Toen Nikki Miguel op het feestje tegenkwam, kwam ze nog drie bekenden tegen
[When Nikki met Miguel at the party, she met three other acquaintances (as well)]
c Nadat Nikki Miguel op het feestje tegenkwam, kwam ze nog drie bekenden tegen[34]
[after Nikki met Miguel at the party, she met three other acquaintances (as well)]

(50)a Toen het regende besloot Nikki thuis te blijven
[when it rained (was raining) Nikki decided to stay home]
b ?Nadat het regende besloot Nikki thuis te blijven
[after it rained (was raining) Nikki decided to stay home

The sentences under (50) have a process in the subsentence; a consequential relation is allowed, according to (50a) but a purely temporal one is not (cf. 50b).

It may be concluded by now that there is a use of *toen* in which the sequential ordering of events is paired with a consequentiality relation. Since the temporal relation between the events is quite different from the one in the temporal interpretation of *toen*, they should be presented as two interpretations in their own right. In the representation of the consequentiality interpretation, the following regularities should be taken into account:

- $\Diamond S_m$ must be located after (at least one of) the S_s^{max} points
- a consequentiality relation between E_s and E_m ($\Diamond S_m$ is included in S_s^{max} over HAVE(E_s))
- S_s^{max} over HAVE(E_s) < **s**

The second point needs some additional comments. If a HAVE(E) interval is always added to terminative events, the fact that a terminative subsentence with *toen* can evoke a consequential interpretation is accounted for. [35]

The question first posed at the end of section 3.1 remains: how and when can process *toen* sentences lead to a consequential interpretation. For convenience I will repeat both temporal (35) and consequential (36) process subsentences in (51) and (52)

(51)a Toen John in het park wandelde verloor hij zijn sleutel
[When John walked in the park he lost his key]
b Toen ik zag wat de Fransen zelf in het gebied hadden aangericht (..) zat Rekel al achter de tralies
[when I saw what the French themselves did to the area (...) Rekel was behind bars already]

---

[34] In the section on *nadat* it will become clear that this TC usually selects a Pluperfect - but that is irrelevant here. A Pluperfect in the subsentence does not alter the argument

[35] This extention of terminative events is completely in line with culmination processes and culminations having a consequence state as in Moens (1987)

We are in the position to check whether this is the case: in (22) in section 2.4 all tense configurations were enumerated where a HAVE(E) interpretation was forced in TTT. If our reinterpretation of this interval is correct, than all main sentence events in these configurations should only have a consequential interpretation with respect to the subsentence event. The sentences below confirm this assumption. The combination of *voordat* and *sinds* with two times Pluperfect, did not occur in the corpus - I left them out.

(45) **Toen** Nikki thuiskwam had haar vader een gigantisch feestmaal aangericht
[when Nikki came home her father had prepaired a big feast]

(46) (Bij proeven is gebleken dat het water daar gemiddeld 30.000 kiemen per kubieke mm bevat,) terwijl het aantal kiemen aan de andere kant van de dijk, **voordat** zuidelijk Flevoland was drooggevallen, gemiddeld maar 160 per kubieke milimeter bedroeg.
[(Samples proved that the water contains a means of 30.000 germs per cubic mm,) while the amount of germs on the other side of the dike, before South Flevoland had been drained, was only 160 per cubic mm.]

(47) De smurfen zijn, volgens Hans, ook minder populair geworden **sinds** ze een merk benzine zijn gaan aanprijzen, want als stripfiguur doe je zoiets niet
[the smurfs have grown less popular, according to Hans, since they started a advertising a brand of fuel, because a comic star shouldn't do a thing like that]

(48) Anna was prikkelbaar en snauwerig **totdat** haar man alle klusjes in huis had opgeknapt
[Anna was touchy and grumpy until her husband had done all the odd jobs in the house]

These examples all involve consequentiality: in (45) Nikki comes home to the results of (the preparing of) the feast [33]; in (46) germs are less after and **because** South Flevoland was drained; in (47) the smurfs are less popular after and **because** they started advertising; and in (48) Anna is not touchy and grumpy anymore after and **because** her husband has done the jobs. These sentences constitute no counter-evidence for the result and/or consequential interpretation of the HAVE(E) interval. In the remainder of this paper, these four will appear to be the only TCs among the TCs studied with a consequential interpretation. It is interesting that it is the TTS "syntax" that tells us in the above cases that this consequential interpretation is the only interpretation available. The TTS "syntax" does not give this result for the other (non-consequential) TCs.

At this stage it could be hypothesized that all precedence relations automatically invite consequentiality but this is not true, as can be seen in the following examples. Whereas the *toen* sequence in (49a) must be interpreted consequential, the relation in (49b) but not the one in (49c)

[33] There is another interpretation of this sentence. The preparation of a feast may follow Nikki's arrival home. In a way the tense information is overruled in this interpretation but the TC definition is not violated. The function we should give to this construction, that is temporally somewhat deviant, is to introduce another perspective. This perspective-creating function of Pluperfect is described in Caenepeel (1989) and Caenepeel/Oversteegen (1993), DANDELION R 1.3.1.

....but perhaps Ajax wouldn't have won anyway
...but perhaps Feijenoord was ahead from the beginning]

b Misschien wilde Mireille net weggaan toen Felix binnenkwam
...maar misschien ook wilde Mireille nog niet weggaan en is Felix niet geweest
[Maybe Mireille was just going to leave when Felix came in
...but maybe Mireille was not ready to leave yet and Felix did not show up]

The conclusion must be that *toen* has a presupposition connected to it (only with respect to the truth of the subsentence (consequential *toen*) or also with respect to the temporal location of the subsentence event (temporal *toen*)) - unless it is a narrative *toen.* In terms of Martin (1992), narrative *toen* is presenting - not presuming . Now we have a discourse level instrument for distinguishing all three interpretations of this TC: in these three interpretations the ratio between stated (or: presented) and presupposed (or: presumed) information differs.

3.3 More about *Toen*

3.3.1 Consequential *toen*

A formulation of the TTS contribution of the three interpretations of *toen* will shed light on another factor discriminating between them. The temporal *toen* was defined already. An addition is needed however: in contrast to the English *when*, *toen* can only be combined with a past tense in the subsentence. If we require that all evaluation points for the subsentence event precede the point of speech, no Present or Future tense is allowed.

(44) *toen*: $\exists x \in \Diamond S_m \ \exists y \in S_s^{max} : x=y$ *constraint*: $S_s^{max} < \mathbf{s}$

For the consequential interpretation of *toen* the same constraint holds. But the definition is different: it must locate the $\Diamond S_m$ from the main sentence in the future of (at least one of) the evaluation points of the subsentence event, and specify, moreover, that there is a consequentiality relation between the events. This implies that we should extend TTSs with the help of something similar to the consequent state. In fact, something like this was formulated for TTT already during the discussion of the double perfect assumption (DPA). An interval was introduced immediately following an event interval and this interval was referred to as HAVE(E). At this point I would like to propose to let consequential *toen* locate the main sentence event in this interval and to interpret the interval as representing the results and consequences of the subsentence event.[32]

Of course this reinterpretation has repercussions: if HAVE(E) has to represent consequences of E for a subsentence event introduced by consequential *toen*, then it has to do so in any context.

[32] Apart from the connection to the double Perfect assumption, this proposal is very similar to proposals made in Moens, 1987; Moens & Steedman, 1986; Caenepeel, 1989 and Vet, 1992.

Summarizing, we now have three interpretations of *toen*: purely temporal, consequential and narrative *toen*. The first two can be distinguished with the help of the broader context, as temporal *toen* presupposes knowledge with respect to the temporal location of the evaluation point of the subsentence event, and consequential *toen* does not. The temporal interpretation will only be informative if the presupposition with respect to the temporal location of S_m is satisfied. But even if the temporal interpretation is allowed, the consequential interpretation is not excluded (NB: it has less requirements). If the semantic content of the propositions gives risen to it, a consequential relation will be concluded. In some cases, as we saw in (22) section 2.4, a consequential interpretation is forced by a combination of tenses.

Since narrative *toen* introduces a new event, it is not demarcated yet from the consequential interpretation. To distinguish them, the three interpretations of *toen* will be scanned on another kind of information status property. The numbers (41)/(43) contain tests for (truth conditional) presuppositional behavior. The presupposition concerns the entire proposition expressed in the subsentence[30]. Both a temporal *toen* sentence and a consequential *toen* sentence appear to have a presupposed content if subjected to well known presupposition tests: neither the negation in (41) nor the modifier in (42) pertain to the subsentence, as is demonstrated by the possibilities for continuations.

(41) Het is niet zo dat het regende toen we gingen wandelen [31]
[It is not the case that it was raining when we went for a walk]
.....het was droog
....het was **nadat** we op pad waren gegaan
*....we gingen niet wandelen
[....it was dry]
[....it was **after** we had left]
[.....we didn't go at all]

(42) Misschien dansten de muizen op tafel toen de kat van huis was
....maar misschien sliepen ze veel
*...maar misschien is de kat thuisgebleven
[Perhaps the mice were dancing on the table when the cat was gone
...but perhaps they were sleeping a lot
...but perhaps the cat stayed at home]

(43)a Misschien zou Ajax winnaar van het toernooi worden toen Feijenoord een onverwacht doelpunt maakte.
....maar misschien zou Ajax sowieso niet gewonnen hebben
....maar misschien stond Feijenoord van meet af voor
[Perhaps Ajax was to be be the winner of the game when Feijenoord scored unexpectedly

[30] This type of presuppositions is merely mentioned in Martin (1992). I would expect them to form a subcategory of presumptions - though they are not necessarily phoric. An important insight in the behaviour of presuppositions is that they may be accomodated.

