IV. INTERACTIONS WITH TEMPORAL ADVERBIALS

1. Introduction

1.1. What we will be concerned with

The aim of this chapter is to provide a survey of the interactions of perfect constructions with temporal adverbials and to explain these interactions.\(^1\) This section serves to sketch more specifically which issues we will be concerned with and which issues we will not be concerned with in the course of the chapter.

The interpretation of temporal adverbials is one of the most complex issues in semantics. An account of their interpretation ultimately has to fulfill many diverging tasks and to answer many questions. Among them are the following ones.

(a) What types of temporal adverbials are there? - At least three main types of temporal adverbials can be distinguished as sketches in (1-1), each of which can be definite (i) or indefinite (ii).\(^2\)

\begin{enumerate}
\item[(1-1)]
\begin{enumerate}
\item POSITION ADVERBIALS (sometimes called 'inclusive adverbials' (Vlach (1993)) or 'location adverbials' (Kamp and Reyle (1993)):
\begin{enumerate}
\item \textit{jetzt} ('now'), \textit{um vier Uhr} ('at four'), \textit{gestern} ('yesterday'), \textit{am Montag} ('on (this/that) Monday'), ...
\item \textit{kürzlich} ('recently'), \textit{am Montag} ('on (a) Monday(s)'), ...
\end{enumerate}
\item DURATION ADVERBIALS (sometimes called 'durative adverbials' (Vlach (1993)) or 'temporal measure adverbials' (Kamp and Reyle (1993)):
\end{enumerate}
\end{enumerate}

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\(^1\) This is not meant to imply that interactions of perfect constructions with other types of adverbials are obvious, i.e. with degree adverbials (e.g. \textit{fairly}, \textit{hardly}, \textit{rather}, \textit{quite}, \textit{too}, \textit{very}), sentence adverbials (e.g. \textit{certainly}, \textit{definitely}, \textit{luckily}, \textit{surely}), locative adverbials (e.g. \textit{here, there, in the forest}), directional adverbials (e.g. referring to the source: \textit{out of the forest}, referring to the goal: \textit{into the forest}), and manner adverbials (e.g. \textit{fast}, \textit{happily}, \textit{hard}, \textit{well}; modifying the VP: \textit{She danced beautifully} or the subject: \textit{He gave her the money reluctantly}). But the investigation of these adverbials would lead too far away from the expression of temporality.

\(^2\) Adverbials like \textit{schon} ('already'), \textit{noch} ('still') etc. will be discussed in chapter V.
(i) *zwei Monate lang* ('for two months'), *von zwei bis fünf Uhr* ('from two to five'), ...
(ii) *eine Zeit lang* ('for some time'), ...

**c. QUANTIFICATIONAL ADVERBIALS** (or 'frequency adverbials'):
(i) *zweimal* ('twice'), ...
(ii) *immer* ('always'), *manchmal* ('sometimes'), ...

Across these type distinctions, some finer-grained distinctions may be drawn, e.g. one between calendaric vs. context-dependently calendaric vs. context-dependent (nondeictic vs. deictic), distinctions concerning the syntactic realization, or other distinctions (cf. Ehrich (1992:108ff), Fabricius-Hansen (1986:171ff)).

(b) How does the internal semantic composition of particular temporal adverbials work?

c) How can the semantics of particular temporal adverbials be characterized, i.e. what is their specific semantic contribution?

(d) What functions do temporal adverbials have in sentence semantics, i.e. what can they specify and how do they contribute their interpretation to the semantics of their clause?

e) How do the different types of temporal adverbials interact with each other, i.e. how do positional or durational and quantificational adverbials interact?

(f) Do they occupy different syntactic base positions and if so, how do their base positions correlate with their semantic function? Which factors govern what syntactic surface positions they can take?

(g) How do they interact with information structural factors?

In this chapter, we will focus only on some of these questions. More specifically, we will take for granted that the classification of temporal adverbials as sketched in (1-1) and as supplemented by more subtle distinctions in the literature is well-motivated, that the internal semantic composition of particular temporal adverbials can be captured adequately, and we will assume plausible definitions of the semantic contribution of particular adverbials without arguing for them in detail.

Our main concern in this chapter are the open questions (d)-(f), i.e. what functions temporal adverbials can have in perfect constructions, what their semantic contribution is, how temporal adverbials can interact with each other in these constructions, and, to some extent, what syntactic base positions they occupy and how they interact with information structural factors. Our main strategy will be to identify possible functions of temporal adverbials and to provide evidence that temporal adverbials can indeed take over these functions. This working strategy does, of course,
not imply any claims about any particular adverbials, nor does it take into account idiosyncratic properties of adverbials in more detail. The semantic contribution of certain specific adverbials will be investigated in chapter V.

1.2. Temporal adverbials in perfect constructions: a problem

It is generally assumed (cf. Bäuerle (1979), Ballweg (1988), Ehrich (1992:133), Fabricius-Hansen (1986), Herweg (1990), Hornstein (1990), and others) that temporal adverbials in a perfect construction can modify either the situation time of the embedded VP or the tense time of the clause, i.e. serve as TS-specifiers or as TT-specifiers. We have seen illustrations of these types of specification repeatedly above (cf. chapter II). (1-2) illustrates the distinction again in an English past perfect clause.

(1-2) John had left at ten.
   TS-specification: "John's leaving took place at ten."
   TT-specification: "John was no longer there at ten."

Recall from chapter II that the preferred reading depends on various factors such as position or intonation and that in German present perfect clauses, the availability of the readings also depends on whether the clause contains a past, a present, or a future time adverbial.

A closer look at perfect constructions, however, shows that temporal adverbials can serve even more functions. This is illustrated in (1-3).

(1-3) a. Immer WAR Lola dies Jahr gerannt.
   *always had Lola this year run*
   b. Immer IST Lola dies Jahr gerannt
   *always had Lola this year run*
   c. Lola ist dies Jahr immer geRANNT.
   *Lola has this year always run*

The past perfect clause in (1-3a) can have a reading paraphrased as follows (The paraphrase contains additional contextual specifications in order to make the reading clearer; these specifications are written in brackets.): "For all times t of this year that are before now [at which I asked Lola out for jogging], Lola was in a post-state of having run [shortly before t]." Under this reading, the quantificational adverb immer quantifies over past times, i.e. over times that are located by the past tense of the clause.

The present perfect clause (1-3b), however, can have the following reading: "For all times t that were, are, and will be contained in this year [and at which I ask Lola out for jogging], Lola is in a post-state of having run [shortly before t]." Under this reading, immer does clearly not quantify over times that are located by the present tense. Rather, the times it quantifies over are located within a generic time interval
that is a large environment of the time of utterance; i.e. it is this generic time interval that is located by the tense. The times quantified over, however, can be located before, at, or after the time of utterance. It seems that here, immer quantifies over post-states of running.

Finally, (1-3c) can have a yet other reading: "For all times t of this year [at which I saw Lola], Lola ran at t." Here immer quantifies over times of running, i.e. over situation times of the VP below the perfect.

In contrast to the traditional distinction between two levels of adverbial modification in perfect constructions, the observations above point out that at least three instead of two levels of temporal modification must be distinguished. These are

- the tense level, which establishes and locates the tense time of a finite clause,
- the aspect level, which establishes and locates the aspect time or the situation time of the main predicate of a clause, and
- the participle level, which establishes and locates the VP-situation time in perfect clauses.

This result reopens the issue of how the different functions of temporal adverbials can be integrated into a general account of perfect constructions.  

Before we discuss the behavior of temporal adverbials in perfect clauses in more detail, we will briefly recapitulate the formal implementation of present perfect clauses proposed at the end of chapter II and consider what options it provides for the application of temporal adverbials.

### 1.3. Recapitulation of the present framework

I proposed that a clause like (1-4a) receives a semantic representation like (1-4b), whose truth conditions are paraphrased in (1-4c). The semantic representation provides slots for contextual quantifier restrictions by introducing three occurrences of $C$.

(1-4)  

<table>
<thead>
<tr>
<th>a.</th>
<th>Lola ist gerannt.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Lola is/has run</em></td>
</tr>
</tbody>
</table>

b. $\lambda t \left( \exists T \left( \lambda t^* \left( C(t^*) \land \text{PRES}(t(t^*)) \right) \right) \right)$

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3 Another distinction of temporal adverbials that occurs in the literature is the one between temporal situation-modifying and frame-setting adverbials. (A) - (C) show some examples of temporal frame-setting adverbials from the literature.

(A) *From May to August* Mary ran every day. (Parsons (1990:211f))
(B) *In 1985* Mary went swimming every morning. (Kamp and Reyle (1993:635ff))
(C) *In ten minutes*, Erna buttered each bagel. (Eckardt (1998:123ff))
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\[
\left[ \lambda t^* \left( \exists A \left[ \lambda t^{**} \left( C(t^{**}) & \text{PERF}(t^*) (t^{**}) \right) \right] \right) \right] \\
\left[ \lambda t^{**} \left( \exists P \left[ \lambda t^{***} \left( C(t^{***}) & \text{ge}...t \text{ sei-} \right) \right] \right) \right]
\]

\[
\left[ \lambda t^{***} \left( \text{Lola_renn-} (t^{***}) \right) \right]
\]

c. \quad \text{[[ Lola ist gerannt ]]^C (now) = 1}

iff there is a time \( t' \) such that \( t' \) is a subinterval of a time the speaker in \( c \) refers to and \( \text{now} \subseteq t' \) or \( \text{now} < t' \)
and there is a time \( t'' \) such that \( t'' \) is a subinterval of a time the
speaker in \( c \) refers to and \( t'' \subseteq t' \)
and there is a time \( t''' \) such that \( t''' \) is a subinterval of
a
and \( \text{Lola runs at } t''' \).

The slots provided for contextual restrictions of the quantifiers, i.e. \( C \) applied to a variable - will usually not be mentioned in the truth conditions or paraphrases when the quantifiers in question do not receive a specific restriction from the context.

Given the semantic representation in (1-4c), we will assume that there are some predestinated slots for the application of temporal adverbials. First, it seems likely that the slots of the phonetically empty default existential quantifiers \( \exists T, \exists A, \) and \( \exists P \) can be taken by overt adverbs of quantification. Second, if position and duration adverbials can serve as restrictors of time quantifiers, the restrictive clauses of the aforementioned adverbs of quantification provide appropriate anchors for these adverbials. In the remainder of this chapter, we will thus be concerned with the following questions.

- Which functions can quantificational adverbials have? Can each of the implicit adverbials \( \exists T, \exists A, \) and \( \exists P \) be substituted by an overt adverb of quantification? Can adverbs of quantification perhaps have additional functions?
- Which functions can positional adverbials and duration adverbials have? Which of the restrictive clauses of the adverbs of quantification can they specify? Are they able to take over other functions? When investigating these questions, it has to be taken into account that, as is well-known and exploited in various standard tests for identifying situation types, the applicability of duration adverbials depends on the situation type (i.e. state, activity, achievement, or accomplishment) of the clauses they are contained in.
- Are the different functions of temporal adverbials in perfect clauses associated with different syntactic base positions?

We will start by looking at the possible functions of quantification adverbials in section 2 and then at the possible functions of position and duration adverbials.
Thereby, we will first look at clauses that contain only one adverbial; more complex constructions with interacting adverbials of different types are investigated in later sections. Moreover, for presentational reasons, we will restrict this initial survey to a few representative adverbials of each of the three types.

2. Functions of quantificational adverbials in perfect clauses

2.1. Quantificational adverbials and $\exists_T$, $\exists_A$, and $\exists_P$

Let us start by showing intuitively what kind of readings quantificational adverbials (QAs) in perfect clauses can have. To this end, we will look at relatively simple perfect clauses and interpret them in specific contexts and sometimes with certain stress patterns that support the readings in question. As will become clear shortly, the task is more difficult than it may appear at first sight, part of the problem being that it is not always easy to make explicit the effects of contextual restrictions that always play a role when quantification is involved (cf. von Fintel (1994) and others).

QAs QUANTIFYING OVER TENSE TIMES. First, there are readings where QAs quantify over tense times. Consider the past perfect clause (2-1), which contains the indefinite quantificational adverb *immer* (‘always’).

(2-1) Lola war immer gerannt.
*Lola was/had always run*

The crucial reading we want to consider here is paraphrased in (2-2a). It is supported by contexts like the following one: the speaker has the occasions until (but excluding) now in mind where she asked Lola out for jogging. For reasons of contextual relevance, the post-states of Lola having run that are associated with each such occasion are preferentially understood as post-states of Lola having run shortly before.

(2-2) Quantification over tense times:
"For all times t until (but excluding) now where I asked Lola out to go jogging, Lola was in a post-state of having run shortly before t (i.e. in a contextually relevant post-state of having run)."

The reading paraphrased in (2-2) comes out best with a slightly changed word order and stress on the auxiliary (2-3a); it is (to my mind) obligatory when the adverbial *schon* (‘already’) is added (2-3b).

(2-3) a. Immer WAR Lola gerannt.
*always was/had Lola run*

b. Immer WAR Lola schon gerannt.
*always was/had Lola already run*
Given what was said in chapter II, section 1.2 about the availability of readings of position adverbials specifying the tense time in perfect clauses, the supporting effect of stress on the auxiliary is not surprising; we may tentatively generalize that temporal (and probably other) adverbials of all types preferentially relate to the tense time of a perfect construction when the auxiliary is stressed.

How is the TT-quantifying reading of QAs represented in our formal account of the semantics of perfect clauses? For the intended reading of (2-1), I propose the semantic representation in (2-4a) and the truth conditions in (2-4b) according to which the QA immer functions as an overt substitute of the quantifier $\exists_T$. Thereby the restrictions to occasions in the past where the speaker asked Lola out for jogging modify the contextual restriction variable $C$ of $\exists_T$. Moreover, the contextual restriction variable of $\exists_P$ restricts the crucial situation time intervals of the VP to times shortly before the respective values of $t'$.

(2-4)  

a. $\lambda t \left( \text{IMMER}_T \left[ \lambda t' (\text{I_asked_Lola_out_for_jogging} (t') \& \text{PAST} (t(t'))) \right] \right)$

b. $\exists_A \left[ \lambda t'' (C (t'') \& \text{PERF} (t'(t''))) \right]$

b. $\exists_P \left[ \lambda t''' (\text{shortly_before}_t' (t'') \& \text{ge...t seis...t'') \& \text{Lola_renn} (t''')) \right]$

The analogous reading is also available with definite QAs like zweimal ('twice') as in (2-5); the corresponding truth conditions are like the ones in (2-4), replacing "for all times $t'$" by "for two times $t'$."
QAs QUANTIFYING OVER SITUATION TIMES OF THE POST-STATE. Note that the reading paraphrased in (2-2) with the intended context is not available with a present perfect clause as in (2-6a) - nor is it with the infinitival perfect clause in (2-6b).

