Outstanding Dissertations in **Linguistics**

General Editor
Jorge Hankamer
University of California, Santa Cruz

A Garland Series

German Temporal Semantics

Three-dimensional Tense Logic and a GPSG Fragment

John A. Nerbonne

Garland Publishing, Inc. ■ New York & London
1985

Library of Congress Cataloging in Publication Data

Nerbonne, John A., 1951–
German temporal semantics.

(Outstanding dissertations in linguistics)
Thesis (Ph.D.)—Ohio State University, 1983.
Bibliography: p.
1. German language—Temporal constructions.
2. German language—Semantics.
3. German language—Grammar, Generative.
4. Tense (Logic)
I. Title. II. Series.
PF3301.N47 1985 435 85-11610
ISBN 0-8240-5436-9 (alk. paper)

The volumes in this series are printed on acid-free, 250-year-life paper.

Printed in the United States of America

GERMAN TEMPORAL SEMANTICS: THREE-DIMENSIONAL TENSE LOGIC AND A GPSG FRAGMENT

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy in the Graduate School of The Ohio State University

By

John A. Nerbonne, B.A., M.A.

* * * * *

The Ohio State University

1983

Reading Committee:

Prof. David R. Dowty

Prof. Ilse Lehiste

Prof. Arnold M. Zwicky

Approved By

David R. Dowty

Advisor
Department of Linguistics

to my grandmother,
Margaret O'Grady Joyce
and to the memory of my grandfather,
John Joseph Joyce

ACKNOWLEDGEMENTS

All art is a collaboration, and there is little doubt that in the happy ages of literature, striking and beautiful phrases were as ready to the story-teller's hand as the rich cloaks and dresses of his time.
- J.M.Synge, Preface to Playboy of the Western World

Alfred Schopf first interested me in the structure of temporal expressions and the range and scope of issues involved in their analysis.

My advisor, David Dowty, first demonstrated the subtlety and explanatory power of model-theoretic semantics as a tool in this analysis. My approach, as well as innumerable specific improvements in this work, are due to him.

Ilse Lehiste and Arnold Zwicky also criticized my work productively. Erhard Hinrichs was sharp about theoretical comments and generous in providing German examples and judgements about their meaning.

Robin Cooper, Ronald Hendricks, Brian Joseph, Barbara Partee and Greg Stump commented beneficially on one or another aspect of the analysis. The local intellectual infrastructure is infusive and must have been the source of most of whatever might be "striking and beautiful" below; I particularly appreciated Bill Boslego, Doug Fuller, Mike Geis, Jean Godby, and Rex Wallace.

TABLE OF CONTENTS

Introduction

This dissertation analyzes temporal meaning in German. The framework is that of a model-theoretic semantics, more specifically one incorporating a multi-dimensional tense logic. Chapter 1 presents this framework and is sufficient for those interested only in the general theory of temporal meaning. It argues that three dimensions are optimal for the description of natural language temporalia, giving rise to a Reichenbachian system for temporal description. Special attention is paid to the definite interpretations of tense noted in Partee (1973). Although it is not the purpose of the investigation, it turns out that the interpretation of Reichenbach's speech, event, and reference times as indices within model theory explains several otherwise unmotivated aspects of Reichenbach's remarks on tense.

Chapter 2 applies this theory to the analysis of temporal meaning in German. Frame adverbials, the Present and Past tenses, duratives, aspectual adverbials using in, and the adverbial particle schon are examined. None of the last three were included in Baeuerle's (1979) tense logical analysis of German, the most extensive (and best) to-date, and both of the first two are given novel analyses. The section on schon uncovers data which has escaped previous notice.

Chapter 3 provides a formal syntax to bear the semantic analysis proposed in 2. This is of some purely syntactic interest because Generalized Phrase Structure Grammar hasn't yet confronted German extensively and because it suggests one innovation, the use of complement features, to treat VP fronting. The chapter may also be of interest because it demonstrates how temporal semantics may be incorporated within GPSG with essentially no new grammatical apparatus.

Chapter 4 explores syntactic and semantic extensions of the fragment, showing how the Perfect, the particle noch, the Passive, and a distinct reading of frame adverbials may be accommodated.

A Reichenbachian Tense Logic

1.1 Introduction

The semantics of tense and other temporal expressions, involving as it does modification, recursion, contextual dependence, lexical variety, crucial scope relationships, and the interaction of elements in several grammatical categories is perhaps as rich and problematic as any in the field of natural language semantics. Model-theoretic semantics allows precise investigation using fairly simple mathematical techniques, and there is, finally, no lack of very competent work upon which to build. This is, in short, a most attractive field of study.

This work proposes a semantics for the description of temporal expressions inspired largely by Hans Reichenbach's brief remarks on the English tenses, and the insights of a number of contemporary researchers, including Partee (1973), Kuhn (1979), Baeuerle (1979), and Enc (1981), that tenses behave semantically rather like definitely referring (nominal) expressions. In spite of the attention paid to it, the parallel between tense and definite nominal reference, it is argued, has been insufficiently appreciated--both with respect to its extent, and with respect to its consequences.