[31] With respect to a not primarily temporal *toen* sentence in preposed position, intuitions are not very trustworthy. I am not sure if the presupposition still holds in that case. If not, a difference between preposed and postposed *toen* sentences in terms of their expressing coherence relations would be expected.

from the preceding discourse nor with the help of world knowledge, a temporal interpretation of the TC becomes odd:

(40)a Mireille had een afspraak bij de kapper. Toen hij haar haar waste schoten haar de tranen in de ogen. Het water was te heet.
[Mireille had an appointment at the hairdressers. When he was washing her hair tears came to her eyes. The water was too hot]
b Mireille had een afspraak bij de kapper. Toen hij haar vertelde dat hij naar Marokko ging schoten haar de tranen in de ogen. Het water waarmee hij haar haar waste was te heet.
[Mireille had an appointment at the hairdressers. When he was telling/told her that he was going to Morocco tears came to her eyes. The water he was washing her hair with was too hot]

The sentence (40a) can easily be interpreted temporally. In (40b) on the other hand there must be a relation between the hairdressers news about going to Morocco and the tears. *Some other coherence relation must be found if a purely temporal relation cannot be concluded and a purely temporal relation cannot be concluded if there is no information inferable about the whereabouts of the* s^{max} *point(s) of the temporal subsentence.*[27]

The last type, the narrative *toen* sentence, is a special case. In terms of givenness it deviates completely from the other types of *toen* sentences: it gives **new** information, that is not expected. "The main clause gives the setting for the *when* clause event, rather than the other way around" Sandström (1990) remarks about the English *when*, that appears to share this property with *toen*.[28,29] Syntactically this type is also different from the others. Whereas the other three types do no show a significant interaction between syntactic position of the subsentence (preposed or postposed) and other sentential properties (tense, event type, type of relation, temporal or other, etc.), the narrative *toen* sentence does. Compare (39h5) wit (39h4) above.

(39)h5 Toen Feijenoord een onverwacht doelpunt maakte zou Ajax zonder enige twijfel winnaar van het toernooi worden
[When Feijenoord scored unexpectedly Ajax was to be the winner of the game beyond the shadow of a doubt]

Sentence (39h5) is hard to interpret; it implies that Feijenoords' scoring would cause Ajax to win. Obviously, the relation changes along with the order. In fact the narrative *toen* is not entirely temporal: as can be seen from the examples the subsentence expresses an unexpected event that has an effect on the main sentence event. So apart from the temporal sequence relation, narrative *toen* carries the implication that the subsentence event causes the main sentence event (usually a state, both in English and in Dutch) to stop abruptly.

27 This regularity is not meant as the discription of a procedure - as will become clear.

28 Sandström (1990) notices a strong connection between (first person) perspective and this use of *when*. This connection was not found - certainly not as a restriction - for Dutch (see examples (39d)).

29 The extraordinary character of this use of the TC causes Martin to doubt if it isn't paratactic rather than hypotactic (Martin, 1992, p. 190).

Now I 've been around for a couple of years (...). When I was ten years of age, I was already to be found at the building sites of my father in my holidays, and I know the workers as if I had created them myself]

e3 Het lijkt ons duidelijk dat hier sprake is van brandstichting, vertelde gistermorgen een politiewoordvoerder over de brand. (...) Raadselachtig is, dat toen de brandweer ter plaatse kwam, zowel uit de linkerramen als uit de rechterramen vuur kwam. [239]

[It seems obvious to us that this is a case of arson, a spokesman of the police said about the fire yesterday morning. (...) Puzzling is the fact that, when the firebrigade arrived, both from the left-hand and from the right-hand windows fire was emanating]

f3 De rekeningen van de leveranciers werden echter met ongedekte cheques betaald. Toen de leveranciers de politie inlichtten, waren de bedriegers als verdwenen [1017]

[The suppliers' bills had been paid with unwarranted cheques.
When the suppliers informed the police, the offenders had already disappeared]

g4 Het wordt nu Barbers taak de erfenis te bestuderen die de socialisten Heath en zijn team hebben nagelaten. Mac Loyd was hierjuist mee begonnen toen hij maandagavond overleed [572]

[It will be Barbers duty to study the legacy left by the socialists Heath and his team. Mac Loyd had just started to do so when he died on Monday evening]

h4 Ajax zou zonder enige twijfel winnaar van het toernooi worden toen Feijenoord een onverwacht doelpunt maakte.

[Ajax was going to be the winner of the game beyond the shadow of a doubt when Feijenoord scored unexpectedly]

The fourth type stands apart; I will first discuss the other three types. The first type represents the most straightforward way for information to be given: if the *toen* sentence refers to an event that has been introduced already, the relevant s^{max} point is available too. Note, that the repetition of information can be remarkingly strong, as in (39b1). In English it may even be verbatim - in Dutch there is always a slight difference in tense use.

In the second type there is an explicit time indicator in the *toen* sentence itself. This indicator makes the location of s^{max} possible.

The third type is not ad hoc as it may seem. A consequentiality relation (or set of relations) was already needed earlier in the analysis of TCs. This relation is also needed, by the way, for the interpretation of temporal sequences as established by tense (Caenepeel & Moens, 1993, Lascarides & Asher, 1991; Oversteegen, 1992; Caenepeel & Sandström, 1992). This same relation is required for inferring the location of s^{max} for the subsentence in these cases. For example in (39f3) the suppliers get unwarranted checks, which leads to their discovery of the unwarrantedness, which in turn leads to their informing the police.

In all these cases knowledge about the temporal location of the s^{max} point(s) of the temporal subsentence is presupposed (because it is inferable) or given explicitly. Thus the temporal subsentence can truthfully be claimed to create a temporal domain for the main sentence event: in all these cases a purely temporal interpretation of the relation denoted by *toen* is possible indeed. If the event expressed in the subsentence is not expected, i.e. if no knowledge about it can be inferred

breach between what is described in an initial temporal subsentence and what is described in the preceding sentence ?[23] If a temporal subsentence has no "automatic" connection with the immediate previous discourse then how can it temporally locate its main sentence event? In order to get an answer to this question consider (37) below.

(37) Het was een rustige dag.
[it was a quite day]
a Toen de drie mannen binnenkwamen stond de barkeeper de tap te vullen
[when the three men entered, the barkeeper was filling up the tap]
b ?Toen er drie mannen binnenkwamen stond de barkeeper de tap te vullen
[when three men entered the barkeeper was filling up the tap]

The continuation (a) is unproblematic. The definiteness of the subject NP indicates that the preceding context contains information about these (topical) men (cf. DANDELION report 1.4.1). But the continuation in (b), containing a new event witness the indefiniteness of the NP, is odd. In general, the corpus was found to contain four different subtypes of temporal *toen*. They were different with respect to the way in which knowledge was established about the location of the event in the subsentence - or to be precise: the location of the s^{max} of the subsentence. In all but one of these types, some kind of knowledge with respect to the temporal location of the content of the subsentence was presupposed.[24] Those types are given in (38) and examples are given in (39).

(38) 1• information inferable from the preceding context
2• information explicit in the temporal subsentence itself [25]
3• information inferable from real world knowledge
4• "narrative" **toen** : new information [26]

(39)a1 Bea ging een week naar Biarritz uit te rusten. Toen ze haar huis verliet voelde ze zich al ontspannen
[Bea left for Biaritz for a week in order to rest. When she left home she already felt relaxed]
b1 Barbara is naar Portugal gegaan in de zomervakantie. Toen ze naar Portugal ging nam ze geen camera mee
[Barbara went to Portugal for the summer holidays. When she went to Portugal she didn't take a camera]

c2 Botermaker M.L. Hoving tekende nog op ramen toen hij al lang volwassen was
Churner M.L. Hoving still drew on windows when he had been adult a long time already
d2 Nu loop ik al een jaartje of wat mee (....). Toen ik tien jaar was, zat ik al in mijn vakanties op de bouwwerken van mijn vader, en ik ken de bouwvakarbeiders (...) of ik ze zelf heb gemaakt.

---

[23] Cf. : a. People began to leave the room. The room was empty. The janitors came in
b. People began to leave. When the room was empty, the janitors came in (Partee, 1986, p. 262)

[24] Martin (1992) speaks in such cases of "presuming" instead of "presupposing" (Martin, 1992, p.101). The relation between theses two notions is not explained in the SFG literature.

[25] The before mentioned "clock-events" as in Dahl (1990); Sandström (1990) would fall under this heading.

[26] Couper-Kuhlen (1988, 1989)

TC is interpreted as purely temporal or as consequential, in Dutch both cases occur, as can be seen in (35) and (36) respectively.[21]

(35)a Toen John in het park wandelde verloor hij zijn sleutel
[When John walked in the park he lost his key]
b Toen ik zag wat de Fransen zelf in het gebied hadden aangericht (..) zat Rekel al achter de tralies [NRC]
[when I saw what the French themselves did to the area (...) Rekel was behind bars already]

(36)a Toen het regende bleef Nikki thuis
[When it rained (was raining), Nikki stayed at home]
b De driehoofdige leiding van het ballet (...) heeft zich dan ook afgevraagd, toen impressario's na de première met aanbiedingen loskwamen, of het Nationaal Ballet zich met of zonder Noerejev moet presenteren [3095]
[The three-headed direction of the ballet (...) has put to itself the question, when impresario's came with offers after the premiere, whether the National Ballet should present themselves with or without Noerejev]
c Een man werd op heterdaad betrapt toen hij in een winkel in de Bredase binnenstad probeerde geld weg te halen [6457]
[A man was caught red-handed when he attempted to steal money from a shop in the inner city of Breda]

Evidently, for Dutch one cannot restrict the use of *toen* to event types that have a consequential state in Moens' taxonomy. Or if one does, a linguistically acceptable description of the coercion involved in such cases will be required. Before a proposal is made, one of the indicators that help to decide which interpretation of *toen* should be chosen will be tracked down.