(2-6)  a. Immer IST Lola gerannt.
       always is/has Lola run
  b. Immer (schon) gerannt zu sein, ist typisch für Lola.
       always (already) run to be is typical for Lola

Since in reading (2-2), the QA quantifies over tense times, and the tense times are located in the past, this is what one expects. However, in the present perfect version (2-6a), a generic/habitual reading is expressed that involves quantification over situation times of the post-state and that may be paraphrased roughly as in (2-7).

(2-7)  Quantification over situation times of the post-state:
"For all times t whenever I ask Lola out for jogging, Lola is in a post-state of having run shortly before t."

In this reading we have a very large tense time including the time of utterance - namely, all the time in the past, present, and future that is contextually relevant - let's say the time of the speaker's jogging-aquaintance with Lola, or something like that. Since under this reading, we have a single large tense time that is located by the present tense, the QA here obviously cannot quantify over tense times. Rather, the QA quantifies over situation times of the post-state. I.e. it functions as an overt substitute of the quantifier \( \exists_A \) in our formal representation. Similarly as in (2-4), the contextual restriction variable of \( \exists_P \) restricts the crucial situation time intervals of the VP to times shortly before the respective values of t" (but not t', as in (2-4)!). Thus, in the context described, this reading of (2-6a) is represented by (2-8a) and receives the truth conditions in (2-8b).

(2-8)  a. \( \lambda t \left( \exists_t \left[ \lambda t' \left( \text{my_jogging_aquaintance_with_Lola} \ (t') \ & \text{PRES} \ (t)(t') \right) \right] \right. \\
         \left. \left[ \lambda t' \left( \text{IMMER} \left[ \lambda t'' \left( \text{I_asked_Lola_out_for_jogging} \ (t'') \ & \text{PERF} \ (t')(t'') \right) \right] \right. \\
         \left. \left[ \lambda t'' \left( \exists_P \left[ \lambda t''' \left( \text{shortly_before_t''} \ (t'') \ & \text{ge...t sei-} \ (t'')(t''') \right) \right. \\
         \left. \left[ \lambda t''' \ (\text{Lola_renn-} \ (t''')) \right] \right] \right) \right) \) \)
b. \[ [\text{Lola ist immer} \, \text{gerannt}]^C \, (\text{now}) = 1 \]
   iff there is a time \( t' \) such that \( t' \) is a subinterval of a time the speaker in \( c \) refers to, i.e. the time of her jogging-aquaintance with Lola, and now \( \subseteq t' \), and for all times \( t'' \) such that \( t'' \) is a subinterval of a time the speaker in \( c \) refers to, i.e. a time where the speaker asks Lola out for jogging, and \( t'' \subseteq t' \), there is a time \( t''' \) such that \( t''' \) is a subinterval of a time the speaker in \( c \) refers to, i.e. the time shortly before the respective \( t'' \), and \( t''' \leq t'' \), and Lola runs at \( t''' \).

The analogous reading with the definite QAs \textit{zweimal} ('twice') as in (2-9), however, does not seem available.

(2-9) Lola ist \textit{zweimal} gerannt.
Lola is/has twice run

It is not yet clear to me, however, how stable this judgement is across sentences and across speakers. But at least indefinite overt QAs can function as substitutes for the phonetically empty quantifier \( \exists_A \).

QAs QUANTIFYING OVER VP-SITUATION TIMES. Another function of QAs in perfect clauses is that they can quantify over VP-situation times. Consider (2-10).

(2-10) Lola ist immer gerannt.
Lola is/has always run

In a context where the speaker considers the times when she saw Lola and Lola ran at each such occasion, this sentence can also have the reading paraphrased in (2-11).

(2-11) QA quantifying over VP-situation times:
"For all times \( t \) at which I saw Lola, Lola ran at \( t \)."

This reading is supported by stress on the VP as in (2-12).

(2-12) Lola ist immer geRANNT.
Lola is/has always run

Again, given what was said in chapter II, section 1.2, about the availability of readings of position adverbials specifying the situation time of the VP in perfect clauses, the supporting effect of stress on the auxiliary is not surprising; let us generalize that
temporal adverbials of all types (and perhaps other adverbials, too) preferably relate to the situation time of the VP of a perfect construction when the VP is stressed.

How can the TS-quantifying reading of QAs be represented in our formal account of the semantics of perfect clauses? I propose that the reading arises when the QA is taken as a substitute of the quantifier ∃_p. (2-13) shows the truth conditions for this case.

(2-13) a. \( \lambda t \left( \exists_T \left[ \lambda t' (C (t') & \text{PRES} (t')(t')) \right] \right) \left[ \lambda t' \left( \exists_A \left[ \lambda t'' (C (t'') & \text{PERF} (t')(t'')) \right] \right) \right] \left[ \lambda t'' \left( \text{IMMER}_P \left[ \lambda t''' (\text{I}_\text{see}_\text{Lola} (t''') & \text{ge...sei-} (t''')(t'''')) \right] \right) \right] \left[ \lambda t''' (\text{Lola}_\text{rein} (t'''')) \right] \right)

b. [[Lola ist immer_gerannt]]^C (now) = 1
   iff there is a time t' such that now \( \subseteq t' \) or now < t'
   and there is a time t'' such that t'' \( \subseteq t' \)
   and for all times t''' such that t''' is a subinterval of a time the speaker in c refers to, i.e. the times when she saw Lola, and t''' \( \leq t'' \),
   Lola runs at t'''.

Again, the analogous reading is possible with a definite QA like zweimal ('immer') as in (2-14). the truth conditions for this reading correspond to the ones in (2-13), replacing "for all times t'''" by "there are two times t'''."

(2-14) Lola ist zweimal geRANNT.

Lola is/has twice run

To summarize, each of the phonetically empty QAs \( \exists_T, \exists_A, \) and \( \exists_P \) can be substituted by an overt adverbial. So far we have not said anything about whether QAs - in perfect clauses or in general - can have any other temporal functions in addition to these. As we will see later, there is evidence that they can have more functions than the three sketched in this section.

2.2. On universal perfect readings

Before we close this section, a few words concerning the so-called UNIVERSAL PERFECT (cf. Comrie (1976) and others) are in order. This reading arises in perfect constructions containing certain adverbials - i.e. duration adverbials or the
quantificational adverb *immer* ('always'). The crucial characteristics of this reading are that what is quantified over is intuitively the situation time of the VP and moreover, that the situation time of the VP can reach up to the time of utterance and in fact, can even include it. The examples in (2-15) illustrate this.

(2-15) a. Lola hat drei Stunden lang getanzt.
    *Lola has three hours long danced*

b. Lola hat immer Donald Duck geliebt.
    *Lola has always Donald Duck loved*

How can this reading be explained in our present account? Here is an explanation of how the universal reading with QAs arises.

The QA *immer* in (2-15b) replaces the quantifier ∃. Moreover, let us assume the following contextual restrictions: the value of t' is restricted to the time of utterance itself (this is not crucial for the explanation, however; it would also work if it were a larger time interval). The value of t" is restricted to Lola's life-time until and including now - because of the semantics of the past participle, which involves the relation "≤", this is unproblematic. Hence, in this context we get (2-16).

(2-16) a. \( \lambda t \left( \exists t' \left( \text{time of utterance} (t') \& \text{PRES} (t(t')) \right) \right) \)

\[
\left[ \lambda t' \left( \exists t'' \left( \text{PERF} (t(t'')) \right) \right) \right]
\]

\[
\left[ \lambda t'' \left( \text{IMMER}_p \left[ \lambda t''' \left( \text{Lola's lifetime} \leq \text{TU} (t''') \right) \right) \right) \right]
\]

b. \[ \left[ \text{Lola hat immer}_p \text{ Donald Duck geliebt} \right] \subset \text{(now) = 1} \]

iff there is a time t' such that t' is the *time of utterance* and now \( \subseteq t' \)
and there is a time t" such that t" \( \subseteq t' \)
and for all times t"" such that t"" is a subinterval of a time the speaker in c refers to, i.e. *Lola's life-time* until and including the *time of utterance*, and t"" \( \leq t''\), Lola loves Donald Duck at t"".

Thus, the availability of the universal reading with quantificational adverbs like *immer* can easily be captured without any additional stipulations.

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4 The conjunction "t' is the *time of utterance* and now \( \subseteq t''\) in (b) is somewhat redundant but formally correct. The first conjunct comes in by the contextual restriction while the second conjunct comes in by the semantics of the present tense.
3. Position and duration adverbials

3.1. The distinction between position and duration adverbials

Before we deal with the questions of what positional and durational adverbials specify and how they contribute their interpretation to the semantics of their clause, let us reconsider the distinction between position adverbials and duration adverbials.

Kamp and Reyle (1993:650) observe that the distinction between duration adverbials and position adverbials is not clear-cut. They observe that some adverbials can be classified as both because they contain durational as well as positional components. The adverbial *for the last three years* in (3-1) is an example in case.

(3-1) Mary has lived in Amsterdam for the last three years.

On the one hand, it provides the (minimal) duration of Mary's having lived in Amsterdam. On the other hand, it locates this interval with regard to the time of utterance - hence, it is positional, too.

Position adverbials in the typical case appear to contain an existential quantification over times; within the time referred to by a position adverbial there must be a time characterized by some property. Contrasting with this, duration adverbials appear to contain a universal quantifier over times; for all the time referred to by a duration adverbial, a certain property holds. This is illustrated by the sentences and rough paraphrases in (3-2a, b).

(3-2) a. POSITION/EXISTENTIAL: This afternoon, John took a walk. = There is a time t included in this afternoon such that John took a walk at t.
    
    b. DURATION/UNIVERSAL: For three hours, John took a walk. = For all times t included in some three-hour-interval, John took a walk.

However, recall the Principle of Frame Time/TS-Proportion that was introduced in chapter III, section 4. When this principle is active, it tries to extend the duration of the situation time at hand so that it is proportionate to its frame time - and perhaps aligns with the duration of the frame time - that can, for instance, be provided by a positional adverbial. Consequently, in this case a universal-like reading as in (3-2a') can arise.

(3-2) a'. POSITION/EXISTENTIAL WITH THE PRINCIPLE OF FRAME TIME/TS-PROPORTION: This afternoon, John took a walk. = John walked all afternoon. = There is a time t included in this afternoon such that John took a walk at t and t covers all afternoon.
In this way, the Principle of Frame Time/TS-Proportion may blur the existential quantification that is often associated with the interpretation of position adverbials.

The above considerations point into the following direction: it seems quite plausible to treat position and duration adverbials at least sometimes as extremes of a supertype of temporal adverbial which contains a position as well as a duration component. These components can, but need not, be explicit. If they are not explicit, they amount either to vague or to existential interpretations. Thus, the duration component in (3-2a) is not made explicit; consequently, the length of the situation time interval is vague and can be assigned a long duration my means of the Principle of Frame Time/TS-Proportion. Similarly, the position component in (3-2b) is left open; (3-2b) mentions some three-hour-interval whose location is unclear. In (3-1), however, both components are explicit.

If this approach is on the right track, then it is to be expected that certain adverbials exhibit ambiguities between position and duration readings, depending on how the implicit components are interpreted. Moreover, these readings are expected to depend on the linguistic and nonlinguistic context of the adverbials.

These expectations are in fact borne out: Vlach (1993:256) points out that certain adverbials are ambiguous between a positional ('inclusive' in his terminology) and a durative reading. According to him, the former reading amounts in perfect clauses to an existential perfect reading while the latter amounts to a universal perfect reading. (3-3a), for instance, exhibits preferably an inclusive/existential reading; (3-3b) exhibits preferably a durative/universal reading; and for (3-3c) both readings are equally plausible.5

(3-3)  
b. I've known Max since 1960.  
c. I've been ill since September.

Under both readings, the since-adverbial specifies the situation time of the respective VP. Under the inclusive/existential reading, the interval that reaches from the time denoted by the complement of since until and including the tense time (or the time of utterance) is asserted to contain at least one truth-interval of the VP-situation. Under the durative/universal reading, due to the Principle of Frame Time/TS-Proportion, the interval is completely 'filled' by the time of the VP-situation; this situation may, of course, also reach beyond the interval into the future.

Intuitively, it seems therefore that both position and duration adverbials can contain two more or less specific components - one concerning the position, the other concerning the duration of a time interval. In typical position adverbials, the duration is unspecified or indefinite, whereas in typical duration adverbials, the position is unspecified or indefinite.

5 The existential readings of the German equivalents of (3-3a, c), involving the preposition seit ('since'), are not available to the same extent. But in principle, German seit-adverbials are also ambiguous in this way. For more details on seit-adverbials, see chapter V.
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(3-4) a. POSITION ADVERBIAL: This afternoon, John took a walk. = There is a time $t$ of indefinite duration included in this afternoon such that John took a walk at $t$.

b. DURATION ADVERBIAL: For three hours, John took a walk. = For all times $t$ included in some three-hour-interval/There is a time $t$ covering all of some three-hour-interval of unspecified position, such that John took a walk at $t$.

Of course, as was illustrated in (3-1), explicit mixtures of both can occur. In principle both definite and indefinite position/duration components can be either explicit or implicit. (3-5) provides a survey of these options with an illustration of each.

(3-5) Realization of position and duration components of adverbials

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration def./expl.</td>
<td>John walked for the last three hours.</td>
<td>[John took a walk at noon.] He walked for three hours.</td>
<td>John walked for three hours on some day.</td>
<td>John walked for three hours.</td>
</tr>
<tr>
<td>Duration def./impl.</td>
<td>[John took a two-hour-walk.] He walked at noon.</td>
<td>[John took a two-hour-walk at noon.] He walked slowly.</td>
<td>[John took a two-hour-walk on a sunny day.] He walked slowly.</td>
<td>[John took a two-hour-walk on a sunny day.] He walked slowly.</td>
</tr>
<tr>
<td>Duration indef./expl.</td>
<td>John walked for some hours yesterday.</td>
<td>[John took a walk at noon.] He walked for some hours.</td>
<td>John walked for some hours on a sunny day.</td>
<td>John walked for some hours.</td>
</tr>
<tr>
<td>Duration indef./impl.</td>
<td>[John took a long walk.] He walked at noon.</td>
<td>[John took a long walk at noon.] He walked slowly.</td>
<td>[John took a long walk on a sunny day.] He walked slowly.</td>
<td>[John took a long walk on a sunny day.] He walked slowly.</td>
</tr>
</tbody>
</table>

To conclude, we will draw one main distinction among temporal adverbials, separating quantificational adverbials from nonquantificational ones. We will assume that each nonquantificational temporal adverbial can contain in principle both a position and a duration component. In traditional 'duration adverbials' the duration component covers all of the time interval that is referred to by the adverbial; with some duration adverbials this is obligatorily so (e.g. with most occurrences of adverbials like für drei Stunden ('for three hours')), with others this is optional (e.g.
with adverbials like seit drei Uhr ('since three o'clock'), the reasons for the obligatory or optional durative nature most likely being the internal semantic composition of the adverbials.