The semantic theory presented in this first chapter is inspired by Reichenbach (1947), and it employs his three-way distinction among times relevant to semantic interpretation--the well-known speech, event and reference times introduced by Reichenbach. The semantics doesn't simply assume Reichenbach's system, but interprets it (and is somewhat selective about certain inexplicit aspects of his temporal descriptions). In the present interpretation speech, event, and

reference times are viewed as times to which deictic reference may be made--effecting the parallelism to definite nominal reference mentioned above.

The proposed semantics is illustrated in Chapter 2 by an extended semantical sketch of German temporal reference. The proposed system for temporal semantics will be tested on an extensive, but necessarily limited range of temporal phenomena--including tense, temporal adverbials and particles, and the inherent temporal structure of verbs (Aktionsarten). All of these expressions are incorporated into a formal fragment (in Generalized Phrase Structure Grammar) in Chapter 3. Chapter 4 presents some semantico-syntactic extensions of the system developed in the first three chapters.

Ultimately, if it is to be adopted, the semantics proposed here must allow cogent analyses of all temporal reference, including not only the phenomena named above, but also temporal clauses, sequence of tense restrictions, and aspect. The system hasn't been tested on these phenomena to-date, though they do not seem to present special difficulties.

1.2 Triple Dependence

Reichenbach is to be credited for introducing the idea that the meaning of some tenses and temporal expressions depends not only on the time of speech, and the time at which an event takes place (or is reported to take place), but also on a third time, the **reference time**. In this chapter, I suggest a semantical formalization of Reichenbach's triple dependence and outline some further crucial background assumptions to a system using this formalization. Chapter 2 then argues that the semantics of temporal reference in German, in particular that of adverbs, and that of adverbial particles such as schon depends on the employment of reference time as a theoretical tool. (In the treatment proposed, reference time functions as one of three dimensions in a tense logic; it is otherwise the same concept introduced by Reichenbach.)

1.3 What is Reference Time?

The concept of reference time has puzzled some researchers. Reichenbach distinguished speech time s, event time e and reference time r. Let us examine these as Reichenbach applied them to the following example:

> In 1678 the whole face of things had changed ... eighteen years of misgovernment had made the ... majority desirous to obtain security at any risk. The fury of their returning loyalty had spent itself in its first outbreak. In a very few months they had hanged and half-hanged, quartered and emboweled, enough to satisfy them. The Roundhead party seemed to be not merely overcome, but too much broken and scattered ever to rally again. Then commenced the reflux of public opinion. The nation began to find out to what a man it had entrusted without conditions all its dearest interests, on what a man it had lavished all its fondest affection. (Reichenbach, 1947:288f)

Speech and event time are easily recognizable. Speech time is simply the time of utterance (read here: writing), while the time of the various episodes described constitutes event time. As to reference time, let us note Reichenbach's remarks:

> The point of reference is here the year 1678. Events of this year are related in the simple past, such as the commencing of the reflux of public opinion, and the beginning of the discovery concerning the character of the king. The events preceding this time point are given in the past perfect, such as the change in the face of things, the outbreaks of cruelty, the nation's trust in the king. (Reichenbach, 1947:289)

An event is thus seen not only from the vantage point of the speech time: it is also seen from time of reference.[1] It is the time of reference which distinguishes the simple past from the past perfect. Each recounts episodes which are prior to speech time, but the episodes relayed in the past perfect are additionally prior to the time of reference. (We will accept Reichenbach's characterization of this distinction, and we try to provide additional support for it in principles for analyzing contextual dependence in 1.6.2.)

A reference time may be explicitly identified, e.g. as 1678 in the

passage above, or it may be provided e.g. by a superordinate clause, as in the sentence below:

> After he had eaten everything, he said good-bye.

The event time of the subordinate clause is the time at which he ate. The reference time of this same clause is provided by the event time of the main clause: it is the time of his saying good-bye. Note that event time is prior to reference time here, and that the past perfect his used, just as it was in main cluases in Reichenbach's example. The configuration of speech, event and reference times is crucial, not syntactic structure. (Cf. 1.7.2.)

Reference time may be neither explicit nor provided by superordinate clauses, but given only by the context, as Reichenbach noted. He commented that in the sentence Peter had gone:

> ...it is not clear which time point is used as the point of reference. This determination is rather given by the context of speech. In a story, for instance, the series of events recounted determines the point of reference, which in this case is in the past, seen from the point of speech; some individual events lying outside this point are then referred, not directly to the point of speech, but to this point of reference determined by the story. (Reichenbach (1947:288))

Two aspects of Reichenbach's proposal will be exploited below. First, reference time is subject to pragmatic influence. Second, and more specifically, reference time may be given by the previous discourse.

Given this rough characterization of the notions of speech, event and reference times, we note that it was Reichenbach's strategy to ascribe one configuration of these times to each tense. For example, he lists the following (p.297):

Past Perfect	E - R - S
Simple Past	R,E - S
Present Perfect	E - S,R
Present	S,E,R
Simple Future	S,R - E
Future Perfect	S - E - R

E, R, and S stand for speech, event and reference times. A comma between two times stands for simultaneity, while the hyphen means that the left time temporally precedes the right.