3.2 Information status of a *toen*-clause

As was said before, the choice for an interpretation of a TC depends on several discourse factors. Real world knowledge is the hardest to describe in a systematic way and to incorporate in an interpretation system. Therefore it seems useful to try to find as many explanations as possible outside the realm of real world knowledge.[22]

It was claimed before, here and in many other studies, that there is a parallel between temporal frame adverbials and temporal subsentences: both are supposed to create a temporal domain for the (main) sentence. In terms of TTT: both specify the range of s_m points. But how is this claim to be reconciled with the observation by Hinrichs (1981) and Partee (1984) that there is a temporal

21 In these cases English would use a Progressive and followed by a Progressive *when* can express a purely temporal relation.

22 There are interesting studies though, like Lascarides & Asher (1992; 1993), Lascarides & Oberlander (1991), attempting to supplement modern theory with a defeasible reasoning system incorporating real world knowledge.

The second question concerns the relation between the temporal and consequential reading of *when.* Moens (1986) and Moens & Steedman (1986) are conscious of the fact that this TC may also express a purely temporal relation, as (30) makes clear. The main sentence events are all considered to be states by the authors. The examples (31), taken from Sandström (1990), demonstrate that it is not only states that can be related to a *when* sentence event purely temporally.[19] Sentence (32) demonstrates that *when* can be really ambiguous with respect to the relation expressed.[20]

(30)	When they built that bridge	I still was a young lad / my grandfather had been dead for several years / my aunt was having an affair with the milkman
(31)a	When I reached home, it started to rain	
b	When the train pulled out of the station, the sun broke through the clouds	
c	When the singer came to the second verse, a shot rang out	
(32)	When Henry broke that vase, Sue was in a good mood	

These sentences may suffice to make my point: there are (at least) two interpretations of *when*, they require different representations. Choosing one of the interpretations for the TC is partly a matter of real world knowledge. But it cannot be entirely determined by world knowledge: in that case there would be something viciously circular about the ambiguity. One would opt for the consequential reading if and only if one would know that the TC carries this interpretation in this context. I will try to find additional indicators for either of the readings.

The third question that poses itself in the context of this paper is: how do the English *when* and the Dutch *toen* relate to each other? Does the English story fit the Dutch data? Let us consider subsentence events other than terminative events (or culmination processes). Apparently, in English states are allowed in this position (cf. (33a)) - but processes are not (cf. (33b)) which is in accordance with (29). For states an additional arrow is proposed in the network: (34) gives the location of the arrow (cf. Sandström, 1990, p.45).

(33)a When we were outside the Laundromat we turned, both at once so that we almost collided

b ?When John walked in the park he lost his key

(34) LEXICAL STATE ------> CONSEQUENT STATE

The Dutch facts appear to deviate from the English: sentence (35a) is the pendant of (33b), but it is acceptable. Whereas in English it is impossible to have a process in the subsentence, whether the

[19] In the words of Dahl (1990) and Sandström(1990), these examples have "clock events" in the subsentence. These are "events used for measuring tme, whether they be conventional as the events of our usual clocks ("when it was nearly half past eight..") or natural ("when the sun set..") (Sandström, 1990, p.48). Clock events need not be consequentially related to the main sentence event. Also "scheduled events and physical movements along specified routes" are counted as clock events - but to me they seem to be typical for the world creating nature of narratives.

[20] Note that the explanation for the temporal interpretation of this example cannot be that it contains a clock event. The expanation offered here will have to cover this case as well.

Now *when* may connect the main sentence event to a subpart of the subsentence event. This may be the preparatory process of the subsentence nucleus (as in (28a)) or it may be its consequent state (as in (28b)).

(28) When they built the 49th Street Bridge
a. they used the best materials
b. they solved most of their traffic problems

The consequential relation between the building of the bridge and the solution of traffic problems is reflected by the location of (the reference point of) the latter event in the consequent state of the former event. In (28a) the main sentence event is not located in the consequent state of the subsentence event: there is no consequential relation.

In fact (27) is not a static taxonomy but a network: certain paths are defined along which a sentential expression may jump from the one event type cell to the other.[17] Such a jump may be brought about by a TC: the following rule for *when* states that any event that combines with this TC turns into a culmination state. This indicates that the primary meaning of *when* is supposed to consist in consequentiality. Even in sentences like (28a), where the consequent state of the subsentence event has no obvious function, it is required by the TC. Moens' rule is given in (29a). Because *when* does not seem to occur in combinations with events other than culmination processes, Sandström (1990) argues in favor of a revision of the TC as a function: a constraint should be preferred over an identity function (see(29b)).

(29)a <u>when</u> : EVENT ------> CULMINATION PROCESS
b <u>when</u> [+cons]

The consequent state seems an important acquisition to me: it enables us to connect the realm of representation of temporality with the realm of representation of consequentiality (and, sometimes, causality). Some questions are generated by the treatment of TCs in Moens (1987), Moens & Steedman (1986) and Sandström (1990).[18] The first question is intended in a model independent way. How should we envisage the relation between an event and its consequent state ? The latter cannot be *part* of the former. If it were we would get a kind of contradiction: during some event e, e's having occurred would be true. Indeed Moens & Steedman (1986) call the culmination the "core event". Consequently a consequent state should be interpreted as the period following an event.

[17] If such a jump is not triggered by an expression or form with a trigger function (like the progressive or certain temporal adverbials), it is called coercion. For fear of a too strong theory we should minimize the amount of coercions. I will come back to one type and try to find linguistic backing for it.

[18] Some of the questions also pertain to Pustejovski (1991)

overlap. The former denotes a temporal precedence relation and the latter has no temporal meaning whatsoever. This may be obvious from the fact that a sentence with a concessive *terwijl* has no constraints with respect to its tense combination: events across time can be contrasted with each other with the help of a concessive relation. Consequently, temporal meaning is lost.

Evidently, the answer König & Traugott give to the first question, that both readings have the entire temporal reading in common, does not agree with the Dutch facts. And even if, diachronically speaking, the consequential interpretation of *toen* has developed from a simple precedence relation, synchronically speaking we have two distinct interpretations. This opinion is strengthened by an observation based on the corpus: all occurrences of *toen* that express temporal precedence also express consequentiality.

Another view on the relation between a temporal and a not primarily temporal reading of a TC can be found in Marc Moens (1987). The quintessence of his view is a richer event ontology - that is: richer in terms of event structures. There is a blueprint for a complete event: a nucleus. The structure of the nucleus is given in (26). Each event type can be characterized in terms of the part of the nucleus it describes. Moens' taxonomy of event types is given in (27). The event type culmination process describes the entire nucleus; the event type culmination describes culmination and consequent state; the event type process describes the preparatory process leading up to the nucleus but not containing it; points only describe the nucleus. And finally, consequent states describe consequent states.[16]

(26) NUCLEUS:

preparatory process consequent state

----------------------------|----------------------------

culmination

(27)

	EVENTS		STATES
	atomic	extended	
+cons	**culmination**	**culmination process**	**consequent state**
-cons	**point**	**process**	**progressive state** **lexical state**

[16] Roughly, processes correspond to Vendlers activities, culmination processes to his accomplishments, culminations to his achievements and states to his states. Points form a new category.

The English translation of *toen*, **when** has an atemporal interpretation. In sentences like *Wolves can read newspapers when they are intelligent* (Carlson, 1979, p. 50), the when-sentence determines a subset of the set of wolves for which the main sentence predicate is said to hold (see Carlson, 1979; Declerck, 1988; Farkas & Sugioka, 1983). In general, many TCs in many languages have a-temporal or not primarily temporal interpretations. The examples in (23a) are taken from König & Traugott (1988), the Dutch examples (23b) are added by me.

(23)a English: since, consequently, hence, while, still, yet
German: infolgedessen, daher, zugleich, indes(sen), dennoch
Swedish: eftersom, emedan
French:, puisque, cependant, encore que
(23)b Dutch: toen, terwijl, voordat

Two questions suggest themselves in relation to these uses of TCs: 1. what do the temporal and the not primarily temporal readings of one TC have in common ? 2. what (context)factors decide in favor of one interpretation or the other ?

An answer was given to the first question by König & Traugott (1988). They explained the secondary meanings as conventionalized conversational implicatures. For instance, there would be a shift from sequence to causation and another from co-occurrence to concessivity.[14] Both English *while* and Dutch *terwijl* have a concessive interpretation. Both English *when* and Dutch *toen* have an interpretation of temporal precedence combined with consequentiality.[15] Examples are given below.