Moreover, some adverbials contain both quantificational and nonquantificational components, e.g. on every Monday or in some years. We will sketch the interpretation of this type of 'mixed' adverbial later in this chapter (cf. section 8). It will be shown that for their interpretation, the quantificational component is raised at LF and the nonquantificational components are then interpreted as restrictors of the raised quantifier.

### 3.2. The interpretation of nonquantificational temporal adverbials

In what ways do we have to extend our semantics in order to take care of the interpretation of temporal adverbials? Let us first consider the interpretation of temporal adverbials that contain explicit position and explicit duration components. Then we will see how the interpretation of implicit temporal specifications can be captured.

Our guideline is the assumption that nonquantificational temporal adverbials function as restrictors of (temporal) adverbs of quantification, i.e. as restrictors of the implicit quantifiers \( \exists_T \), \( \exists_A \) and \( \exists_P \) and their overt substitutes, respectively. Accordingly, they are predicates of times, i.e. of type \( <i, e> \). (3-6) shows the interpretations of some temporal adverbials where both the position and the duration components are explicit. Recall that in this chapter we will not discuss the internal semantic composition of particular adverbials; moreover, the definitions of their semantic contribution should be viewed as tentative. The illustrating interpretations are formulated for English adverbials.

(3-6) Temporal adverbials with explicit position and duration components:

a. \([[[for the last three hours ]]c = \text{the function } f: D_i \rightarrow D_t \text{ such that for any } t^* \in D_i, f(t^*) = 1 \text{ iff } t^* \text{ is the time of the last three hours and } t^* \text{ is three hours long (= } t^* \text{ is the interval consisting of the last three hours).}\]

b. \([[[for three hours on some day ]]c = \text{the function } f: D_i \rightarrow D_t \text{ such that for any } t^* \in D_i, f(t^*) = 1 \text{ iff } t^* \text{ is a subinterval of some day and } t^* \text{ is three hours long.}\]

c. \([[[for some hours yesterday ]]c = \text{the function } f: D_i \rightarrow D_t \text{ such that for any } t^* \in D_i, f(t^*) = 1 \text{ iff } t^* \text{ is a subinterval of yesterday and } t^* \text{ is some hours long.}\]

d. \([[[for some hours on a sunny day ]]c = \text{the function } f: D_i \rightarrow D_t \text{ such that for any } t^* \in D_i, f(t^*) = 1 \text{ iff } t^* \text{ is a subinterval of a sunny day and } t^* \text{ is some hours long.}\]

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(3-7) shows the interpretations of two temporal adverbials with an explicit position component and an implicit duration component. Implicit components can receive a value by the context in accordance with the intention of the speaker.

(3-7) **Temporal adverbials with explicit position and implicit duration components:**

- a. \([\text{at noon }]^C\) = the function \(f: D_i \rightarrow D_t\) such that for any \(t^* \in D_i\), \(f(t^*) = 1\) iff \(t^*\) is an environment of the contextually salient noon and \(t^*\) is of a duration the speaker in \(c\) attributes to it.

- b. \([\text{on a sunny day }]^C\) = the function \(f: D_i \rightarrow D_t\) such that for any \(t^* \in D_i\), \(f(t^*) = 1\) iff \(t^*\) is a subinterval of a sunny day and \(t^*\) is of a duration the speaker in \(c\) attributes to it.

(3-8) illustrates the interpretations of two temporal adverbials where the position component is implicit while the duration component is explicit.

(3-8) **Temporal adverbials with implicit position and explicit duration components:**

- a. \([\text{for three hours }]^C\) = the function \(f: D_i \rightarrow D_t\) such that for any \(t^* \in D_i\), \(f(t^*) = 1\) iff \(t^*\) is a time the speaker in \(c\) refers to and \(t^*\) is three hours long.

- b. \([\text{for some hours }]^C\) = the function \(f: D_i \rightarrow D_t\) such that for any \(t^* \in D_i\), \(f(t^*) = 1\) iff \(t^*\) is a time the speaker in \(c\) refers to and \(t^*\) is some hours long.

Let us now consider the two examples in (3-9), which contain implicit position as well as implicit duration specifications. The speaker in \(c\) refers to a two-hour-interval that are an environment of the contextually salient past noon-time in (3-9a) and to an unspecific long time interval included in a sunny day in (3-9b).

(3-9) a. [John took a two-hour-walk at noon.] He walked slowly.

b. [John took a long walk on a sunny day.] He walked slowly.

We now have to revise the interpretation of implicit temporal restrictions that was introduced in chapter I. More specifically, the interpretation must be extended by a duration component. Since this augmentation is presumably necessary for the implicit temporal restrictions of \(\exists_T\) and \(\exists_A\) as well as \(\exists_P\), I propose the revised definition in (3-10) for all implicit temporal restrictions. Note that this definition allows for definite and precise as well as indefinite or vague or duration specifications.
Implicit temporal restrictions:

\[ \text{such that for any } t^*_i \in D_i, f(t^*_i) = 1 \text{ iff } t^*_i \text{ is a subinterval of a time the speaker in } c \text{ refers to and } t^*_i \text{ is of a duration the speaker in } c \text{ attributes to it.} \]

Often it is not necessary to make use of this revised and more precise definition, however, in order to give adequate paraphrases of the truth conditions of sentences.

With regard to the duration component of explicit and implicit temporal adverbials, one has to keep in mind that, as is well-known and made use of in various standard tests for identifying situation types, their applicability depends on the length of the time interval they refer to and on the situation type - i.e. state, activity, achievement, or accomplishment - of the clauses they are contained in. For details, see, for instance, Krifka (1989), Parsons (1990), Vendler (1957), and the brief sketch in section 12 below.

4. Functions of nonquantificational temporal adverbials in perfect clauses

As was mentioned above and illustrated in the preceding section, we assume that temporal adverbials, like implicit temporal specifications \( C \) (cf. chapter II), function as the restrictors of temporal adverbs of quantification in the semantics. Let us now consider the effects of their restricting \( \exists_T, \exists_A, \text{ and } \exists_P \), respectively.

TEMPORAL ADVERBIALS RESTRICTING \( \exists_T \). Temporal adverbials can restrict the quantifier \( \exists_T \). We will first consider position adverbials.

When a position adverbial restricts \( \exists_T \), then this leads to the readings that were captured above under the term 'TT-specifying'; using Reichenbach's terminology, in the literature they are sometimes called 'R(eference time)-specifying' - under these readings, the temporal adverbial modifies the tense time of the clause. (4-1) illustrates such a case. Recall from chapter II that present and future adverbials in present perfect clauses - but not in past perfect clauses, of course - can only serve as TT-specifiers but not as TS-specifiers; this is due to the behavior of the present tense combined with the stative nature of perfect constructions. Hence, the example is unambiguous in this respect, even without special supporting word order or stress patterns.

(4-1) Jetzt/morgen ist Lola gerannt.

\( \text{now/tomorrow is/has Lola run} \)

(4-2) shows the semantic representation and the truth conditions of (4-1) under the TT-specifying reading of the temporal adverbial. Note that the presence of an overt restrictor does not prohibit the restriction by further contextually provided temporal restrictors.
(4-2) a. \( \lambda t \left( \exists T \left[ \lambda t' \left( C(t') \& \text{jetzt/morgen} \left( t' \right) \& \text{PRES} \left( t \left( t' \right) \right) \right) \right] \right) \)

\( \lambda t' \left( \exists A \left[ \lambda t'' \left( C(t'') \& \text{PERF} \left( t \left( t'' \right) \right) \right) \right] \right) \)

\( \lambda t'' \left( \exists P \left[ \lambda t''' \left( C(t''') \& \text{ge...t sei-} \left( t'' \right) \left( t''' \right) \right) \right) \right) \)

b. \([ \text{Jetzt/morgen}_T \text{ ist Lola gerannt }] C (\text{now}) = 1 \)

iff there is a time \( t' \) such that \( t' \) is a subinterval of now/tomorrow and now \( \subseteq t' \) or now < \( t' \)

and there is a time \( t'' \) such that \( t'' \subseteq t' \)

and there is a time \( t''' \) such that \( t''' \leq t'' \)

and Lola runs at \( t''' \).

So far so good. But how about duration adverbials? Can they also restrict \( \exists T \)?

To my mind, it seems that it is hardly possible to have a duration adverbial that restricts \( \exists T \), the reason for this presumably being the fact that the addition of such an adverbial does not make much sense. Consider the following case, for instance. Let us assume the sentence \( \text{Morgen ist Lola gerannt} \) (Tomorrow Lola will have run.) is true. Then there is some subinterval \( t' \) of tomorrow that includes a post-state time \( t'' \) of Lola having run. A duration adverbial restricting \( \exists T \) would give us the duration of the interval \( t' \). However, the maximal duration of \( t' \) will always be the same. If Lola's running took place today, then the maximal duration of \( t' \) would consist in the whole time interval covered by tomorrow; at any time \( t'' \) included by \( t' \), Lola would be in a post-state of having run. But if Lola started running, let's say tomorrow at ten, then the maximal duration of \( t' \) would also consist in the time interval of tomorrow. Hence, it would not be informative at all to make the maximal length of \( t' \) explicit. But neither would it be informative to explicitly characterize a smaller subinterval of tomorrow as the tense time. If Lola's running took place today, then for any subinterval \( t' \) of tomorrow regardless of its length, it will be true that there is a time \( t'' \) included by \( t' \) at which Lola is in a post-state of having run. And if Lola started running tomorrow at ten, then the same will be true. Hence, if this argument is on the right track, then there is a pragmatic reason of why it is hard to restrict \( \exists T \) by duration adverbials.

TEMPORAL ADVERBIALS RESTRICTING \( \exists P \). Temporal adverbials can also restrict the quantifier \( \exists P \). This leads to the readings that were captured above under the term 'TS-specifying'; in Reichenbach's terminology, they are called 'E(vent time)-specifying.' Under these readings, a position adverbial modifies the situation time of the VP. (4-3) illustrates such a case. Recall from chapter II that past adverbials in present perfect clauses - but not in past perfect clauses, of course - can only serve as TS-specifiers but not as TT-specifiers since a past tense time would be incompatible
with the canonical interpretation of its tense time. Hence, like (4-1), the example is unambiguous in this respect, too.

(4-3) Am letzten Sonntag ist Lola gerannt.

*(on-the last Sunday is/has Lola run)*

(4-4) shows the semantic representation and the truth conditions of (4-3) under the TS-specifying reading of the temporal adverbial.

(4-4) a. \[ \lambda t \left( \exists_T \left[ \lambda t' \left( C \left( t' \right) \& \text{PRES} \left( t(t') \right) \right) \right] \left[ \lambda t' \left( \exists_A \left[ \lambda t'' \left( C \left( t'' \right) \& \text{PERF} \left( t'(t'') \right) \right) \right] \left[ \lambda t'' \left( \exists_P \left[ \lambda t''' \left( C \left( t''' \right) \& \text{am_letzten_Sonntag} \left( t''' \right) \& \text{ge...t sei-} \left( t'(t'') \right) \right) \right] \left[ \lambda t''' \left( \text{Lola_renn} \left( t''' \right) \right) \right] \right) \right) \right) \right) \]

b. \[ \left[ \text{Am letzten Sonntag} \left( t'' \right) \& \text{ist Lola gerannt} \right] \left( t' \right) \right) \left( t'' \right) \left( \frac{\text{now}}{\leq} t'' \right), \] and Lola runs at \( t'' \).

\( \exists_P \) can also be restricted by duration adverbials. (4-5) is an example constructed on the basis of (4-3) that illustrates this.

(4-5) Am letzten Sonntag ist Lola eine Stunde lang gerannt.

*(on-the last Sunday is/has Lola an hour long run)*

(4-6) shows the semantic representation and the truth conditions of (4-5) under the \( \exists_P \)-restricting reading of the duration adverbial.

(4-6) a. \[ \lambda t \left( \exists_T \left[ \lambda t' \left( C \left( t' \right) \& \text{PRES} \left( t(t') \right) \right) \right] \left[ \lambda t' \left( \exists_A \left[ \lambda t'' \left( C \left( t'' \right) \& \text{PERF} \left( t'(t'') \right) \right) \right] \left[ \lambda t'' \left( \exists_P \left[ \lambda t''' \left( C \left( t''' \right) \& \text{am_letzten_Sonntag} \left( t''' \right) \& \text{eine_Stunde_lang} \left( t'''' \right) \right) \right] \left[ \lambda t''' \left( \text{Lola_renn} \left( t''' \right) \right) \right] \right) \right) \right) \right) \right) \]
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ge...t sei- (t')(t''))

\[\lambda t'' \ (Lola_{\text{renn-}} \ (t'''))]\)

b. [\[ Am letzten Sonntag ist Lola gerannt ]]^C (now) = 1
   iff there is a time t' such that now \(\subseteq t'\) or now < t'
   and there is a time t'' such that t'' \(\subseteq t'\)
   and there is a time t''' such that t''' is a subinterval
   of last Sunday and t''' is an hour long and t''' \(\leq t''\),
   and Lola runs at t'''.

TEMPORAL ADVERBIALS RESTRICTING \(\exists_A\). Are temporal adverbials also able to restrict the quantifier \(\exists_A\)? In the traditional view of the functions of temporal adverbials in perfect constructions, this possibility has not been recognized. However, it seems that the contribution of the duration adverbial in (4-7) can be analyzed best as restricting \(\exists_A\). The reading is supported by stress on the auxiliary.

(4-7) Morgen um 12 IST Lola eine Stunde lang gerannt.
   tomorrow at 12 is/has Lola an hour long run

(4-8) shows the semantic representation and the truth conditions of (4-7) under this reading.

(4-8) a. \(\lambda t \ (\exists_T \ [\lambda t' \ (C \ (t') \ \& \ \text{morgen}\_\text{um}\_12 \ (t') \ \& \ \text{PRES} \ (t(t'))])
   [\lambda t' \ (\exists_A \ [\lambda t'' \ (C \ (t') \ \& \ \text{eine}\_\text{Stunde}\_\text{lang} \ (t') \ \& \ \text{PERF} \ (t(t''))])
   [\lambda t'' \ (\exists_P \ [\lambda t''' \ (C \ (t'') \ \& \ \text{ge...t sei-} \ (t'')(t'''))])
   [\lambda t''' \ (Lola_{\text{renn-}} \ (t''''))])]

b. [\[ Morgen um 12T IST Lola eine Stunde lang_A gerannt ]]^C (now) = 1
   iff there is a time t' such that t' is tomorrow at 12 and now \(\subseteq t'\) or now < t'
   and there is a time t'' such that t'' is an hour long and t'' \(\subseteq t'\)
   and there is a time t''' such that t''' \(\leq t''\),
   and Lola runs at t'''.