(24)a When I last had the flu, my doctor gave me anthropax (Moens 1987, p83)
b Bill was in Venezuela last year, while we are going there next year (Heinåmåki, 1978, p.35)
(25)a Koeperman stond geïrriteerd op toen een handtekeningenverzamelaar hem om zijn handtekening vroeg
[Koeperman got up irritably when an autograph hunter asked for his autograph]
b Terwijl Anne jou gisteren de keuken heeft helpen opruimen weiger je haar nu te helpen
[while Anne helped you in cleaning the kitchen yesterday, you refuse to help her now]

To the opinion of König & Traugott the shift cannot imply a loss of meaning. The sentences in (25) demonstrate that it may in Dutch: neither *toen* in (25a) nor *terwijl* in (25b) denotes temporal

---

[14] Examples of these shifts given by the autors are *since* and *while* respectively.

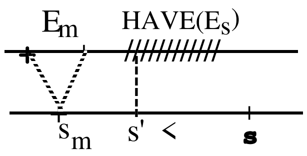
[15] Causation would be too strong a notion. The notion consequentiality was introduced in the way intended here by Moens (1987). A definition of the set of relations that are called consequential as taken from Caenepeel & Sandström (1992) looks as follows:

An event e' is consequential upon an event e if:

i. **e** causes or takes part in causing **e'**
ii. **e** creates or takes part in creating the appropriate conditions for **e'** to take place
iii. **e** evokes or is part of what evokes **e'** as a response; or
iv. one of the relations (i)-(iii) holds between **e'** and **e''** together (and possibly more events) and another event **e** (or several other events).

Sentence (21) does not express a relation between two events, it expresses a relation between a state (of Peter having taken the cake) and an event (of Nikki's eating a piece of cake). Note that it is odd to add a typical event modifier like *onopgemerkt* [unnoticed] to the subsentence. The TTS contribution of the Pluperfect should be like (8b), the state interpretation, and not like (5c); the TTS for (21) is given in (21c).

(21c)



The subsentence event itself has to precede the HAVE(E_s) interval immediately; therefore it will by implication also follow the main sentence event.[12]

In general, a TTS that holds no information about the relation between the event intervals while the corresponding sentence does, is not a correct representation. Each of the definitions in (19) were supplied with their corresponding TTS in sentences with all kinds of tense and event type combinations. A detailed report of the TTSs of all these combinations will not be given here, but he reader will be able to reconstruct them. In some cases a well-formed and correct TTS could not be obtained on the most straightforward interpretation of the Perfect, (5a), but it could on the state interpretation (8a). Something similar goes for the Pluperfect: sometimes only the state interpretation (8b) could be used to form a well-formed and correct TTS. The configurations which can only obtain a TTS that is a correct representation if the state reading of the Perfect or Pluperfect is selected are given in (22). [13]

(22)a	PPerf	**toen**	sP
b	sP	**voordat**	PPerf
c	PPerf	**voordat**	PPerf
f	Perf	**sinds**	Perf
g	PPerf	**sinds**	PPerf
h	sP	**totdat**	PPerf

At this stage the configurations with a state interpretation are merely enumerated; after the HAVE(E) interval has been given a special interpretation in Section 3, I will return to these cases.

3 *Toen* [when]

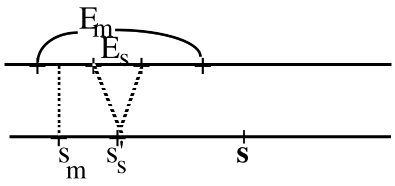
3.1 *When* and *toen*

[12] Supposedly, immediate precedence should be excluded in the definition of *voordat* [before]. In this case it would lead to overlap of the two events

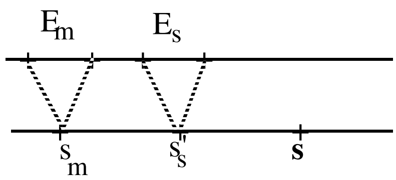
[13] It may be remarked that *sinds* is the only TC that can have a present Perfect in the subsentence. In the section on *sinds* I will return to this property.

b Voordat Nikki binnenkwam at Peter haar taartje op
[before Nikki entered Peter ate her piece of cake]

(20a)



(20b)



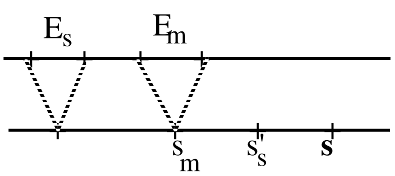
Whereas the event intervals are strictly ordered with respect to each other in (20b), it is not determinable in the TTS in (20a) whether the main sentence event ends before the start of the subsentence event or whether it continues. This reflects the vagueness of sentence (20a) with respect to ordering.

In the following sections I will come back to these definitions one by one. As they are, they are incapable of explaining the range of interpretations of each TC. In order to cover the observations in section 1, they need additional constraints and a description of broader context factors influencing the felicity or their precise interpretation. The definitions in (19) account for local interactions: with tense and event type. As was apparent from the introduction, TCs display an interaction with a broader context.

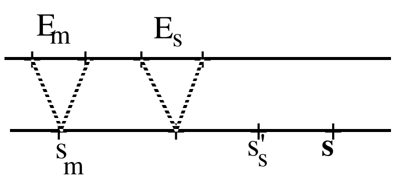
One issue deserves some attention first, however. In general the definitions given in (19) engender the correct local interactions. But there is one systematic flaw that needs repair. Consider the sentence (21), that is interpreted as expressing a precedence ordering between Nikki's eating (first) and Peters steeling. The corresponding TTSs are given in (21).

(21) Voordat Peter haar taartje had gestolen at Nikki er al een
[before Peter had taken her piece of cake, Nikki already had one]

(21a)



(21b)



The definition in (19) for *voordat* [before] defines a precedence relation between s_m and s'_s: at least one evaluation point from the main sentence event must precede all evaluation points from the subsentence event. This relation is the same in (21a) and (21b), so they both obey the instruction. But the relation between the E-intervals is different in both TTSs whereas the corresponding sentence harbors no vagueness.

The solution to this problem is to be found in a phenomenon that has been introduced already in another context: the twofold interpretation of the Perfect in Dutch (the double Perfect assumption).

The processes used in the main sentence of (15a) and in the subsentence of (15b) contribute a partitioned interval and a set of (potential) evaluation points to the TTSs. The terminative events used in the subsentence in (15a) and in the main sentence in (15b) merely contribute a singleton set of (potential) evaluation points. If in (18a) this singular S-point is equated to a member of the set of potential evaluation points coming from the main sentence, the main sentence event is conceived as including the subsentence event. In (18b) it is the other way around.[11] So TTT succeeds in obtaining TC interpretations in dependence of the event types used in a complex sentence, while the TC definition itself does not need to mention event type.

In (19) a first approximation is given of each of the six TCs that will be described in this paper. Behind the formula, in brackets its common sense translation is given.

(19)

toen : $\$x\mathbf{e}\ \Diamond S_m\ \$y\mathbf{e}\ S_s^{max} : x=y$ *(both events share at least one evaluation point)*

terwijl : $"x\mathbf{e}\ \Diamond S_m\ \$y\mathbf{e}\ S_s^{max} : x=y$ *(the evaluation points for the main sentence events are a subset of the evaluation points for the subsentence event)*

voordat: $\$x\mathbf{e}\ \Diamond S_m\ "y\mathbf{e}\ S_s^{max} : x< y$ *(at least one evaluation point for the main sentence event precedes all evaluation points for the subsentence event)*

nadat: $"x\mathbf{e}\ \Diamond S_m\ "y\mathbf{e}\ S_s^{max} : y< x$ *(all evaluation points for the main sentence event follow those for the subsentence event)*

totdat: $"x\mathbf{e}\ S\ "y\mathbf{e}\ S_s^{max} : x<y \rightarrow x\ \mathbf{e}\ \Diamond S_m$ *(all the S-points which precede all evaluation points for the subsentence event are evaluation points for the main sentence event)*

sinds: $\$x\mathbf{e}\ S_s^{max}\ "y\mathbf{e}S: x< y \rightarrow y\ \mathbf{e}\ \Diamond S_m$ *(all the S-points which follow some evaluation point for the subsentence event are evaluation points for the main sentence event)*

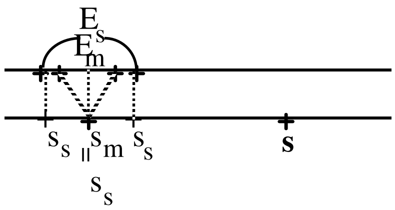
Illustration of the way the definitions in (19) explain the facts is called for. If one takes the definition for *voordat* [before], it allows one to construct the TS under (20a) for sentence (20a) and the TTS under (20b) for the sentence (20b).

(20)a Voordat Nikki binnenkwam regende het
[before Nikki entered it rained (was raining)]

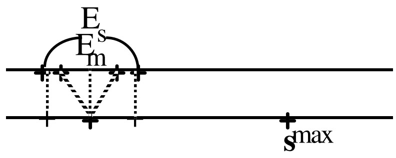
[11] In order to check whether definions of TCs in terms of S-points instead of event intervals themselves isn't too weak, Oversteegen (1989) applied Allen's transitivity relations (Allen, 1981). In TTT, the possible relations between E_m and S_m are determined by the event type of E_m(injection and convergence lead to different sets of possible relations). The relation between S_m and S_s^{max} is given by the TC and the possible relations between S_s^{max} and E_s are determined by the event type of E_s. By applying transitivity twice it is possible to compute the possible E-interval relations for each TC defined in TTT for each event type combination.

try is ruled out. As a second try, we have a TC define a relation between s^{max} points contributed by the main sentence and those contributed by the subsentence. The latter option is given by (17b): in both main sentence and subsentence, their tenses being Present Perfects, the point of speech itself is s^{max}. Again the resulting TTS is well-formed, as it should not be.

(17a)



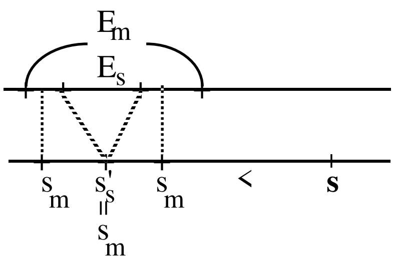
(17b)



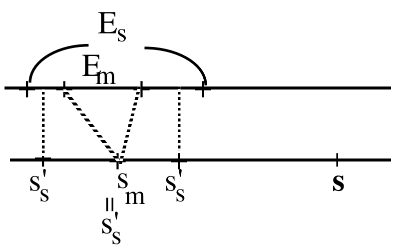
The conclusion must be that the choice of S-points related by a TC was wrong, both in (17a) and in (17b). But there are convincing arguments in favor of a third option. Most theories on TCs strive to treat temporal frame adverbials and temporal subsentences on a par (cf. Hinrichs, 1981, 1986; Moens, 1987; Sandström, 1990; Hamann, 1991). Their syntactic function is very much alike and semantically, they seem to have the same function too: they create a temporal domain for the event expressed in the main sentence. This implies that the s_m points from the main sentence should be located with respect to the temporal subsentence. And the relevant S-points from the temporal subsentence are the evaluation points, which are the strongest (deictic) indices since they are defined with respect to the point of speech. In short, I claim that a TC defines a relation between the set of s_m points (from the main sentence) and the set of s_s^{max} points (from the subsentence). Treating TCs this way, the parallel between temporal adverbs and temporal subsentences is preserved: both specify the set of s_m points for the matrix sentence.

Supposing that a TC gives a relation between s_m points and s_s^{max} points, we may generalize over sentences containing *toen* [when], like (15a) and (15b), by demanding that those two sets overlap, i.e. that at least one s_m point can be found that is a s_s^{max} point as well. This would be the independent contribution of *toen* to a TTS. Still, we would want to get different interpretations for *toen* in (15a) and (15b) because the TC interacts differently with the event types used. The TTSs (18a) and (18b) for (15a) and (15b) respectively, demonstrate how this is accomplished.

(18a)



(18b)



obvious that the precise interpretation of a TC may depend on the combination of event types in main and subsentence.

(14) a *Toen Laura ziek is, gaat/ging Sander niet naar school
[when Laura is ill is, Sander goes/went not to school]
b Toen Laura ziek was, ging Sander niet naar school
[when Laura was ill, went Sander not to school]
c *Toen Sander naar school zal gaan, zal het mooi weer zijn
[when Sander to school will go, will the weather be nice]
d *Nadat Sander naar school zal gaan, wordt het stil in huis
[after Sander will go to school, it will be quite in the house]
e Nadat Sander naar school ging, werd het stil in huis
[after Sander went to school, it became quite in the house]
(15)a Toen Stephany haar laatste brief schreef, trok Sander door Italië
[when Stephany wrote her last letter, Sander was touring through Italy]
b Toen Sander door Italië trok, schreef Stephany haar laatste brief
[when Sander was touring through Italy, Stephany wrote her last letter]

In (15a) the subsentence event E_s is temporally included in the main sentence event E_m. In (15b), on the other hand, the subsentence event E_s includes the main sentence event E_m. Consequently *toen* [when] cannot be defined as an inclusion relation between event intervals: the direction of the relation depends on the event types in both sentences.

In TTT a TC does not define a relation between event intervals; it defines a relation between (potential) evaluation points on the S-track. These points are connected both to the tense contribution and to the event type contribution to a TTS. Therefore the advantage claimed for this choice of relata concerns the desired interaction with tense and event type. This claim will be defended in this section.

The sentences under (16) give a strong indication with respect to the S-points that should function as relata in the definition of a TC. The majority of the Dutch TCs cannot be combined felicitously with a Present Perfect.

(16)a *Toen het heeft geregend heb ik een paraplu meegenomen
[when it has rained, I have taken along an umbrella]
b *Voordat het heeft geregend verwachtte ik zonnig weer
[before it has rained I expected sunny weather]
c *Terwijl ik je gemist heb vermaakte jij je
[while I have missed you, you enjoyed yourself]

The argument based on the observation in (16) runs as follows. A well-formed TTS constructed for (16a), for example, should not come about given the unacceptability of the sentence. As a first try, we have a TC define a relation between the s_m points contributed by the main sentence and the s_s points contributed by the subsentence. Assuming that *toen* [when] would define some kind of temporal overlap between s_i points, as seems intuitively correct, this option is given by (17a). One of the injection images of the subsentence event (a process) equals the convergence image of the main sentence event (a terminative). There appears to be no problem in the construction of this TTS: there is overlap between the relevant points. But the TTS should not be well-formed! So this first

There is a difference between the rows A and C on the one hand and the rows B and D on the other hand. By force of the definition of the Perfect tense, the right-hand bound of the event interval in B and D precedes the E-track point that is linked to **s** by a bridge. The bridge manifests simultaneity of its starting point and end point and as a result the event precedes the speech point entirely. Not so for A or C; here the s' points are defined as preceding **s**. Since no bridge is formed from **s** in the case of a simple Past, no relation between the right-hand bound of the event interval and **s** is defined. The event interval does not have to precede the point of speech. Indeed, in Dutch it is not always clear from a sentence in simple Past whether the event has reached its end yet.[10]

The distinctions between event types discussed so far only concern their evaluation potential. There is reason, however, to assume a richer structure for some event types. For example Moens, (1987), Moens & Steedman (1988), Webber (1988) and Pustejosvski (1991) introduce events consisting of different phases. At a later stage in this paper I will discuss their proposals and I will incorporate part of it: the part that is lacking in TTSs so far but that non the less is required for the explanation of the interpretation of Dutch temporal connectives - as will be argued in the next sections.

At this stage the potential evaluation points in the Perfect TTSs may seem superfluous: they are not converted, so what is their status? They do have a function, however. We already saw that they are "localizers" to which temporal adverbials can adhere (cf. (6b)). The question how temporal connectives fit in the framework sketched so far will be answered in the next section.

2.4 Temporal Connectives in TTT

The independent contribution principle forces us to find a unique core meaning for each temporal connective (henceforth TC). This is not easily accomplished. In so far as the literature on temporal meaning focuses on TCs, the definitions given for them are usually rather complex and of a conditional form. TCs are defined as relations between events or event intervals. Tense and/or event type are mentioned in those definitions and the interpretation of the TC is made dependent on them (Hornstein, 1977; Heinåmåki, 1978; Hinrichs, 1981; Hamann, 1991).

There is indeed an interaction between TCs and tense choice and event type (among others). In the examples (14) it is demonstrated that TCs are selective with respect to tense. In (15) it becomes

---

[10] This difference between A and C versus B and D in combination with the persistence property predicts the following implications:

(i)	a	process/sP	**=>**	process/Perf
	b	process/Perf	**=>**	process/sP
	c	term.event/sP	**„>**	term.event/Perf
	d	term.event/Perf	**=>**	term.event/sP

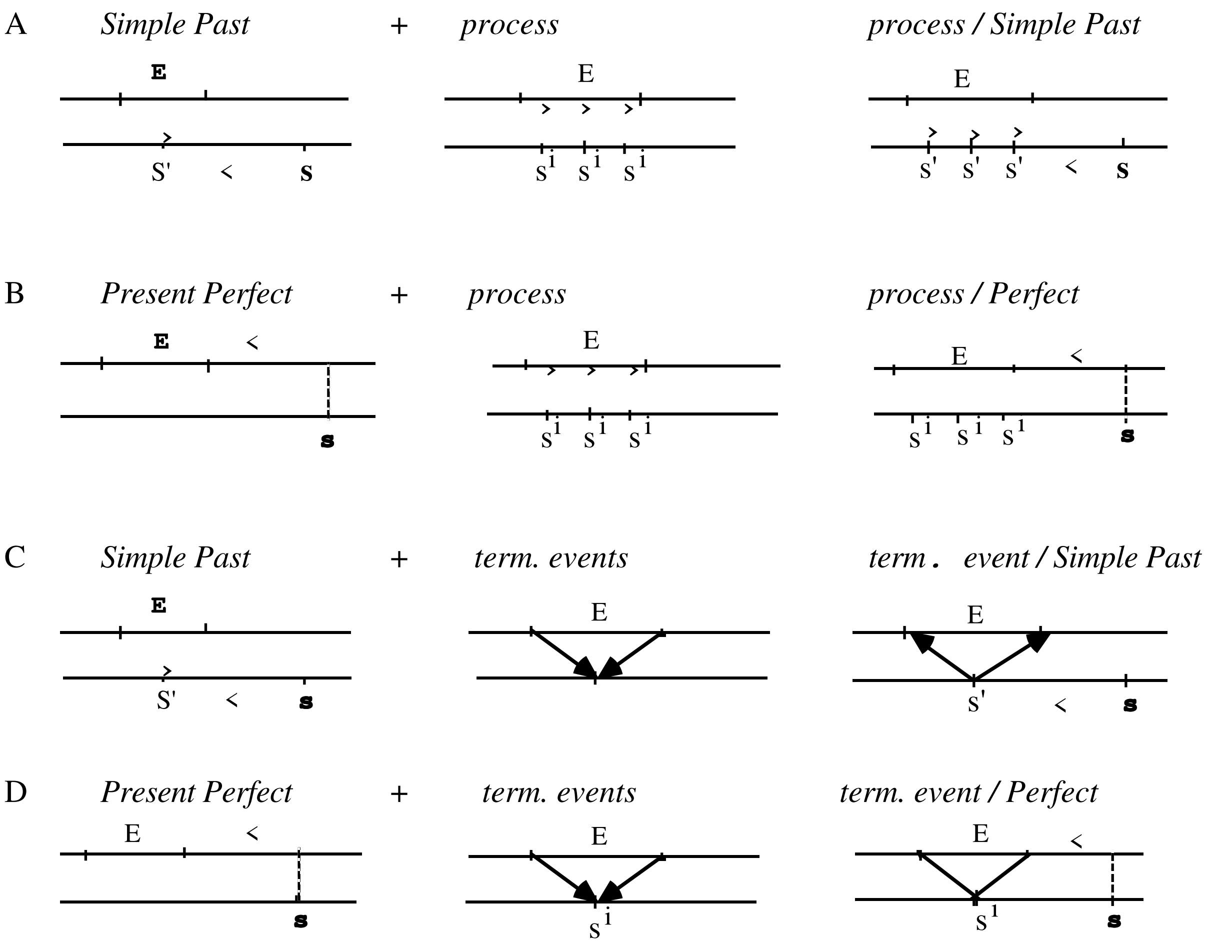
They appear to be correct for Dutch: ad c.: Laura at een broodje kaas **„>** Laura heeft een broodje kaas gegeten
[Laura ate a cheese sandwich Laura has eaten a cheese sandwich]