As far as I can see, the position adverbial morgen um 12 ('tomorrow at 12') in (4-7) can also be analyzed as a restrictor of \(\exists_A\), leading thus to a semantic representation analogous to the one in (4-6a).

To summarize, nonquantificational temporal adverbials in perfect clauses can restrict each of the quantifiers \(\exists_T\), \(\exists_A\), and \(\exists_P\), respectively - and their overt
substitutes, of course. It is important to keep in mind, however, that these possibilities are restricted by independent factors like the situation types associated with the time intervals they restrict (for more details, see chapter V). Moreover, recall that as was observed and explained in chapter II, there are some restrictions with regard to the TS-specification and TT-specification (= $\exists P$- and $\exists T/\exists A$-restriction, respectively) depending on the choice of past, present, or future adverbials in present perfect clauses: past adverbials can serve as TS-specifiers but not as TT-specifiers (= as $\exists P$-restrictors but not as $\exists T/\exists A$-restrictors), while present and future adverbials can serve as TT-specifiers but not as TS-specifiers (= as $\exists T/\exists A$-restrictors but not as $\exists P$-restrictors). It seems that $\exists T$ can only be restricted by position but not by duration adverbials; the reason for this is not yet entirely clear. Note that until now we have not said anything about whether nonquantificational temporal adverbials can take over other functions in addition to the three ones that were sketched above. We will come back to this point later (cf. sections 6-10).

5. Interactions of nonquantificational and quantificational adverbials

Let us now have a look at how nonquantificational and quantificational adverbials interact when they cooccur in a clause. We will look first at the material of section 2 and go through the main examples that exhibited the possible functions of quantificational adverbs. We will briefly illustrate that each of the overt quantificational adverbs can have overt nonquantificational ones as restrictors.

When we replace the contextual temporal specification used in section 2 by overt temporal adverbials, we can easily illustrate simple interactions of quantificational and nonquantificational temporal adverbials in perfect constructions. Here are some examples. The subscripts indicate which part of the semantic representation particular quantificational or nonquantificational adverbials belong to.

(5-1) a. Lola WAR immer$T$ um 10 Uhr$T$ (schon) gerannt.  
$Lola was/had always at 10 o'clock run$
$= For all times t before now that were times at 10, Lola was in a post-state of having run (shortly before t).$

b. Dies Jahr$T$ IST Lola immer$A$ um 10 Uhr$A$ gerannt.  
$This year is/has Lola always at 10 o'clock run$
$= For all times t that are included in this year and that are times at 10, Lola is in a post-state of having run (shortly before) t.$

c. Lola ist immer$P$ um 10 Uhr$P$ geRANNT.  
$Lola is/has always at 10 o'clock run$
$= For all times t that were times at 10, Lola ran at t.$

Of course, also various kinds of setups with all three kinds of adverbials - quantificational, position, and duration adverbials - can occur. (5-2a) is an example where a quantificational, a position, and a duration adverbial on the participle level are
combined; (5-2b, c) show its semantic representation and its truth conditions, respectively.\(^6\)

(5-2) a. Lola ist letztes Jahr oft zwei Stunden lang gerannt.  
\textit{Lola is/has last year often two hours long run}

\(\lambda t \left( \exists T \left[ \lambda t' \left( (C (t') \land \text{PRES} (t(t'))) \right) \right] \) 
\(\left[ \lambda t' \left( \exists A \left[ \lambda t'' \left( (C (t'') \land \text{PERF} (t')(t'')) \right) \right] \) 
\(\left[ \lambda t'' \left( \text{OFT} \left[ (C (t'')) \land \text{letztes_Jahr} (t'') \land \text{zwei_Stunden_lang} (t'') \land \text{ge...t sei-} (t''(t'')) \right) \right] \) 
\(\left[ \lambda t''' \left( \text{Lola_renn} - (t''') \right) \right] \right) \) \)

b. \(\left[ \text{[ Lola ist letztes Jahr oft zwei Stunden lang gerannt ]]C \right) \) (now) = 1
\text{iff there is a time t' such that now } \subseteq t' \text{ or now } < t'
\text{and there is a time t'' such that t'' } \subseteq t'
\text{and there are many times t''' such that t''' is a subinterval of last month and t''' is two hours long}
\text{and t''' } \leq t'',
\text{Lola runs at t''}.

Finally, (5-3) shows a case where adverbials on all three levels - the tense level, the aspect level, and the participle level - occur in a single clause.

(5-3) a. Dieses Jahr ist Lola immer am Montag um 10 eine Stunde früher eine
\textit{this year is/has Lola always on-a Monday at 10 an hour earlier a halbe Stunde lang gerannt.}
\textit{half hour long run}

\(\lambda t \left( \exists T \left[ \lambda t^* \left( (C (t^*) \land \text{dieses_Jahr} (t^*) \land \text{PRES} (t(t^*)) \right) \right] \) \)

\(^6\)The order of the adverbials is crucial for the reading that is intended. Thus, the sentence \textit{Lola ist letztes Jahr zwei Stunden lang oft gerannt} receives another reading, where \textit{oft} functions below the participle level (cf. section 7). For a brief discussion of the unmarked order of adverbials on the same level, see section 12.1.
So far, the interactions of quantificational and nonquantificational adverbials that we looked at largely meet the expectations set up by our framework of perfect semantics.

But closer inspection of the semantic contribution and the interaction of some adverbials shows that the situation can be more complex. Thus, sometimes it turns out the requirements of different adverbials appear to ask contradictory claims of our framework. This shows that the devices implied by our framework so far are not sufficient in order to treat all aspects of the complex behavior of adverbials adequately: adverbials are able to take over functions that have not been captured so far. In the next three sections we will discuss some examples that exhibit such additional functions of adverbials. The illustration of additional options does not claim to be exhaustive, however.

6. Additional functions of adverbials I: frame-setting modifiers

A function of nonquantificational temporal adverbials that has not been mentioned so far and that goes beyond the scope of this work is their occurrence as temporal FRAME-SETTING MODIFIERS in the sense of Maienborn (1996, 1998, 1999).\(^7\)

\(^7\) Other authors use terms like 'frame adverbial' in order to refer to temporal adverbials like yesterday in the following sentence: *Yesterday Frank discovered a species with ten legs.* Here
Maienborn shows that locative modifiers can display three different semantic functions in clauses corresponding to the basic syntactic position they take as shown in the survey (6-1): they can function as frame-setting, as situation-external, or as situation-internal modifiers.\(^8\)

(6-1) Functions of locative modifiers

<table>
<thead>
<tr>
<th>Function</th>
<th>Basic syntactic position</th>
<th>Illustrating example</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRAME-SETTING MODIFIERS: 'sets the scene' for the rest of the clause.</td>
<td>Above all arguments of the verb, i.e. adjoined at some functional clausal projection.</td>
<td>In Europa ist Fußball beliebt. <em>in Europe is soccer popular</em></td>
</tr>
<tr>
<td>SITUATION-EXTERNAL MODIFIER: specifies the location where the situation denoted by the VP takes place.</td>
<td>Between the subject and the remaining arguments of the verb.</td>
<td>Goethe ist in Weimar gestorben. <em>Goethe is/has in Weimar died</em></td>
</tr>
<tr>
<td>SITUATION-INTERNAL MODIFIER: express a spatial relationship that holds within the situation denoted by the VP.</td>
<td>Below the verb's arguments in close proximity to the verb.</td>
<td>Paul steht auf dem Kopf. <em>Paul stands on the head</em></td>
</tr>
</tbody>
</table>

While the distinction between situation-external and situation-internal modifiers is intuitively clear, the one between frame-setting modifiers and situation-external modifiers deserves some more attention: Maienborn (1998:8) argues that by using a (locative) frame-setting modifier, a "speaker claims that a certain proposition holds true with respect to a given spatial region." Her example in (6-2) shows this nicely. It is an utterance of the German actor Harald Juhnke from 1998.

(6-2) In Deutschland bin ich weltberühmt.  
*in Germany am I world-famous*

Here the frame-setting modifier *in Deutschland* ('in Germany') receives an epistemic interpretation, saying that the people in Germany believe that Harald Juhnke is world-famous. Generally speaking, according to Maienborn frame-setting modifiers correspond to restrictions on the application of the comment to the topic of a clause.

\(^8\) According to Maienborn, frame-setting modifiers function as a semantically underdetermined restriction of the application of the comment to the topic of a clause, situation-external modifiers modify the situation argument of the VP, and situation-internal modifiers provide a conceptually determined specification of a semantically underdetermined restriction applying to the situation argument of the VP.

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*yesterday* provides a temporal frame within which the discovery of the species is located. See, for instance, Fabricius-Hansen (1986).
Analogously to the case of locative frame-setting modifiers, there are also temporal frame-setting modifiers. Because of their semantic underdetermination, they can receive other, nontemporal, functions. For instance, they can receive epistemic interpretations, too. The examples in (6-3) illustrate this.

(6-3) a. In diesem Jahrzehnt ist Jane Austen dank zahlreicher Verfilmungen
    *in this decade is Jane Austen thanks numerous movies*
    ihrer Romane eine sehr produktive Schriftstellerin.
    *of-her novels very productive author*

b. Und die Fledermaus gehört heute auch nicht zu den Vögeln, sondern zu
    *and the bat belongs today also not to the birds, but to*
    den Säugetieren.
    *the mammals*

(6-3a), which is modeled after (6-2), under its most prominent reading means something like "According to what people in this decade think because of the numerous movies made from her novels, Jane Austen was a very productive author"; thus, the adverbial *in diesem Jahrzehnt* ('in this decade') does not temporally locate the situation of Jane Austen being a very productive author but rather the time of a particular period of appraising Jane Austen by a large number of people. Similarly, (6-3b) means something like "According to what people know today, bats are not birds but mammals."

An account of frame-setting temporal adverbials goes well beyond the scope of this work, and we will not enter a discussion of their behavior here. One should, however, keep in mind that there are clearly functions of temporal adverbials that cannot be attributed to one of the three levels of tense interpretation, aspect interpretation, or participle interpretation.

7. Additional functions of adverbials II:
   adverbials below the participle level

Let us now take a closer look at the case of adverbials belonging to the lowest layer of the semantic representation - the one concerned with the interpretation of the past participle. Recall example (5-2), repeated here as (7-1).

(7-1) Lola ist letztes Jahr oft zwei Stunden lang gerannt.
    *Lola is/has last year often two hours long run*

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9 The example in (b) is taken from the *dtv-Atlas zur deutschen Sprache*, second edition. München: 1978, p113.
The marked position and duration adverbials restrict the quantifier *oft* ('often') on the participle level. Now consider the slightly modified example in (7-2a) with the picture illustrating its meaning in (7-2b).

(7-2) a. Lola ist letztes Jahr oft zwei Wochen lang häufig gerannt.

*Lola is/has last year often two weeks long frequently run*

b. ![Diagram](image)

The quantificational adverbial *häufig* ('frequently') here obviously cannot take over the function of ∃ₚ - this quantifier has already been substituted by *oft* ('often'). Rather, *häufig* must apply on a level lower than the level directly concerned with the participle interpretation.

Hence, it seems possible to have direct modifications of the VP-situation that are contained in the VP in LF; these modifications thus correspond to what might be called event modification. In an account that integrates event arguments (or: situation arguments) into the semantic representation, the function of such adverbials may be represented as event argument modifiers; here we will just indicate the VP-internal modification very roughly as in (7-3).

(7-3) a. $\lambda t \left( \exists t' \left[ \lambda t'' (C(t')) & \text{PRES}(t(t')) \right] \right.$

$\left[ \lambda t' ' \left( \exists \lambda t'' (C(t'') & \text{PERF}(t'(t'')) \right) \right.$

$\left[ \lambda t''' \left( \text{OFT}_p \left[ \lambda t''' (C(t''') & \text{letztes_Jahr}(t''')) & \text{zwei_Wochen_lang}(t''')) & \text{ge...t sei-}(t'(t''')) \right) \right.$

$\left. \left[ \lambda t'' (\text{Lola}_{häufig_renn-}(t''')) \right] \right) \right)$

b. $[[ \text{Lola ist letztes Jahr oft zwei Wochen lang gerannt } ]^C \text{(now)} = 1$

iff there is a time $t'$ such that now $\subseteq t'$ or now $< t'$

and there is a time $t''$ such that $t'' \subseteq t'$

and there are many times $t'''$ such that $t'''$ is a

subinterval of last month and $t'''$ is two weeks

long

and $t'' \leq t'''$,}

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Lola **frequently** runs at t'', i.e. there are many subintervals t* of t'', such that Lola runs at t*.

As with the frame-setting modifiers mentioned in the preceding section, we will also not discuss modifications on the VP-level in more detail - and the question how modifications on the VP-level can be iterated; but see the somewhat related discussion in the next section. It is important, however, to be aware of the fact that there are temporal adverbial modifications beyond the ones we discuss in this chapter.

8. Additional functions of adverbials III: temporal adverbials with a quantificational and a nonquantificational component

Still another case of additional functions of temporal adverbials occurs when they contain both a quantificational and a nonquantificational component, e.g. *on every Monday* or *in some years*. This subsection serves to illustrate the interpretation of such adverbials. They are split up into the quantificational and the nonquantificational component in the semantic representation. We illustrate this with a simple past tense sentence (8-2a); this keeps the semantic representation simpler than it would be in a perfect sentence. The interpretation should basically work the same way with a perfect clause.

Our illustrating example contains the temporal adverbial *an jedem Montag* ('on every Monday'). This adverbial is intended to be associated with the quantifier ∃A. The temporal adverbial contains an explicit quantificational position component and an implicit duration component. However, the quantificational component does not substitute ∃A; rather, it is raised to a position higher than ∃A and leaves the existential interpretation of the aspect quantifier ∃A untouched. The raised quantifier is restricted by the nonquantificational component of the adverbial *an jedem Montag*.

Note that when temporal quantificational structures are nested into each other, each quantificational structure must be linked to the next higher one in some way. This can happen by tense predicates or by aspect predicates - or, in cases where there is no grammaticalized linking element like tense or aspect by a default relation; the default of this linking relation seems to be inclusion. Unless evidence to the opposite is found, I will assume this to be the case; note that this also corresponds to the most common actual interpretation of the default aspect in German (cf. chapter I). Thus, we assume a principle like (8-1).

(8-1) **Principle of the Integration of Temporal Quantificational Structures:**

a. Any temporal quantificational structure is integrated into the semantic representation of the clause by an obligatory restriction linking the temporal variable it introduces to the temporal variable introduced by the next higher temporal quantifier.
b. When this obligatory restriction is implicit, the linking is realized by the subinterval relationship, such that the value of the higher temporal variable includes the value of the lower temporal variable.

Hence, we need to add the inclusion relation in the restrictive clause of the universal quantifier. Note moreover that because of the insertion of this quantifier the aspect relation is also moved down one step down; it is not directly linked to the tense of the clause anymore.

(8-2b) shows the semantic representation of the sentence, where "JED" represents the universal quantifier subtracted from *an jedem Montag* and "am_Montag" represents the rest of the adverbial. The quantificational component "JED" of *an jedem Montag* (‘on every Monday’) is raised out of the adverbial expression at LF and attached in the position of the phonetically empty default quantifier ∃Α. It then takes the nonquantificational component of the adverbial as one of its restrictors.

(8-2) a. Lola rannte an jedem Montag.
Lola ran on every Monday

b. \( \lambda t \left( \exists T \left[ \lambda t^* (C(t^*) & PAST(t(t^*))) \right] \right) \\
\left[ \lambda t^* \left( JED \left[ \lambda t** (C(t**) & am_Montag(t**) & t** \subseteq t^*) \right] \right) \right) \\
\left[ \lambda t** \left( ∃Α \left[ \lambda t*** (C(t***) & PERF(t**)(t***) \right) \right) \left[ \lambda t*** (Lola_renn-(t***)]) \right) \right) \right) \]
iff (by $\lambda$-Conversion)
\[ [[ \exists_T \left( \lambda t^* (C (t^*) & \text{PAST} (t(t^*)) \right) ]
\left[ \lambda t^* \left( \text{JED} \ \lambda t^{**} (C (t^{**}) & \text{am_Montag} (t^{**}) & t^{**} \subseteq t^*) \right) \right]
\left[ \lambda t^{**} \left( \exists_A \left( \lambda t^{***} (C (t^{***}) & \text{PERF} (t^{**})(t^{***}) \right) \right] \left[ \lambda t^{***} (\text{Lola_renn-} (t^{***})) \right) \right] ] c, [t \rightarrow \text{now}] = 1 \]

iff (by the lexical entry of $\exists_T$) there is a time $t'$ such that
\[ [[ \lambda t^* (C (t^*) & \text{PAST} (t(t^*))) ] c, [t \rightarrow \text{now}] (t') = 1 \]
and
\[ [[ \lambda t^* \left( \text{JED} \ \lambda t^{**} (C (t^{**}) & \text{am_Montag} (t^{**}) & t^{**} \subseteq t^*) \right) ]
\left[ \lambda t^{**} \left( \exists_A \left( \lambda t^{***} (C (t^{***}) & \text{PERF} (t^{**})(t^{***}) \right) \right] \left[ \lambda t^{***} (\text{Lola_renn-} (t^{***})) \right) \right] ] c, [t \rightarrow \text{now}] (t') = 1 \]

iff (by Predicate Modification applied to the RC of $\exists_T$ and by $\lambda$-Conversion) there is a time $t'$ such that
\[ [[ \lambda t^* (C (t^*)) ] c, [t \rightarrow \text{now}] (t') = 1 \]
and
\[ [[ \lambda t^* (\text{PAST} (t(t^*))) ] c, [t \rightarrow \text{now}] (t') = 1 \]
and
\[ [[ \text{JED} \ \lambda t^{**} (C (t^{**}) & \text{am_Montag} (t^{**}) & t^{**} \subseteq t^*) ]
\left[ \lambda t^{**} \left( \exists_A \left( \lambda t^{***} (C (t^{***}) & \text{PERF} (t^{**})(t^{***}) \right) \right] \left[ \lambda t^{***} (\text{Lola_renn-} (t^{***})) \right) \right] ] c, [t \rightarrow \text{now}], [t^* \rightarrow t'] = 1 \]

iff (by $\lambda$-Conversion and by the lexical entry of JED) there is a time $t'$ such that
\[ [[ C (t^*) ] c, [t \rightarrow \text{now}], [t^* \rightarrow t'] = 1 \]
and
\[ [[ \text{PAST} (t(t^*)) ] c, [t \rightarrow \text{now}], [t^* \rightarrow t'] = 1 \]
and
for all times $t''$ such that
\[ [[ \lambda t^{**} (C (t^{**}) & \text{am_Montag} (t^{**}) & t^{**} \subseteq t^*) ] c, [t \rightarrow \text{now}], [t^* \rightarrow t'] (t'') = 1, \]
\[ [[\lambda t^{**} (\exists A \left[ \lambda t^{***} (C (t^{**}) \& \text{PERF} (t^{**})(t^{***})) \right] \\
\left[ \lambda t^{***} (\text{Lola}_\text{renn-} (t^{***})) \right] )]] c, [t \rightarrow \text{now}], [t^{*} \rightarrow t'] (t'') = 1, \]

iff (by \(\lambda\)-Conversion)
there is a time \(t'\) such that
\[ [[C (t^{*})] c, [t \rightarrow \text{now}], [t^{*} \rightarrow t'] = 1 \]
and
\[ [[\text{PAST} (t)(t^{*})] c, [t \rightarrow \text{now}], [t^{*} \rightarrow t'] = 1 \]
and
for all times \(t''\) such that
\[ [[C (t^{**}) \& \text{am}_\text{Montag} (t^{**}) \& t^{**} \subseteq t^{*}]] c, [t \rightarrow \text{now}], [t^{*} \rightarrow t'], [t^{**} \rightarrow t''] = 1, \]
\[ [[\exists A \left[ \lambda t^{***} (C (t^{**}) \& \text{PERF} (t^{**})(t^{***})) \right] \\
\left[ \lambda t^{***} (\text{Lola}_\text{renn-} (t^{***})) \right] )]] c, [t \rightarrow \text{now}], [t^{*} \rightarrow t'], [t^{**} \rightarrow t''] = 1, \]

iff (by Predicate Modification applied to the RC of JED)
there is a time \(t'\) such that
\[ [[C (t^{*})] c, [t \rightarrow \text{now}], [t^{*} \rightarrow t'] = 1 \]
and
\[ [[\text{PAST} (t)(t^{*})] c, [t \rightarrow \text{now}], [t^{*} \rightarrow t'] = 1 \]
and
for all times \(t''\) such that
\[ [[C (t^{**})]] c, [t \rightarrow \text{now}], [t^{*} \rightarrow t'], [t^{**} \rightarrow t''] = 1 \]
and
\[ [[t^{**} \subseteq t^{*}]] c, [t \rightarrow \text{now}], [t^{*} \rightarrow t'], [t^{**} \rightarrow t''] = 1 \]
and
\[ [[\text{am}_\text{Montag} (t^{**})]] c, [t \rightarrow \text{now}], [t^{*} \rightarrow t'], [t^{**} \rightarrow t''] = 1, \]
there is a time \(t''\) such that
\[ [[\lambda t^{***} (C (t^{**}) \& \text{PERF} (t^{**})(t^{***})) ] c, [t \rightarrow \text{now}], [t^{*} \rightarrow t'], [t^{**} \rightarrow t''] (t''') = 1, \]
and
\[ [[\lambda t^{***} (\text{Lola}_\text{renn-} (t^{***})) ] c, [t \rightarrow \text{now}], [t^{*} \rightarrow t'], [t^{**} \rightarrow t''] (t''') = 1, \]

iff (by the lexical entry of \(\exists A\))
there is a time \(t'\) such that
\[ [[C (t^{*})] c, [t \rightarrow \text{now}], [t^{*} \rightarrow t'] = 1 \]
and
\[ [[\text{PAST} (t)(t^{*})] c, [t \rightarrow \text{now}], [t^{*} \rightarrow t'] = 1 \]
and
for all times \(t''\) such that
\[ [[C (t^{**})]] c, [t \rightarrow \text{now}], [t^{*} \rightarrow t'], [t^{**} \rightarrow t''] = 1 \]
and 
\[ ([t** \subseteq t^*])^c, [t \rightarrow \text{now}], [t^* \rightarrow t'], [t^* \rightarrow t^n] = 1 \]
and 
\[ ([\text{am}_\text{Montag}(t**))]^c, [t \rightarrow \text{now}], [t^* \rightarrow t'], [t^* \rightarrow t^n] = 1, \]
there is a time \( t'' \) such that 
\[ ([\lambda_{t***} (C(t***) \& \text{PERF} (t**(t***)))]^c, [t \rightarrow \text{now}], [t^* \rightarrow t'], [t^* \rightarrow t^n] (t'') = 1, \]
and 
\[ ([\lambda_{t***} (\text{Lola}_\text{renn}-(t***))]^c, [t \rightarrow \text{now}], [t^* \rightarrow t'], [t^* \rightarrow t^n] (t'') = 1, \]
iff (by \( \lambda \)-Conversion)
there is a time \( t' \) such that 
\[ ([C(t^*)]^c, [t \rightarrow \text{now}], [t^* \rightarrow t'] = 1 \]
and 
\[ ([\text{PAST}(t)(t^*)]^c, [t \rightarrow \text{now}], [t^* \rightarrow t'] = 1 \]
and 
for all times \( t'' \) such that 
\[ ([C(t**)]^c, [t \rightarrow \text{now}], [t^* \rightarrow t'], [t^* \rightarrow t^n] = 1 \]
and 
\[ ([t** \subseteq t^*])^c, [t \rightarrow \text{now}], [t^* \rightarrow t'], [t^* \rightarrow t^n] = 1 \]
and 
\[ ([\text{am}_\text{Montag}(t**))]^c, [t \rightarrow \text{now}], [t^* \rightarrow t'], [t^* \rightarrow t^n] = 1, \]
there is a time \( t''' \) such that 
\[ ([C(t**)]^c, [t \rightarrow \text{now}], [t^* \rightarrow t'], [t^* \rightarrow t^n], [t*** \rightarrow t'''] = 1, \]
and 
\[ ([\text{Lola}_\text{renn}-(t***])]^c, [t \rightarrow \text{now}], [t^* \rightarrow t'], [t^* \rightarrow t^n], [t*** \rightarrow t'''] = 1, \]
iff (by Predicate Modification applied to the RC of \( \exists \lambda \))
there is a time \( t' \) such that 
\[ ([C(t^*)]^c, [t \rightarrow \text{now}], [t^* \rightarrow t'] = 1 \]
and 
\[ ([\text{PAST}(t)(t^*)]^c, [t \rightarrow \text{now}], [t^* \rightarrow t'] = 1 \]
and 
for all times \( t'' \) such that 
\[ ([C(t**)]^c, [t \rightarrow \text{now}], [t^* \rightarrow t'], [t^* \rightarrow t^n] = 1 \]
and 
\[ ([t** \subseteq t^*])^c, [t \rightarrow \text{now}], [t^* \rightarrow t'], [t^* \rightarrow t^n] = 1 \]
and 
\[ ([\text{am}_\text{Montag}(t**))]^c, [t \rightarrow \text{now}], [t^* \rightarrow t'], [t^* \rightarrow t^n] = 1, \]
there is a time \( t''' \) such that 
\[ ([C(t**)]^c, [t \rightarrow \text{now}], [t^* \rightarrow t'], [t^* \rightarrow t^n], [t*** \rightarrow t'''] = 1, \]
and
\[[\text{PERF } (t^{**})(t^{***}) ]\] c, \([t\rightarrow{\text{now}}], [t^{*}\rightarrow{t'}], [t^{**}\rightarrow{t''}], [t^{***}\rightarrow{t'''}] = 1,\]
and
\[[\text{Lola_renn- } (t^{**}) ]\] c, \([t\rightarrow{\text{now}}], [t^{*}\rightarrow{t'}], [t^{**}\rightarrow{t''}], [t^{***}\rightarrow{t'''}] = 1,\]

iff (by variable assignments)
\[[\text{C } (t') ]\] c = 1
and
\[[\text{PAST } (t)(t') ]\] c = 1
and
for all times \(t''\) such that
\[[\text{C } (t'') ]\] c = 1
and
\[[t'' \subseteq t']\] c = 1
and
\[[\text{am_Montag } (t'') ]\] c = 1,
there is a time \(t''\) such that
\[[\text{C } (t''') ]\] c = 1,
and
\[[\text{PERF } (t'')(t''') ]\] c = 1,
and
\[[\text{Lola_renn- } (t''') ]\] c = 1,

iff (by the lexical entries of the remaining elements)
t' is a subinterval of a time the speaker in c refers to and t' is of a duration the speaker in c attributes to it
and
t' < now
and
for all times \(t''\) such that
\(t''\) is a subinterval of a time the speaker in c refers to and \(t''\) is of a duration the speaker in c attributes to it
and
\(t'' \subseteq t'\)
and
\(t''\) is a subinterval of a Monday and \(t''\) is of a duration the speaker in c attributes to it
and
there is a time \(t'''\) such that
\(t'''\) is a subinterval of a time the speaker in c refers to and \(t'''\) is of a duration the speaker in c attributes to it
and
\(t''' \subseteq t''\)
and
Lola runs at t"'.

Hence, leaving aside irrelevant conditions, in the context given in (8-2), *Lola rannte an jedem Montag* is true if and only if there is a time t' such that t' is before now and for all times t'' such that t'' is a subinterval of a Monday and t' is of a duration the speaker in c attributes to it and t' includes t'', there is a time t''' such that t'' includes t''' and Lola runs at t'''.

9. Additional functions of adverbials IV: iteration of adverbials on a single level

A related case of additional functions of temporal adverbials comes into play when adverbials are iterated on a single level of temporal modification. Presumably such cases occur on the tense level as well as on the aspect level; but the ones that are most clear and moreover, best available by intuitions in perfect constructions, are cases on the participle level.

Consider (9-1), an example modeled after a similar example of Fabricius-Hansen (1986). The crucial observation about this example is that each of the adverbials somehow functions on the participle level.

(9-1)  
*Das Telefon hat letzte Woche jeden Tag zwischen zwei und drei
viermal ein paar Minuten lang geklingelt.*

*the phone has last week every day between two and three
four-times a few minutes long rung*

However, since the sentence contains two quantificational adverbs it is clear that not both of them can function as substitutes of ∃p. One certainly can, but how about the other? What function does it have? And how can it be adequately integrated into the semantic representation of the clause?

I suggest the following analysis for the nested cases. The nuclear scope of each quantificational adverb can introduce another quantifier that must be integrated into its embedding quantificational structure. According to the Principle of the Integration of Temporal Quantificational Structures (8-1) (see section 8), the integration of a particular quantifier's structure is guaranteed by an implicit obligatory restriction of this quantifier that imposes the subinterval property on the relationship of its variable to the one of the next higher quantifier. In this way we can count quantificational structures and assign indices to them depending on whether they belong to the first, upmost, the second, ..., or the lowest quantifier. (9-2) illustrates this for example (9-1).