ad d. : Laura heeft een broodje kaas gegeten **=>** Laura at een broodje kaas
[Laura ate a cheese sandwich Laura has eaten a cheese sandwich]

The intervals representing events on the one hand and processes and states on the other hand, are the input for functions with points s_i as images. The images in both cases consist of a set S_i - which happens to be a singleton in case of an event. The operations on the intervals are carried out irrespective of tense. Still, these operations do interact with tense. To illustrate how, I will present the construction of the four different TTSs which result from interactions between simple Past and Perfect with a terminative event and a process respectively. If and only if tense determines that there should be a bridge that ends in an E-interval, the S^i, contributed by event type, is **converted** into an evaluation point over this interval.[8] If there is a non-singleton set S_i - that is: those cases in which the event type is process or state- this set is converted into a non-singleton set of evaluation points. In other words: potential evaluation points become 'real' evaluation points **s** or s' if tense dictates so.[9]

(13)

(i) **Tense** (ii) **event type** (iii) **Tense + event type**



[8] In figure (13) the upward arrows in the rightmost column characterize the real evaluation points.

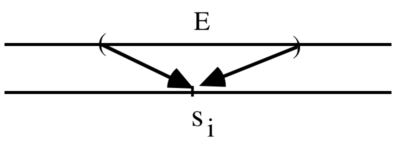
[9] If suitable, **s** and s' will be generalized over as s^{max} and the sets **S** (singleton) and S' as S^{max}.

Every partitioning will result in a different set of evaluation points s_i on the S-track. Figures (12a) and (12b) show how the potential evaluation points of the process or stative interval are obtained. Theoretically, the amount of points s_i may vary from just one (in which case the partitioning is vacuous) to a large set. A duration adverb like *urenlang* [for hours] requires a certain amount of evaluation points over the event interval. Indeed it can be combined felicitously with a process - but not with an event.

Terminative events, or their equivalents in other theories, have often been noted to be indivisible (Bach, 1986; Mourelatos, 1978; Platzack, 1979; Dowty, 1979, 1986; Kamp, 1981; etc.). Although obviously they can have duration, they are evaluated as a whole. If we take the event described by: *Sarah ate an apple*, its parts or sub-events can not be described as *Sarah ate an apple*. Terminative events are neither persistent nor cumulative. In a TTS this type is represented with the help of a convergence operation (cf. (11) below). The convergence operation warrants that each interval representing an event delivers exactly one image s_i on the S-track. Since the S-track merely represents the temporal perspective of the speaker, the duration of the original event is left intact. The convergence operation reflects the fact hat a terminative event is conceived as an indivisible entity.

(11) *terminative events*:

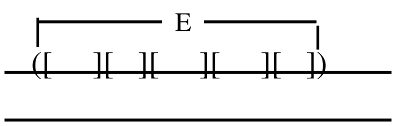
(11)a **convergence**



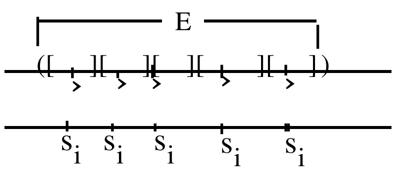
(11b) convergence is a constant function γ: E $\to$ S , where the image is a single point s_i

(12) *Processes & states:*

(12)a partitioning *P* (constrained or unconstrained)



(12)b **injection**



(12)c an injection is a one-to-one function ι : *P* $\to$ S

2.3 Event type in TTT

Ever since Vendler wrote about types of events (as expressed by the verb), distinctions that were first made by Aristotle, many alternative classifications have been proposed. Most proposals consist in an extension of Vendlers four categories: states (no change), activities (change, no limit), achievements (limit, no duration) and accomplishments (limit and duration). The extensions concern the number of classes and the syntactic level at which the classes are defined. It is well argued in the literature that it is useful to distinguish states and events (cf. Verkuyl, 1972; Mourelatos, 1978; Dowty, 1979, 1986; Hinrichs, 1981; Kamp, 1981; Partee, 1984; Bach, 1986; Moens & Steedman, 1986; Webber, 1988; Poesio & Kameyama, 1992; Caenepeel, 1991) and that a distinction between limited and unlimited events, or events and processes, should also be made (Verkuyl, 1972; Mourelatos, 1978; Dowty, 1979, 1986; Bach, 1986; Moens & Steedman, 1986; Caenepeel, 1991).[6]

In interval semantics the crucial difference between these types of events was located in their evaluation potential. The definitions by Dowty (1986) are probably best known. Röper (1980) gives two definitions which are useful to TTT. One sentence property has been called *persistency*. Here persistency will be regarded as a property of event types. If a main sentence is persistent, then so is the event type it contains. Following a definition in Röper (1980):

(9) **Persistency**: a sentence **a** is *persistent* if it is true over an interval I only if it is true over every subinterval of I

(10) **Culmination**: If **a** is true over every interval w in some set G of intervals then **a** is true over ¨G if ¨G exists

The E-track events are supplied with a set of evaluation points on the S-track. The nature of this set is determined by the type of event. Sentences expressing states have both properties defined in (9) and (10). Sentences expressing processes have (10) but a restricted version of (9).[7] This is accomplished by a double operation on the original interval on the E-track. First the interval representing the state or process is subdivided by a partitioning. The partitions are mapped one-to-one onto the S-track by an injection. The images of this injection are potential evaluation points. Such an image is called s_i, where stands for potential and s_i is an evaluation point of the interval co-indexed with it. (The status of 'potential evaluation point' will become evident in the next section). Persistency warrants that at each partition the state/process may be evaluated as being true.

---

[6] These three semantic types of entities are referred to under many different names by the autors mentioned. What I mean by *event* parallels terminative event in Verkuyls work, culmination in Moens and Moens & Steedmans work etc. What I mean by *process* parallels durative event in the former work and culmination process in the latter work.

[7] For processes there is a minimal size for the subintervals at which the process still holds: beyond this atomic level the process does not hold anymore. So, for example, pouring something in ones mouth is not drinking yet (it could be something medicinal to rinse ones mouth). Though physically this constraint seems to be called for, I doubt if linguistically it is.

(1979). I will not go into its specific advantages and problems here - Future will not play a central role in this paper.

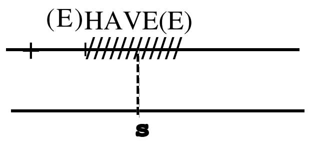
The TTS contribution for a Perfect form needs additional comment. The way Reichenbach pictures Perfect tenses represents only one of their possible interpretations while they have two. Besides the interpretation for Present Perfect that can be read from Reichenbachs three point structure E-----R,S and that can be paraphrased as: some time in the past there was an event E, there is another possibility. It can be paraphrased as: at the current moment there is a state of an event having occurred. In recent studies, the second option is usually given as the only one for English: Perfect envisaged as a stative operator (Kamp, 1981; Galton, 1984; Moens, 1986). This may be correct for English but it is not for Dutch. Compare the following sentences:

(6) a *He has painted the door yesterday
b Hij heeft gisteren de deur geschilderd
(7) a Allen had de hele afstand uiterst langzaam te voet afgelegd
[Allen had covered the entire distance very slowly on foot]
b Allen had de hele afstand om 11.33 uur afgelegd
[Allen had covered the entire distance at 11.33 AM]

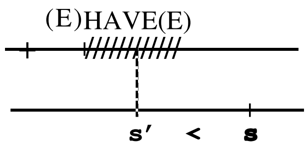
Whereas an English Present Perfect cannot have a temporal adverb specifying the time of the event, in Dutch this is very common. According to a traditional assumption, temporal frame adverbs specify either the time of the event or some reference time. In case of a combination of a Past adverb and a Present Perfect tense it must be the time of the event itself that is specified. This implies that (6b) has the event reading pictured in (5a) - a reading lacking for English.

The adverbs of manner **uiterst langzaam** [very slowly] and **te voet** [on foot] stress the event character of the proposition under (7a), whereas in (7b) the endpoint specification **om 11.33 uur** [at 11.33 AM] triggers a state reading. Ergo, Dutch has both an event interpretation and a state interpretation for a Perfect tense. This is true both for Present Perfect and Past Perfect (or Pluperfect) and I will call this the *double Perfect assumption* (as in Oversteegen, 1989). The state reading representations for Present Perfect (8a) and Pluperfect (8b) are given below [5].