(9-2)  
*Das Telefon hat letzte Woche jeden Tag zwischen zwei und drei
viermal ein paar Minuten lang geklingelt.*

*the phone has last week every day between two and three
four-times a few minutes long rung*
(9-3) shows a semantic representation of the example and its truth conditions.

\((9-3)\) a. \(\lambda t \left( \exists t' \left( (C(t') \& \text{PRES}(t(t'))) \right) \left[ \lambda t'' \left( \exists A \left( (C(t'') \& \text{PERF}(t)(t'')) \right) \right) \right] \left[ \lambda t'' \left( \text{JEDP}_1 \left( \lambda t''' \left( (C(t''' \& \text{Tag}(t''')) \& \text{letzte_Woche}(t'') \right) \& \text{zwischen_zwei_u._drei}(t''') \& \text{ge...t hab-}(t''')(t''') \right) \right) \right] \left[ \lambda t''' \left( \text{VIERP}_2 \left( \lambda t^* \left( (C(t^*) \& t^* \subseteq t''' \& \text{ein paar Minuten lang}(t^*)) \right) \right) \right] \left( \lambda t^* \left( \text{das_T._klingel-}(t^*)) \right) \right) \right) \right]

b. [[] Das Telefon hat letzte Woche jeden Tag zwischen zwei und drei viermal ein paar Minuten lang geklingelt ]\(\subseteq\) (now) = 1

iff there is a time t' such that now \(\subseteq t'\) or now < t' and
there is a time t'' such that t'' \(\subseteq t'\) and for all times t''' such that t''' is a subinterval of any day of last week and t''' lasts from two to four and t''' \(\leq t''\)
there are four times t* such that t* is a subinterval of t'''
and there are four times t* such that and t* is a few minutes long,
and the phone rings at t*.

10. Additional functions of adverbials V: Restrictors of nontemporal quantifiers

A fifth case of modification by temporal adverbials comes into play in connection with certain nontemporal quantifiers: it turns out that temporal adverbials cannot only serve as restrictors of temporal quantifiers but also of generic operators that seem to quantify over individuals. Consider (10-1). The sentence makes a generic statement over students. However, the statement concerns only students in the seventies. It cannot be understood as a statement concerning present students.

\((10-1)\) In den siebziger Jahren waren Studenten im Kindergarten.

\(\text{in the seventy years were students in-the kindergarten} = \text{in the seventies, individuals who were students then were in the kindergarten.}
\neq \text{In the seventies, individuals who are students now were in the kindergarten.}

Since it is contradictory to attribute to an individual both the property of being a student and being a kindergarten-child at the same time, the sentence is either
infelicitous under this reading, or the students in the seventies are understood to be, for instance, grown-up visitors in the kindergarten.

Nongeneric noun phrases that do not differ from generic ones too much semantically, i.e. universally quantified ones, do not show this behavior: (10-2) can quite easily be understood as a statement concerning present students instead of students in the seventies.

(10-2) In den siebziger Jahren waren alle Studenten im Kindergarten.

In the seventy years were all students in the kindergarten.

Thus it seems that in contrast to determiner quantifiers, generic operators can be restricted by temporal adverbials. The construction in (10-1) can thus only receive a logical form very roughly like (10-3). The one in (10-2), however, can also receive logical forms very roughly like (10-4).

(10-3) GEN_x ∃_t [ student (x) & in the seventies (x)]  [ be in the kindergarten (x, t) & in the seventies (t)]

(10-4) ALL_x ∃_t [ student (x)]  [ be in the kindergarten (x, t) & in the seventies (t)]

For more details on constructions like this, see Musan (1995/1997: chapter III).

11. Negation

Having seen what kinds of semantic function temporal adverbials can take in perfect constructions, we will now briefly consider what negation can apply to in perfect constructions. As was shown in the preceding sections, temporal adverbials can serve as modifiers on all three levels we are concerned with in perfect constructions - the tense level, the aspect level, and the participle level. Which of these levels can negation by *nicht* ('not') apply to?

First, as the simple past tense clause in (11-1a) shows, negation on the tense level is available, as is indicated in the reading in (11-1b). Moreover, in this example, negation on a level lower than the tense level - e.g. the aspect level and the VP-internal level - does not seem to be available: the respective readings, paraphrased in (11-1c, d), do not seem to be available - they are too weak. According to these readings, (11-1a) should be judged true when yesterday afternoon included some time interval at which Eva did not play with Rafael.10

10 This has also been discussed in von Stechow (1999b:11ff).
(11-1) NEGATION ON THE TENSE LEVEL:

a. weil Eva gestern nachmittag nicht mit Rafael spielte
   *since Eva yesterday afternoon not with Rafael played*

b. = It is not the case that there is a time t' such that t' is (possibly improperly) included in yesterday afternoon and t' < now
   and there is a time t" such that t" ⊆ t'
   and Eva plays with Rafael at t".

c. ≠ There is a time t' such that t' is (possibly improperly) included in yesterday afternoon and t' < now
   and it is not the case that there is a time t" such that t" ⊆ t'
   and Eva plays with Rafael at t".

d. ≠ There is a time t' such that t' is (possibly improperly) included in yesterday afternoon and t' < now
   and there is a time t" such that t" ⊆ t'
   and it is not the case that Eva plays with Rafael at t".

This does not mean, however, that negation is only available on the tense level. Consider a situation where Eva and Rafael played together all afternoon yesterday - except for an hour where Eva had to take a bath. The example in (11-2a) is intuitively judged true with regard to this situation; it is especially good with stress on the negation. But as is shown in (11-2b-d), for expressing this reading, negation on the VP-level is required.

(11-2) NEGATION ON THE VP-LEVEL:

a. weil Eva gestern nachmittag eine Stunde lang nicht mit Rafael spielte
   *since Eva yesterday afternoon an hour long not with Rafael played*

b. ≠ It is not the case that there is a time t' such that t' is (possibly improperly) included in yesterday afternoon and t' < now
   and there is a time t" such that t" is an hour long and t" ⊆ t'
   and Eva plays with Rafael at t".

c. ≠ There is a time t' such that t' is (possibly improperly) included in yesterday afternoon and t' < now
   and it is not the case that there is a time t" such that t" is an hour long and t" ⊆ t'
   and Eva plays with Rafael at t".

d. = There is a time t' such that t' is (possibly improperly) included in yesterday afternoon and t' < now
   and there is a time t" such that t" is an hour long and t" ⊆ t'
   and it is not the case that Eva plays with Rafael at t".

However, the matter turns out to be even more complex. Examples (11-3) - (11-5) display some readings that appear to me to be available in perfect clauses. In order to get the relevant readings, it is helpful to make use of the stress patterns that are
indicated with the examples - obviously, variations of the topic-focus structure trigger more or less subtle differences between the readings (for more details on this, see the vast literature on negation, e.g. Horn (1989), Jacobs (1991)).

(11-3a) illustrates a negated sentence where negation applies on the aspect level. The intended reading comes out best with stress on the auxiliary. (11-3b) provides a paraphrase of this reading.

(11-3) NEGATION ON THE ASPECT LEVEL:

a. weil Eva nicht geschlafen HAT
   *since Eva not slept has*

b. There is a time t' such that now ⊆ t'
   and it is not the case that there is a time t" such that t" ⊆ t'
   and there is a time t'" such that t'" ≤ t'
   and Eva sleeps at t'".

A paraphrase of (11-3) that is intuitively more comprehensible is something like "Eva is now not in a post-state of sleeping (but in an alternative state, for instance, in a state of sleeping)."

In (11-4a), negation applies on the participle level. Unsurprisingly, this reading is best available with stress on the participial verb.

(11-4) NEGATION ON THE PARTICIPLE LEVEL:

a. weil Eva nicht geSCHLAfen hat
   *since Eva not slept has*

b. There is a time t' such that now ⊆ t'
   and there is a time t" such that t" ⊆ t'
   and it is not the case that there is a time t'" such that t'" ≤ t'
   and Eva sleeps at t'".

The less technical paraphrase of this reading is something like "Eva is now not in a post-state of sleeping (but the post-state of an alternative situation, for instance, in a post-state of running)."

Negation by nicht ('not') also seems to be able to apply on the VP-level. (11-5a, b) provides an illustrating example; in order to get the intended reading, it is helpful but not necessary to put stress on the auxiliary; it is crucial, however, to put stress on the negation element and to insert a pause (marked by "||") before nicht ('not') and between the participial verb and the auxiliary. (11-5c) shows the official paraphrase of the readings.

(11-5) NEGATION ON THE VP-LEVEL:

a. weil Eva || NICHT_geschlafen || HAT
   *since Eva not slept has*

b. weil Eva || NICHT_geschlafen || HAT
since Eva not slept has
c. There is a time t' such that now ⊆ t'
   and there is a time t'' ⊆ t'
   and there is a time t'''
   such that t'''' ≤ t''
   and it is not the case that
   Eva sleeps at t''''.

Intuitively, the precise paraphrase of (11-5a) is something like "What Eva did was not

to sleep/to be awake;" the one of (11-5b) is something like "Eva is now in a post-state

of not-sleeping."

If these readings are indeed available and their paraphrases are adequately

represented in the truth condions in the above examples, then there is evidence

negation by nicht ('not') in a perfect clause can be applied on the aspect level, on the

participle level, and on the VP-level. So far I do not see any evidence, however, that it

can be applied on the tense level here, too. If it were, then a reading like the one in

(11-6) should be available.

(11-6) *NEGATION ON THE TENSE LEVEL:

a. weil Eva nicht geschlafen hat
   since Eva not slept has

b. It is not the case that there is a time t' such that now ⊆ t'
   and there is a time t'' ⊆ t'
   and there is a time t'''' such that t'''' ≤ t''
   and Eva sleeps at t''''.

I do not believe, however, that it is.

To conclude, the applicability of negation on the different levels of semantic

representation seems to depend on various factors. These factors, however, appear to

be quite complex and hard to understand; they clearly lead beyond the scope of this

study. Hence, their investigation is an ideal candidate for future research.

12. Syntactic base and surface positions of temporal adverbials

For an account of how temporal adverbials function in perfect constructions and how

they are integrated into the semantic composition of the clause, we will sketch the

syntax/semantics interface to the extent to which it concerns temporal adverbials. Temporal adverbials, like noun phrase arguments of verbs, have certain canonical

base positions and, again like noun phrase arguments, can leave these base positions

under certain restricted circumstances.

This section examines these issues. In particular, we will deal with questions like

the following ones:
What are the syntactic base positions of temporal adverbials belonging to the tense level, to the aspect level, to the participle level, and to the VP-level?
What are the syntactic base positions of temporal adverbials of different types belonging to the same level of semantic representation?
Which factors determine their surface positions?

Before we go into a discussion of these issues, I will provide a brief survey of some important claims concerning these questions that have been made in the literature.

12.1. The unmarked surface order of temporal adverbials of a single level

The unmarked surface order of German temporal adverbials belonging to the single level can be identified when the intonation of a clause is unmarked. Let us check the acceptability of the logically possible sequences of the adverbials manchmal ('sometimes'), morgens ('in the morning'), and eine Stunde lang ('for an hour') in (12-1).

The adverbials function on the same level when the position adverbial and the duration adverbial restrict the quantificational adverb. Note that the acceptability marks "*", "*?", and "?" in (12-1) do not concern the acceptability of the sentences as such but their acceptability under the reading "There is one morning of last week such that this morning contains an interval of one hour's length at which Lola ran."

\[(12-1)\]
\[
a. \text{ Letzte Woche ist Lola einmal morgens eine Stunde lang gerannt.} \\
\text{ last week is/has Lola once in-the-morning an hour long run} \\
b. \text{ *?Letzte Woche ist Lola einmal eine Stunde lang morgens gerannt.} \\
\text{ last week is/has Lola once an hour long in-the-morning run} \\
c. \text{ ?Letzte Woche ist Lola morgens einmal eine Stunde lang gerannt.} \\
\text{ last week is/has Lola in-the-morning once an hour long run} \\
d. \text{ *Letzte Woche ist Lola morgens eine Stunde lang einmal gerannt.} \\
\text{ last week is/has Lola in-the-morning an hour long once run} \\
e. \text{ *Letzte Woche ist Lola eine Stunde lang einmal morgens gerannt.} \\
\text{ last week is/has Lola an hour long once in-the-morning run} \\
f. \text{ *Letzte Woche ist Lola eine Stunde lang morgens einmal gerannt.} \\
\text{ last week is/has Lola an hour long in-the-morning once run} \\
\]

(12-1) thus suggests that the unmarked surface order of adverbials on a single level in German is the one presented in (12-2).

\[(12-2)\] Quantificational adverbial < position adverbial < duration adverbial

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11 The adverbial letztes Jahr ('last year') just serves to restrict the readings to past readings in contrast to present or future readings of the present perfect (cf. chapter II). In order to keep it from confusing the judgements on the acceptability or surface orderings, it is put into the clause-initial topicalization position.
However, this holds only when the position adverbial and the duration adverbial are indefinite. When they are substituted by definite adverbials, the picture changes; a comparison of relevant data shows that definite and indefinite position adverbials tend to occupy different surface positions with regard to quantificational adverbials. The same holds for definite and indefinite duration adverbials. Both definite position and definite duration adverbials like to precede quantificational adverbials, where the position adverbials still like to precede the duration adverbials.

(12-3) a. ?Letzte Woche ist Lola einmal am Montag von 8 bis 9 gerannt.
   last week is/has Lola once in-the-morning from 8 until 9 run

b. *Letzte Woche ist Lola einmal von 8 bis 9 am Montag gerannt.
   last week is/has Lola once from 8 until 9 in-the-morning run

c. ?Letzte Woche ist Lola am Montag einmal von 8 bis 9 gerannt.
   last week is/has Lola in-the-morning once from 8 until 9 run

d. Letzte Woche ist Lola am Montag von 8 bis 9 einmal gerannt.
   last week is/has Lola in-the-morning from 8 until 9 once run

e. *?Letzte Woche ist Lola von 8 bis 9 einmal am Montag gerannt.
   last week is/has Lola from 8 until 9 once in-the-morning run

f. ?Letzte Woche ist Lola von 8 bis 9 am Montag einmal gerannt.
   last week is/has Lola from 8 until 9 in-the-morning once run

Hence, we arrive at the following unmarked surface order of temporal adverbials on a single level.

(12-4) pos. adv.def < dur. adv.def < quantific. adv. < pos. adv.indef < dur. adv.indef

According to my account, however, both definite and indefinite nonquantificational temporal adverbials function as restrictors of quantificational adverbials. Hence, it seems that their surface position does not affect their semantic function. Rather, their surface position seems to be the result of some movement process that is significantly associated with definiteness. This is, of course, reminiscent of the SCRAMBLING of noun phrases in languages like Dutch and German. We will come back to this point below.