(8a)



(8b)

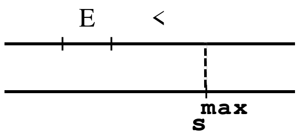


The quintessence of the state interpretation is that the evaluation concerns HAVE (E) instead of E itself. The consequences of this difference will become clear later. This impression of the representation of tense in TTT will suffice for the purpose of this paper.

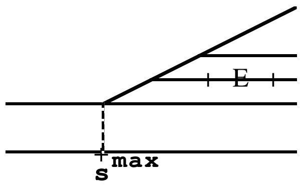
---

[5] The Present Future Perfect and Past Future Perfect are not discussed in this paper but their TTS contribution can only be of the state type.

(4)c. PERF



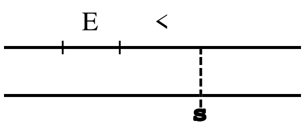
(4)d. FUT



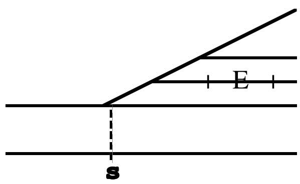
Perfect and Future are not considered to be real tenses as they do not contribute an evaluation point (cf. (4c) and (4d)): the entity called S^{max} is a variable that only gets a value in combination with Present or Past ((4a) and (4b)). In case of a Present this value will be S (cf. (5a)/(5b)) and in case of a Past it will be S' (cf. (5c)/(5d)). For this reason only Past and Present deserve the name "real tenses" while Perfect and Future are capable only of forming "derived tenses" - in combination with the real ones.[4] In (5) some combinations of the tenses Present and Past with Perfect and Future are given as derived tenses. The value of S^{max} will be S both for Perfect and Future in case they are combined with a Present tense, and it will be S' if they are combined with a Past tense.

(5) *Derived Tense Forms:*

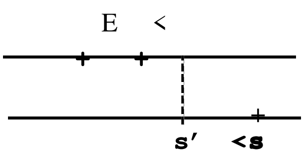
(5)a. PRES PERF



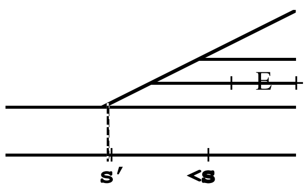
(5)b. PRES FUT



(5)c. PAST PERF



(5)d. PAST FUT



The branching E-track reflects the fact that Future is never wholly temporal: there always is a modal flavor to it. So the event interval holds at a certain percentage of the branches - but not at all of them. The notion "supervaluation" (van Fraassen, 1969) was first applied to the temporal realm by Dowty

[4] See Vet (1980), Janssen (1983) for arguments in favour of a two-tense system- at least for Dutch.

locating the event expressed in the sentence with respect to the point of speech. But there are several ways to accomplish such a relation and there are more than just the three possibilities that a Priorean tense logic can express: $E<S$, $E=S$ and $E>S$ (where E stands for event and S for point of speech). TTT, by its two track structure, is capable of expressing more subtle differences.

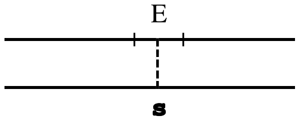
Because of the importance of Reichenbach (1947) for tense logicians and linguists, I assume familiarity with the way Reichenbach characterizes each tense in terms of E, S and R, the point of reference. In TTT there is an entity S' which resembles R in some ways; it is similar to R in discriminating between Perfect and simple Past. But the nature of S' is different from R. S' is viewed as an imaginary speech point - and as such as an evaluation point - because an utterance like *Maria at een appel* (Mary ate an apple), if true, can be analyzed as stating that there was a point in time before S, an imaginary speech point S', at which *Maria eet een apple* (Mary eats a apple) could truthfully have been uttered. For a Present Perfect there is no need for an imaginary speech point as it coincides with S: a real speech point is not imaginary any longer.

Tense indicates an evaluation point (i.e. a real or imaginary point of speech) from which the event expressed is viewed. In case of a Present or Past Perfect, this is an evaluation point which is already present in the structure as an (imaginary) speech point; Perfect forms don't lead back in time to an anterior reference point. They are a way of looking back from the current or imaginary speech point without actualizing the past period where the event must be located. In contrast, the "real" tenses create a new evaluation point. In case of a Present tense the point of speech itself functions as evaluation point.[3] As can be seen from the TTT representation of the tenses in (4), Future is taken to be the mirror image of a Present Perfect rather than of a simple Past. Considerations that led to this choice are spelled out in Oversteegen (1989).

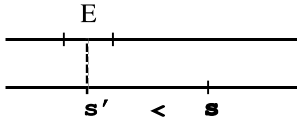
The main function of tense in a TTS consists in creating a bridge between the S-track and the E-track. A bridge constitutes simultaneity between its starting point (on the S-track) and its end point (on the E-track). It connects an evaluation point on the S-track and the part of the E-track that is to be evaluated. In case of a Perfect tense, the event interval precedes the E-track side of the bridge (see (4c)); in case of a Future tense the E-interval follows the E-side of the bridge (see (4d)). Thus, the effect of tense is locating an event with respect to the point of speech.

(4) *Basic Tense Forms:*

(4)a. PRES:



(4)b PAST



[3] It is possible to interpret a Present tensed statement like *Sheila doet de afwas* (Sheile washes the dishes) or *Sheila heeft de afwas straks gedaan* (Sheila has washed the dishes soon) as stating something about a future time. For this reason, in Oversteegen (1989) a representation of PRES was proposed slightly different from the one in (4a). The difference is of no importance here.

point of Speech. The S-track has a point-structure and harbors points of speech and points of evaluation. Points of perspective in general are to be represented on the S-track.

The second way of conceptualizing time is independent of a point of view. This conceptualization might be seen as a God-like overview over the history of events. The events are temporally ordered by the precedence relation; if one event is ordered as preceding another, this relation will never change as time goes by. In other words: this type of temporal ordering is permanent. Moreover, it is not related to the point of speech and consequently non-deictic.

Natural language elements establishing this static and non-deictic temporal ordering are represented on the so-called E-track, where E stands for Event. The E-track has a dense structure: on it intervals representing events are mapped.

In these two conceptualizations of time the ideas of the philosopher McTaggart can be recognized (McTaggart, 1927). He made a plea for distinguishing two series, the A-series and the B-series. To his B-series corresponds the E-track and to his A-series corresponds the S-track, plus its relations to the E-track In TTT the separation of two types of temporal ordering is assumed, but they are allowed to interact. The basic idea in TTT is that linguistic categories expressing temporal meaning may cause an interaction between the two tracks of which the representation structures consist. This interaction should reflect the interaction observed between the temporal categories in natural language. The two tracks are well suited to express temporal perspective as well as vagueness.[2]

Basically, the linguistic categories expressing temporal meaning are: tense, event type, temporal adverbials and temporal connectives. Each of these categories can be associated with one or both of the tracks. Tense, obviously being a deictic category since it is characterized by the predicates PAST, PRESENT and FUTURE, is mainly represented on the S-track. Event type appears to be independent of temporal location with respect to the point of speech; a process located in the future will be just as well a process when it is present or past. Therefore event type is associated with the E-track. Temporal adverbials can be deictic (cf. *yesterday*) and consequently located on the S-track, or non-deictic (cf. *an hour earlier*) and consequently located on the E-track. Temporal connectives will be argued to belong to the S-track. It is important to realize that all contributions made by temporal categories to the representation structures are defined independent of each other; this I will refer to as the **independent contribution principle** (ICP).

2.2 Tense in TTT

The contribution of tense primarily concerns the S-track. But tense also establishes a connection, or a bridge, between the two tracks. The most important function of the tense of a sentence consists in

[2] As can be seen in 2.1, an event is not per se connected to the S-track and consequently it may have an unspecified relation to the point of speech.

[when Stephany wrote her last letter, Sander was touring through Italy]
b Toen Sander door Italië trok, schreef Stephany haar laatste brief
[when Sander was touring through Italy, Stephany wrote her last letter]

And finally, the system should account for the fact that many temporal connectives have mixed temporal/non-temporal interpretations. There is no a priori reason to expel these interpretations from the system - there is one to include them: their being (partly) temporal.

Before it is possible to give an enriched alternative for Martins system for Dutch, one by one the temporal connectives of Dutch will have to be analyzed. One of the instruments in these analyses will be the Two Track representation model introduced below.

2 The Two Track Theory of Time (TTT)

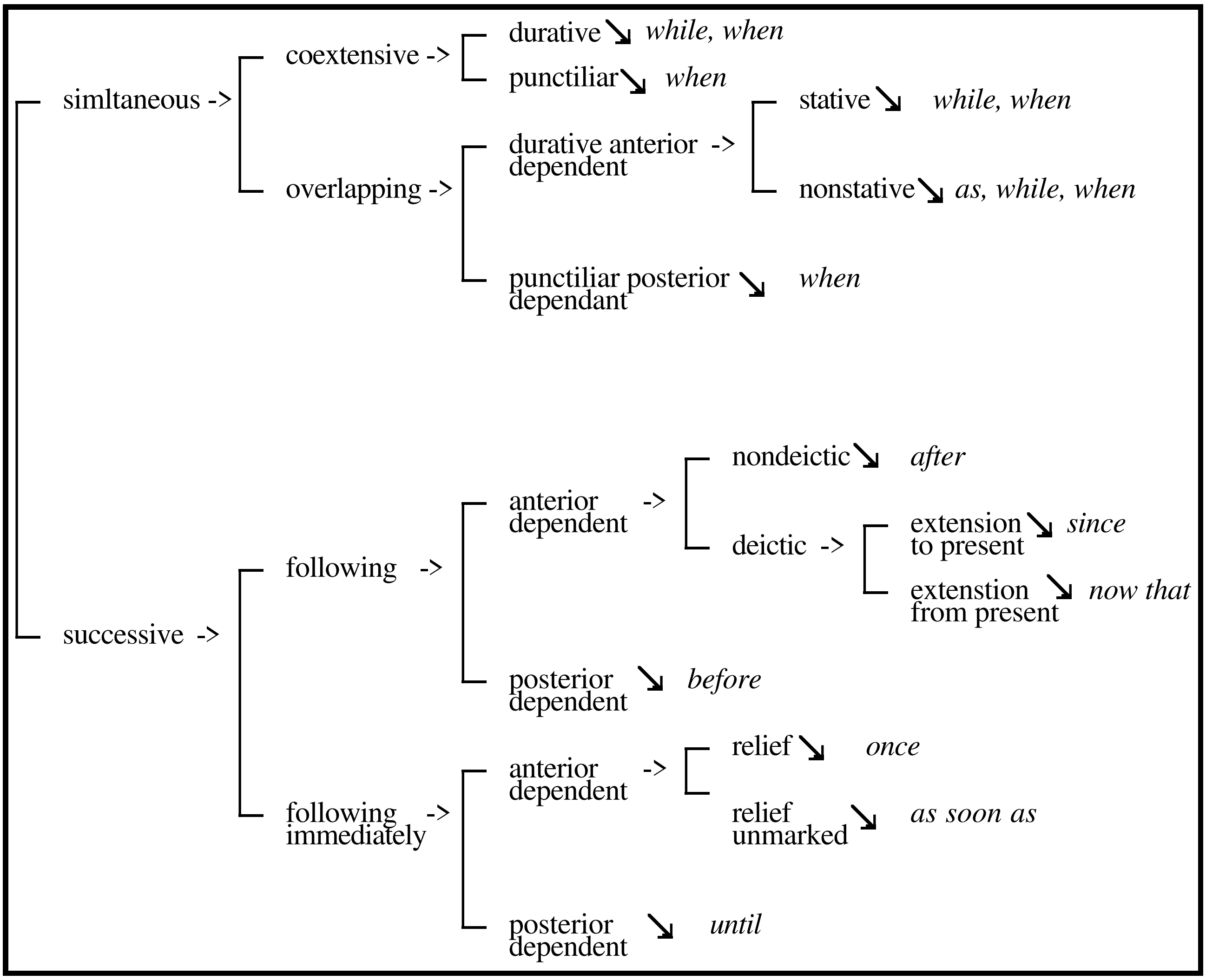
2.1 TTT, a representation model for temporal meaning

The so called Two Track theory of time (henceforth TTT) is used here as a vehicle for finding correct and precise definitions for some representative Dutch temporal connectives (Oversteegen, 1989). It should be seen as a language rather than as a goal in itself. The advantage of this representation language lies in the fact that temporal information coming from other sources than temporal connectives (e.g. tense and event type) has been defined in it. Consequently, the interaction among these temporal meaning bearers can be described in terms of two track structures, TTSs.

Natural language is capable of expressing both immediate temporal relations between events 'in the world' and a temporal perspective on those events. TTT is designed to account for two different ways of conceptualizing time. The first way of conceiving time is as a subject oriented ordering of propositions and entities. If we order propositions with the help of predicates like PAST or PRESENT or FUTURE, we introduce their relation with respect to some deictic center, the point of speech. Each utterance determines its own point of speech and its truth value (if it expresses a contingent sentence) depends on a concrete point of speech. Therefore the truth value of a sentence characterized e.g. by the predicate PAST is not permanent but changing.[1] If the utterance of a sentence to which the predicate PAST has been applied is true, the same sentence to which the predicate PRESENT has been applied could have been uttered in the past and again that sentence to which the predicate FUTURE has been applied, could have been uttered further in the past. If there is no knowledge about the time of utterance, a truth value cannot be determined. For this reason expressions or grammatical devices determining relations with the point of speech are considered deictic; the point of speech is determined by the speech situation.

Natural language elements expressing this dynamic and deictic temporal meaning are represented in the Two Track Theory of Time on the so called S-track. Here S stands for Speaker or

[1] Or - to be accurate - the sentence does not have a truthvalue



The lexical items, all temporal connectives, following the downward arrow are available as grammatical options when the path through the system leads to them. They correspond to the series of characteristics that has been passed by in reaching them. But, as was said before, to each node in the system a (set of) conditions may be adhered, expressing the Syntagmatic and paradigmatic options at that point. One of the purposes in this paper is to specify these conditions for a set of Dutch temporal connectives. These conditions should lead one through the system to the (exact set of) possible temporal connective(s) in a given context. Consequently they should give *terwijl* as an option in (1b) but not in (1a); they should exclude (2); they should have different paths leading to *toen* in (3a) and in (3b). The former should be characterized by "included in" and the second path by "includes".

(1) *Terwijl grootvader oud was had hij veel hulp nodig
[while grandfather was old he needed much assistence]
Terwijl grootvader oud was had hij geen hulp nodig
[while grandfather was old he needed no assistence]

(2) *Ze waren al moe voordat ze skieden
[they were tired before they were skiing]

(3)a Toen Stephany haar laatste brief schreef, trok Sander door Italië

1.2 The Systemic Functional framework

Systemic Functional Grammar (henceforth SFG) belongs to the family of grammatical frameworks based on statements of the co-occurrence possibilities of grammatical features, like General Phrase Structure Grammar (GPSG) and Head-driven Phrase Structure Grammar (HPSG). But SFG is functionally oriented, unlike the other, fundamentally structural approaches.

The SFG framework distinguishes several levels of information and their interrelations. The grammatical level is split in a paradigmatic and a syntagmatic component. For paradigmatic information representation SFG makes use of system networks. Syntagmatic realizations are dependent on particular paradigmatic contexts and so the choices in those systems that are available are constrained by (semantic and functional) conditions on context. These are formulated in choosers and inquiries.

SFG is not the subject of this paper and for a proper introduction of the framework I refer to Halliday, 1985; Berry, 1981; Bateman & Mathiessen, 1990; Martin, 1992. Relevant to the subject at hand is the SFG conviction that language fulfills three major functions: the **ideational** function (experiental, organizing the experienced world), the **interpersonal** function (author- and reader-related) and the **textual** function (organizing the linguistic message). These three functions stress different components of a communicative situation. They correspond to three components of the semantic system: **Field**, **Tenor** and **Mode** respectively. A particular language event is characterized by a selection from these three parameters.

News reports are supposed to inform. Therefore the ideational function will be strongest. They are supposed to be truthful. Moreover, the perspective used should be as transparent as possible. The writer will not so much try to make the reader believe something (as is the case in argumentative texts) as pass on information on a certain (actual) subject. In certain cases, of course, he may use his expertise in the case as ground for expectations or predictions. These should be recognizable, however, and follow from facts given. The attitude of the writer with respect to the content of the information is a matter of tenor. The degrees of likelihood he attributes to the ideational content are called **mediation**, and they resort under tenor.

In this paper ideational meaning (field) will receive most attention. Temporal connectives are mostly defined in terms of field for reasons that will become apparent later. As an example of a system representing the ideational (external) meaning of temporal relations the system given by Martin (1992) is given below.

1 Introduction

1.1 General Introduction

This paper is concerned with the form and function of temporal connectives in Dutch. The interpretation of a temporal connective in a certain context appears to depend on various properties of both main sentence and temporal subsentence (tense, event type, agentivity, information status, etcetera) and our real world knowledge about their relation (i.e. consequential, contrastive). The first purpose here is to find a context independent characterization for each connective that, however, renders the interpretation required as a more or less computable product of interaction of the relevant context factors. After having thus explained the possible interpretations of temporal connectives in specific contexts, I will be able to specify the contexts in which each of the connectives may occur. The results of this double task can subsequently be given in the form of sets of ordered pairs attributed to each connective. The first member of the ordered pair would define a specific interpretation of the connective, the second pair would be a set of discourse conditions (in terms of tense, event type, etc).

The purpose of this paper is twofold. Being a part of a discourse research project making use of systemic/functional grammars, it should systematically present the environments in which each of the temporal connectives may occur. But the danger in merely giving the systems could be a loss of coherence in the meaning of the individual temporal connectives. The method followed - searching constant factors in the interpretations of individual temporal connectives and describing their interaction with context properties - ensures some explanatory force.

For representation, so called Two Track Structures are used. They function mainly as a heuristic device: by defining temporal connectives, along with other temporal information like tense and event type, in terms of TTS, it was possible to discover subtleties about the behavior of the connectives.

The data used are partly obtained from a corpus of news reports (part of the Eindhoven corpus) and partly constructed. The texts in the corpus are expository. They do not fit exactly in one of the text type subcategories. But since newspaper texts are supposed to inform, certain text properties can be expected given the Systemic Functional grammar view (see section 1.2 below). A relation may be expected between these text properties and the types of interpretation found in the corpus. Future research could consolidate this relation by investigating the same connectives in linguistic material belonging to an entirely different text type.

Contents