Moreover, as is illustrated by the adverbial letzte Woche ('last week') in (12-1) and (12-3), temporal adverbials in German can, like most phrases, occur in the sentence-initial so-called 'topicalization' position - a position that functions as the target not only of topic-related movement but may also host constituents that are in focus. The 'TOPICALIZATION' of temporal adverbials, i.e. their undergoing movement to the 'topicalization' position, is reminiscent of the preposing of temporal adverbials that can be observed, for instance, in English. In order to prevent misunderstandings, let me add already at this point that the so-called 'topicalization' movement in German is only very loosely associated with topichood: topical elements are only one type of expressions that can undergo this movement; elements in focus can be 'topicalized' as well.
We will in the following three subsections have a closer look at the scrambling, the 'topicalization', and the preposing of temporal adverbials in English and German. Our main goal will be to understand the meaning effects of these movement processes.

### 12.2. Preposing of temporal adverbials in English

De Swart (1999) provides a thorough survey of the ways in which the interpretation of preposed temporal adverbials in English differs from the interpretation of postponed ones. She points out several meaning differences between them and argues that the source of the differences is a topic-focus contrast: while preposed temporal adverbials are always topical, i.e. can hardly ever be in focus, postponed temporal adverbials can very easily, but need not, be in focus. As a consequence, sentences with preposed (12-4a, c) and postponed (12-4b, d) position adverbials differ with regard to what kind of questions they may answer felicitously (p338).

(12-4) a. What happened at six o'clock? - At six o'clock, Jane left.
   b. What happened at six o'clock? - Jane left at six o'clock.
   c. When did Jane leave? - #At six o'clock, Jane left.
   d. When did Jane leave? - Jane left at six o'clock.

Because of the topic-focus difference, the adverbials differ with regard to their presuppositional character. This in turn has consequences for their requirements with respect to their anchoring in the discourse context: topical, i.e. preposed, temporal adverbials can be anchored to the time axis directly without being dependent on the rhetorical structure of the local context. The general rule seems to be as follows. If a clause has no temporal adverbial, then its tense time is set in relation to the tense time of the preceding clause: stative clauses maintain it, whereas nonstative clauses shift it to a later time. If the clause has a temporal adverbial, then it depends on its position. If it is in the initial position, it usually introduces a fresh tense time. If it is not preposed, it is normally related - either by maintenance or shift - to the preceding tense time.12

De Swart proposes to analyze topical temporal adverbials as temporal frame adverbials of their clause and focussed temporal adverbials as event modifiers.

At least two types of meaning differences can be derived from the difference concerning topic-focus structure. First, the topic-focus contrast has consequences in combination with items whose interpretation is determined by the topic-focus structure of their clause, e.g. with negation (12-5) and with focus-sensitive particles like even (12-6) (p339).

(12-5) a. At three o'clock, the bomb didn't explode.

12 'Reference times' according to de Swart; in her paper, however, de Swart proposes a system that does not make use of a notion of reference time.
According to de Swart, both readings can be viewed as different ways to spell out the more general reading "It is not the case that there is an event of the bomb exploding such that this event took place at three o'clock." The semantic scope of negation can then be taken as the entire proposition while its pragmatic scope is the part of the sentence that is in focus.

The focus-sensitive particle *even* carries a scalar presupposition concerning likelihood (cf. König (1991)). It takes the focus part of its clause as the property whose likelihood is measured.

(12-6) a. After midnight, Julia even drinks vodka.
   = It is unlikely that Julia drinks vodka.
   b. Julia even drinks vodka after midnight.
   = It is unlikely that Julia drinks vodka after midnight.

Thus, whereas (12-6b) with the postponed adverbial *after midnight* can add the time restriction to the measure of likelihood, this is not possible in (12-6a). This is so because the adverbial is preposed in this sentence. Hence, it is topical and consequently cannot be taken as part of the focus of the clause.

Second, certain truth-conditional differences arise in combination with quantification. Being topics and hence, providing old information with respect to their clause, preposed adverbials take wide scope over operators contained in the rest of the clause. Having no fixed status with regard to topic-focus structure, postponed adverbials, however, can participate in scope ambiguities (344ff). This is illustrated in (12-7).

(12-7) a. On a beautiful Sunday in spring, every student on campus went hiking in the foothills.
   = There is a beautiful Sunday in spring such that every student on campus went hiking in the foothills on that Sunday.
   ≠ For every student on campus there is a beautiful Sunday in spring on which he went hiking in the foothills.
   b. Every student on campus went hiking in the foothills on a beautiful Sunday in spring.
   = There is a beautiful Sunday in spring such that every student on campus went hiking in the foothills on that Sunday.
   = For every student on campus there is a beautiful Sunday in spring on which he went hiking in the foothills.
The truth-conditional effects show that the correlation between the position and the meaning of temporal adverbials is not a mere pragmatic effect (de Swart (1999:346)).

Hitzeman (1997) explains another set of data in a way that fits together very well with de Swart's approach. Hitzeman accounts for the apparent position/duration ambiguity of adverbials like for an hour, since 1960 or until midnight that has been dealt with in the literature at various places (cf. Dowty (1979), Kamp and Reyle (1993), Vlach (1993); see also section 3 above). Hitzeman's crucial observation is that the adverbials exhibit different readings depending on their syntactic surface position. Thus, the postponed adverbial for an hour in (12-8a, b) is ambiguous. First, it can have a reading where the crucial hour-interval starts or ends, respectively, at the time of utterance and is therefore position-definite, or short: P-DEFINITE (cf. the terminology of Klein (1992a)). Second, it can have a reading where the interval is located at some unspecified time in the future or past, respectively; since the interval is not anchored at a definite time, this reading is called NON-P-DEFINITE. This contrasts with the behavior of the preposed adverbial in (12-8c, d). It is not ambiguous; it can only have the respective p-definite reading.13

(12-8) a. Martha will be in her office for an hour.
   b. Martha has been in her office for an hour.
   c. For an hour Martha will be in her office.
   d. For an hour Martha has been in her office.

To conclude, the following picture arises. Position as well as duration adverbials in English can undergo preposing. Preposing has in principle the same effect on both types of adverbials: since preposing is associated with topichood, preposed adverbials always have topic-like properties. These topic-like properties can show in slightly different ways. For instance, overtly indefinite duration adverbials like for an hour are p-definite, and position adverbials like on a beautiful Sunday receive wide scope interpretations in combination with certain quantificational environments or they show predictable interactions with focus-sensitive particles.

12.3. 'Topicalization' of temporal adverbials in German

In many ways, German exhibits a kind of preposing of temporal adverbials similar to the one in English. More specifically, in German, temporal adverbials in main clauses can, like most other phrases of a clause, be moved to the sentence-initial 'topicalization' position, which is usually identified as the specifier position of the CP (For details, the reader is referred to Stechow and Sternefeld (1988)). The

13 Hitzeman derives the behavior of these temporal adverbials as an extension of the tree splitting account of Diesing's (1990, 1992) Mapping Hypothesis. However, as has been argued in the literature at various places (e.g. Jäger (1999) and literature cited therein), the effects of Diesing's syntactic tree splitting mechanism can more adequately be reformulated in terms of topichood.
construction, used above repeatedly, is illustrated again in (12-9a) together with its apparent English counterpart in (12-9b).

(12-9) a. Um sechs Uhr ging Jane.
   at six o'clock left Jane
   b. At six o'clock, Jane left.

In contrast to preposing in English, the 'topicalization' of temporal adverbials (or of other phrases) in German, however, does not obligatorily involve topichood. In fact, despite the misnomer 'topicalization', the specifier position of the CP in German can very easily host phrases that are in focus. Consequently, German 'topicalized' temporal adverbials are predicted to behave differently from English preposed ones. Thus, compare (12-10) to (12-4); in contrast to (12-4c), (12-10c) is acceptable.

(12-10) a. Was ist um sechs Uhr passiert? - Um sechs Uhr ging Jane.
   what is/has at six o'clock happened? - at six o'clock left Jane
   b. Was ist um sechs Uhr passiert? - Jane ging um sechs Uhr.
   what is/has at six o'clock happened? - Jane left at six o'clock
   c. Wann ging Jane? - Um sechs Uhr ging Jane.
   when left Jane? - at six o'clock left Jane
   d. Wann ging Jane? - Jane ging um sechs Uhr.
   when left Jane? - Jane left at six o'clock

Similarly, since the front position of temporal adverbials is not strictly associated with topichood, the interactions with focus-sensitive expressions in English that were illustrated in (12-5) and (12-6) do not arise in the same way in German. There are interactions, of course, but they are not triggered by the information-structural properties of the phrase that is moved into the specifier position of the CP.

Let us first consider the interactions with negation in (12-11). In contrast to (12-5a), (12-11a) can have at least the two readings indicated; in order to get the one that is excluded in English, one just has to change the intonation pattern. That is, fronting the temporal adverbial does not restrict the readings. However, when the temporal adverbial is not moved into the specifier position of the CP, it has two options - it can either appear in its base position on the right hand side (12-11b) or, due to scrambling, on the left hand side of negation (12-11c).

(12-11) a. Um drei Uhr explodierte die Bombe nicht.
   at three o'clock exploded the bomb not
   = What happened at three o'clock was that the bomb didn't explode.
   = The bomb exploded, but this didn't happen at three o'clock.
   b. Die Bombe explodierte nicht um drei Uhr.
   the bomb exploded not at three o'clock
   = What happened at three o'clock was that the bomb didn't explode.
   = The bomb exploded, but this didn't happen at three o'clock.
c. Die Bombe explodierte um drei Uhr nicht.

the bomb exploded at three o’clock not
= What happened at three o'clock was that the bomb didn't explode.
≠ The bomb exploded, but this didn't happen at three o'clock.

Interestingly, the latter option is incompatible with the second reading; thus, in this respect, scrambling of temporal adverbials in German behaves like preposing in English. As we will see in the next subsection, where we discuss scrambling in more detail, this is not surprising. In fact, since scrambling is associated with topicalhood, this is rather what one would expect.

Next, let us consider the German counterparts of the English data in (12-6), which concern interactions of temporal adverbials with the focus-sensitive particle sogar (‘even’). Again, with the temporal adverbial in the specifier position of the CP (12-12a), both readings mentioned above are available; as with negation, the availability depends on the intonation pattern. However, in contrast to the negation data, locating the temporal adverbial to the right hand side (12-12b) or to the left hand side of sogar (‘even’) (12-12c) both has a disambiguating effect as is indicated.

(12-12) a. Nach Mitternacht trinkt Julia sogar Wodka.

after midnight drinks Julia even vodka
= It is unlikely that Julia drinks vodka.
≠ It is unlikely that Julia drinks vodka after midnight.

b. Julia trinkt sogar nach Mitternacht Wodka.

Julia drinks even after midnight vodka
≠ It is unlikely that Julia drinks vodka.
= It is unlikely that Julia drinks vodka after midnight.

c. Julia trinkt nach Mitternacht sogar Wodka.

Julia drinks after midnight even vodka
= It is unlikely that Julia drinks vodka.
≠ It is unlikely that Julia drinks vodka after midnight.

Thus, it seems that the sequencing of sogar (‘even’) and temporal adverbials in the Mittelfeld does not hinge on scrambling. Rather, I propose that the particle can be posed in the Mittelfeld relatively freely. It then seems to be sensitive mainly to what appears on its right side.

Now, how about the truth-conditional effects that were illustrated in (12-7)? Since neither fronted temporal adverbials (12-13a) nor temporal adverbials that remain in their base position (12-13b) are obligatory topics, we expect both to participate in scope ambiguities. This expectation is indeed borne out.

(12-13) a. An einem schönen Sonntag wanderte jeder Student im Gebirge

on a beautiful Sunday hiked every student in-the mountains
= There is a beautiful Sunday where every student went hiking in the mountains.
For every student there is a beautiful Sunday on which he went hiking in the mountains.

b. Jeder Student wanderte an einem schönen Sonntag im Gebirge.
   *every student hiked on a beautiful Sunday in the mountains*
   = There is a beautiful Sunday where every student went hiking in the mountains.
   = For every student there is a beautiful Sunday on which he went hiking in the mountains.

Finally, as one expects at this point, the distribution of p-definite and non-p-definite readings in English cannot be found in the corresponding German constructions; the adverbials in all four sentences in (12-14) can have p-definite as well as non-p-definite readings.

(12-14) a. Martha wird eine Stunde lang in ihrem Büro sein.
   *Martha will an hour long in her office be*
   b. Martha ist eine Stunde lang in ihrem Büro gewesen.
   *Martha is/has an hour long in her office been*
   c. Eine Stunde lang wird Martha in ihrem Büro sein.
   *an hour long will Martha in her office be*
   d. Eine Stunde lang ist Martha in ihrem Büro gewesen.
   *an hour long is/has Martha in her office been*

To conclude, 'topicalization' of temporal adverbials in German does not trigger topichood and therefore, behaves differently from preposing in English.

### 12.4. Scrambling of temporal adverbials

As shown in the preceding subsections and as I already argued in Musan (1995, 1997) (see also Pittner (1999)), definite and indefinite temporal adverbials tend to take different surface positions in German. This is best described as SCRAMBLING. In fact, the scrambling of temporal adverbials seems to be subject to the same conditions as the scrambling of noun phrase arguments in German. More specifically, according to Büring (1994), Diesing (1990, 1992), von Fintel (1994), Jäger (1995), Meinunger (1995), and others, scrambling of noun phrases is associated with properties like definiteness, specificity, presuppositionality, or topichood - where definiteness, specificity, and presuppositionality can be analyzed as a special case of topichood.

It seems that the scrambling of temporal adverbials is triggered by the same factor as noun phrase scrambling - namely, by topichood. Thus, one would expect scrambled adverbials in German to exhibit basically the same characteristics as preposed adverbials in English. As we have already seen in the preceding subsections, this expectation is borne out at least in part.
Thus, (12-3) shew that position and duration adverbials tend to take different surface positions depending on whether they are definite or indefinite. Specifically, definite temporal adverbials tend to stand to the left of a quantificational adverb while indefinite temporal adverbials prefer to remain on the right side of a quantificational adverbial. (12-11c) illustrated the fact that scrambled temporal adverbials yield a restricted range of readings in combination with negation since they are associated with topichood. We will come back to the specific effects of adverb scrambling in German and its similarities and differences to adverb preposing in English shortly.

As should be clear at this point, the scrambled and nonscrambled positions of temporal adverbials and of noun phrases - for instance, their location relative to certain particles, to negation, or to adverbs of quantification - exhibit similar properties. Both noun phrases and temporal adverbials tend to be located to the left of adverbs of quantification when they are definite (12-15), or, when they are indefinite and specifically interpreted (12-16) - where 'specific' means that the speaker has a particular individual or time interval in mind which is characterized by the indefinite noun phrase or the indefinite temporal adverbial, respectively.

Thus, (12-15a) and (12-15c), where a definite noun phrase or a definite temporal adverbial appears to the right of the quantificational adverb immer ('always'), are marked when not focussed. By contrast, (12-15b) and (12-15d) are fine, because here the definite items appear on the left of the adverb of quantification. In (12-16 a, c) and (12-16b, d), indefinite noun phrases and indefinite temporal adverbials, respectively, appear on the right hand side and on the left hand side of the adverb of quantification, respectively. When they appear on the right hand side, an unspecific interpretation is preferred, but when they appear on the left hand side, the resulting sentences appear strange unless the items are specifically interpreted, i.e. unless the speaker has a particular woman or a particular Sunday in mind, respectively.

(12-15) a. ??weil immer die Frau angeln ging
   since always the woman fishing went
 b. weil die Frau immer angeln ging
   since the woman always fishing went
 c. ?? weil Hanna immer an diesem schrecklichen Sonntag angeln ging
   since Hanna always on that terrible Sunday fishing went
 d. weil Hanna an diesem schrecklichen Sonntag immer angeln ging
   since Hanna on that terrible Sunday always fishing went

(12-16) a. weil immer eine Frau angeln ging [preferedly unspecific]
   since always a woman fishing went
 b. weil eine Frau immer angeln ging [preferedly specific]
   since a woman always fishing went
 c. weil Hanna immer an einem Sonntag angeln ging [preferedly unspecific]
   since Hanna always on a Sunday fishing went
 d. weil Hanna an einem Sonntag immer angeln ging [preferedly specific]
   since Hanna on a Sunday always fishing went
To conclude, temporal adverbials as well as noun phrases can be scrambled in German. Scrambling of both items is associated with some property in the range of topichood. It seems that in this respect, scrambling in German functions analogous to preposing in English. I do not assume, however, that scrambling changes the semantic function of particular temporal adverbials. This is in remarkable contrast to a commonly held view, first proposed by Diesing (1990, 1992) about the mapping of scrambled and nonscrambled noun phrases at LF.

Having established these basic points, I will now turn to a difference between the effects of adverbial scrambling in German and adverb preposing in English. Recall that preposing of temporal adverbials in combination with subject quantifiers triggers wide scope of the adverbial, while postponed temporal adverbials are scope ambiguous (12-7). In German, neither 'topicalized' temporal adverbials nor temporal adverbials remaining in the Mittelfeld have obligatory wide scope (cf. (12-13)). One would expect, however, that scrambling in German has the same effect as preposing and that nonscrambled temporal adverbials participate in scope ambiguities just as postponed adverbials in English do. But it turns out that neither scrambled nor nonscrambled temporal adverbials in the Mittelfeld are scope ambiguous in constructions corresponding to (12-7) and (12-13).

(12-17) displays scrambled and nonscrambled versions of (12-13b), where - following Diesing (1990, 1992) - the particle ja doch ('indeed') marks the borderline. In (12-17a), an einem schönen Sonntag ('on a beautiful Sunday') stands on the right hand side of ja doch ('indeed') and hence, is not scrambled. In (12-17b), the adverbial stands on the left hand side of the particle and hence, is scrambled. It seems to me that the distribution of readings indicated does not correspond to what one would expect if scrambling of adverbials in German has the same effect as preposing them in English.

(12-17) a. Jeder Student wanderte ja doch an einem schönen Sonntag im Gebirge.
   every student hiked PARTICLE on a beautiful Sunday in the mountains
   ≠ There is a beautiful Sunday where every student went indeed hiking in
   the mountains.
   = For every student there is a beautiful Sunday on which he went indeed
   hiking in the mountains.

b. Jeder Student wanderte an einem schönen Sonntag ja doch im Gebirge.
   every student hiked on a beautiful Sunday PARTICLE in the mountains
   = There is a beautiful Sunday where every student went indeed hiking in
   the mountains.
   = For every student there is a beautiful Sunday on which he went indeed
   hiking in the mountains.

At this point, it is not clear to me which factors determine the availability of the readings in (12-17).
12.5. Conclusion: base positions and surface positions of temporal adverbials

This subsection examines what the base positions of temporal adverbials are. According to Ehrich (1992:108), temporal adverbials are modifiers of V'. However, as the preceding discussions have shown, such a uniform view is too simple. Since temporal adverbials can function on different levels of the semantic representation, the tense level, the aspect level, the participle level, and the VP-level, one expects that their base positions vary depending on which level they belong to. In this regard, temporal adverbials show a variation similar to the variation of base positions which Maienborn (1996, 1999) observes with regard to locative modifiers.

Before we can try to provide a survey of the base and surface positions of adverbials, we have to consider what the precise effects of scrambling of adverbials are. Are they moved to one special kind of clausal position, or are they moved relative to some point of orientation on their own level, let us say the quantificational adverb of that level? We can at least tentatively test this in a clause that contains several 'geographical' landmarks which help to identify possible landing sites of scrambled adverbials and definite nonquantificational temporal adverbials that stem from at least two different levels and are scrambled.

The use of the landmarks makes only sense, of course, if we identify in advance where they are located relative to the base positions of temporal adverbials of different levels. Consider (12-18). It shows a past perfect clause that contains two indefinite position adverbials from different levels. Since they are indefinite, we conclude that in the most unmarked case they stand in their base positions.

Thus it seems that sentential adverbs like bekanntlich ('as is known') are located relatively high in the hierarchy while particles like ja doch ('indeed') are located much lower, at least below the tense level.

(12-19) shows word order variations of a similar clause in which the adverbials are substituted by definite variants. To me it seems that (12-19d) is the most unmarked version of the clause.

(12-18) weil bekanntlich an irgend einem schönen Morgen um 10 Tja doch
since as-is-known on some a beautiful morning at 10 PARTICLE
einige Stunden früher Polizisten illegale Angler beobachtet hatten
some hours earlier policemen illegal fishers observed had
('since, as is known, on some beautiful morning at 10 policemen had observed illegal fishers some hours earlier')

Thus it seems that sentential adverbs like bekanntlich ('as is known') are located relatively high in the hierarchy while particles like ja doch ('indeed') are located much lower, at least below the tense level.

(12-19) shows word order variations of a similar clause in which the adverbials are substituted by definite variants. To me it seems that (12-19d) is the most unmarked version of the clause.

(12-19) a. ?weil bekanntlich am Montagmorgen um 10 Tja doch
since as-is-known on-the Mondaymorning at 10 PARTICLE
zwei Stunden früher Polizisten illegale Angler beobachtet hatten
two hours earlier policemen illegal fishers observed had
(‘since, as is known, on Mondaymorning at 10 policemen had observed illegal fishers two hours earlier’) 

b. weil am Montagmorgen um 10 bekanntlich ja doch since on-the Mondaymorning at 10 as-is-known PARTICLE zwei Stunden früher Polizisten illegale Angler beobachtet hatten two hours earlier policemen illegal fishers observed had 

c. weil am Montagmorgen um 10 zwei Stunden früher bekanntlich ja doch Polizisten illegale Angler beobachtet hatten as-is-known PARTICLE policemen illegal fishers observed had 

d. weil am Montagmorgen um 10 bekanntlich zwei Stunden früher ja doch Polizisten illegale Angler beobachtet hatten PARTICLE policemen illegal fishers observed had 

If this is so, then we have evidence that scrambling can happen relative to a single level. I.e. a definite tense level adverbial can be scrambled on the tense level, and a participle level adverbial can be scrambled on the participle level. However, since none of the examples in (12-19) appears extraordinarily bad, I conclude that scrambling of adverbials can also happen to higher adjunction sites.

Thus, the tentative schematic picture of base positions and surface positions in (12-20) emerges; surface and LF-positions of particular items that differ from base positions are added for better orientation in italics. The middle column in (12-20) shows the hierarchy of functional clausal categories including the VP and their adjunction sites for items like quantificational adverbs, temporal adverbials, negation, moved constituents, etc. Note that negation is treated as an adjunct here instead as a functional element with its own functional category. The left column shows what kind of expressions are presumably located in the respective projections. The right column indicates what the head of the respective category is, regardless of whether the head is located in fact on the right hand side (which is not the case with the head of the CP in German).
13. Effects of Aktionsarten and situation types on the acceptability of adverbials

Whether or not a particular temporal adverbial can be applied on a certain level of the semantic representation depends on a variety of interacting factors. For instance, as

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14 Only "indefinite" ones seem to be available, cf. section 2.
was mentioned above, there are pragmatic restrictions to the extent that adverbials are only fully felicitous when they are informative. Other factors that were mentioned above are of a still unidentified nature. Thus, the requirement of overt future adverbials in order to get future readings with durative predicates in German present tense clauses (cf. chapter II) have not yet been explained. In this section, we will deal with well-known restrictions on the acceptability of adverbials that have to do with the *Aktionsart* or situation type of the element they apply to. The section does not aim at presenting new ideas or results, however; rather, its purpose is to remind the reader of another factor that plays an important role in the interpretation of temporal adverbials.

As is well-known from standard tests for identifying situation types, the application of duration adverbials depends on the length of the time interval they refer to and on the situation type - i.e. state, activity/process, achievement, or accomplishment - of the clauses they are contained in (for details, see, for instance, Krifka (1989), Parsons (1990), and Vendler (1957)).

Generally speaking, duration adverbials characterize a time interval of a particular length; a situation that is said to be the case at a time characterized by a duration adverbial is said to cover the whole time referred to by the adverbial. In this respect duration adverbials differ from position adverbials, which cut out a subinterval of the time they refer to. Thus, duration adverbials need to be applied to situations that are able to cover the time interval they characterize.

As a consequence, duration adverbials like *eine Stunde lang* or *für eine Stunde* ('for an hour') cannot apply to achievements and accomplishments (13-1c, d) in the same way as they do apply to states or activities/processes (13-1a, b): achievements and the culmination points of accomplishments are simply too short by definition as to be able to cover noninstantaneous time intervals and therefore, the resulting sentences are not very good under the intended readings, where the being tired, the running, the finishing of building a house, and the discovery of the formula are to be understood as lasting for an hour. Clauses referring to achievements and accomplishments that are modified by duration adverbials can be saved, however, when appropriate reinterations can be coerced. Thus, (13-1c, d) get (more or less) acceptable when the adverbial is understood as characterizing the duration of the preparatory phase of Maria's building a house and of Maria's discovery of the formula.

(13-1)  
\[ \text{a. STATE:} \]
\[ \text{Maria war eine Stunde lang müde.} \]
\[ \text{*Maria was an hour long tired*} \]

\[ \text{b. ACTIVITY/PROCESS:} \]
\[ \text{Maria rannte eine Stunde lang.} \]
\[ \text{*Maria ran an hour long*} \]

\[ \text{c. ACCOMPLISHMENT:} \]
\[ (?) \text{Maria baute eine Stunde lang ein Haus.} \]
\[ \text{*Maria built an hour long a house*} \]

\[ \text{d. ACHIEVEMENT:} \]
\[ (?) \text{Maria entdeckte eine Stunde lang die Formel.} \]
Maria discovered an hour long the formula

Similarly, (13-2c, d) get (more or less) acceptable when the adverbial is understood as characterizing the duration of the result or target-state of Maria's building a house and of Maria's discovery of the formula, respectively - at least to the extent to which the resulting readings make sense; i.e. under this reading, (13-2c) suggests that the house broke down after an hour, and (13-2d) suggests that after an hour the formula was forgotten or lost again.

(13-2) a. STATE:
Maria war für eine Stunde müde.
Maria was for an hour tired
b. ACTIVITY/PROCESS:
Maria rannte für eine Stunde.
Maria ran for an hour
c. ACCOMPLISHMENT:
(?) Maria baute für eine Stunde ein Haus.
Maria built for an hour a house
d. ACHIEVEMENT:
(?) Maria entdeckte für eine Stunde die Formel.
Maria discovered for an hour the formula

In order to represent such reinterpretations semantically, it is necessary to refer to items contained in the lexical meaning of the accomplishment or achievement predicates.

Similarly, adverbials like in einer Stunde (in the sense of 'within an hour'), which set a time-limit are usually not acceptable with states and activities/processes but fine with accomplishments and achievements under the reading where they set a limit for reaching the final point of the situation denoted by the VP, e.g. the moment of finishing building a house or the moment of discovering the formula. Again, however, the unacceptable sentences can be saved by appropriate reinterpretations: (13-3a, b) are fine when the adverbial measures the time from some evaluation time before the situations of Maria's being tired and her running, respectively.

(13-3) a. STATE:
(?) Maria war in einer Stunde müde.
Maria was an hour tired
b. ACTIVITY/PROCESS:
(?) Maria rannte in einer Stunde.
Maria ran in an hour
c. ACCOMPLISHMENT:
Maria baute in einer Stunde ein Haus.
Maria built in an hour a house
d. ACHIEVEMENT:
Maria entdeckte in einer Stunde die Formel.

Maria discovered in an hour the formula

Thus, if an adverbial does not find an element it can apply to appropriately, one of two alternatives is possible: either the respective clause is unacceptable or a reinterpretation of the clause is coerced so as to provide an appropriate element the adverbial can apply to.

14. Summary

In this chapter, we have shown what kinds of functions temporal adverbials can have in perfect constructions. Concentrating on quantificational adverbials and position and duration adverbials, I proposed that they can function in principle on all three levels that were shown in chapter II to be crucial for the semantic representation of perfect clauses: the tense level, the aspect level, and the participle level. More specifically, quantificational adverbials can replace the phonetically empty temporal quantifiers $\exists_T$, $\exists_A$, and $\exists_P$, whereas position and duration adverbials can function as restrictors of these quantifiers. There is, however, a pragmatic restriction concerning informativity that leads to an unacceptability of duration adverbials as restrictors on the tense level.

In addition to these possible functions of quantificational and nonquantificational temporal adverbials, they can have other functions in semantic representations as well. Thus, at least position adverbials can serve as frame-setting modifiers; quantificational, position, and duration adverbials can function on the VP-level below the participle level; temporal adverbials that combine quantificational and nonquantificational components introduce an additional quantifier into the semantic representation; and generally it seems that on all levels adverbials can appear iteratively. A brief look at negation suggested that it can function on the aspect level, the participle level, and on the VP-level, but not on the tense level.

I then examined what syntactic base and surface positions temporal adverbials can take. It seems that they have base positions on the respective level to which they belong semantically, where the base order is the following: quantificational adverbs before position before duration adverbials. However, the base positions can be varied. In German, two movement processes are predominant - the so-called 'topicalization', which is not obligatorily linked to topichood, and adverbial scrambling, which is.

Finally, it is important to keep in mind that the options for the applicability of temporal adverbials are often restricted by requirements they impose on the situation type of the entity they modify. Duration adverbials, for instance, need entities that are long enough to cover the whole time interval they characterize.