Implicit in Reichenbach is surely the position that no more than three times are involved in the interpretations of any tense. I shall accept a slightly more general version of this position:

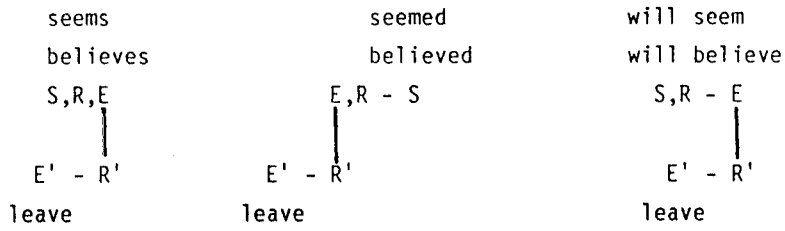
Maximally Triple Dependence: No more than three times are involved in the interpretation of any temporal expression.

The generalization is from "tense" to "temporal expression." The notion "times" is admittedly still vague above. It may be made precise in 1.4 through the notion "temporal index," and Maximally Triple Dependence will be seen to follow as a trivial consequence of the position that tense logic for natural language are three dimensional.

There is some reason, however, to reject other positions which also seem implicit in Reichenbach's analyses. Returning to the tense schemata above, it is perhaps remarkable that every tense specifies a linear configuration of all three times: in no case is a tense regarded as specifying a relation among less than three times, and never does it appear to have seemed necessary to Reichenbach to resort to nonlinear configurations of S, E, and R. On the contrary, however, the Perfect infinitive seems to require only that E precede R, and is indifferent to speech time, as the sentences below might suggest:

He seems to have left	She believes him to have left
He seemed to have left	She believed him to have left
He will seem to have left	She'll believe him to have left

This isn't the point at which one even could argue for any semantic rule in detail; we've simply developed too little of the overall apparatus for any rule to be justified in detail. But if we accepted Reichenbach's specification of the Present, Simple Past and Simple Future tenses (for the purposes of this illustration), then it might be seen that the only relationship with which the Perfect Infinitive may consistently be associated is that of the event time (of the VP to which it is attached) preceding reference time. The following schemata illustrate how the Perfect Infinitive specifies its times:



At least in the complements of the verbs seem and believe, the event time of the matrix clause is used as reference time in the complement. The Perfect Infinitive then marks the time at which the episode reported in the complement clause takes place--regardless of speech time.

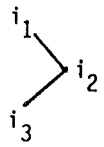
The remarks above cannot be construed as defended analysis of the temporal import of the Perfect Infinitive--but only as an indication of the possible wisdom of allowing temporal elements to specify less than an exhaustive relation among speech, event, and reference times.

Similarly, there are tenses which seem to specify a nonlinear relation among the speech, event and reference times. This is perhaps a bit surprising. Relations are linear, of course, iff they are transitive, irreflexive, and connex. Clearly the points of time are ordered linearly under '$<$,' so that it may be surprising that some

tense specify times in a nonlinear fashion. The key is connexity. Recall that a relation R is connex in a set S iff

$$\forall i_1 \in S \forall i_2 \in S (i_1 R i_2 \vee i_2 R i_1 \vee i_1 = i_2)$$

The connexity axiom disallows then situations such as the following:



where i_1 and i_3 are distinct, but unordered with respect to each other.

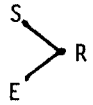
Note the following use of the Future Perfect:

I don't know whether he's left. He certainly will have left by tomorrow, however.

The pair of sentences is sensible enough, but this indicates that the event time of the Future Perfect may either follow or precede speech time. Either of the following configurations is thus compatible with the Future Perfect:

S - E - R (Reichenbach's configuration)
E - S - R

(Cf. Comrie, 1981:28.) The Future Perfect requires then that speech, event and reference time be ordered thus:



This relation is nonlinear.

Let us avoid one potential confusion: the time of utterance and

the time at which he left (in the sentence above) will certainly be ordered with respect to each other (in any particular use of that sentence). This isn't the point, which is rather that the Future Perfect cannot specify that speech and event time always stand in one or the other relation. The tense cannot require a particular linear relationship among the three times.

We therefore will not follow Reichenbach in having each tense exhaustively specify a linear relation among the three times. It is not explicit in Reichenbach in any case that one ought to do so, though it certainly was his practice.

I would like now to turn to an area where Reichenbach will be followed most exactly; this concerns his conception of reference time. Let us be careful to note the nature of the influence of context on reference time (noted above): reference time may be given by the previous discourse. This seems to have been Reichenbach's conception as well. Notice that his remark about how the events recounted may determine reference time is likewise qualified: this is so "in a story." This suggests that reference time isn't always provided in previous discourse, and that we have, in effect, two sorts of discourse--that in which reference time is fixed by previous discourse, and that in which it isn't. Let us call the first sort **(temporally) connected discourse** and the second **(temporally) free discourse** (or **temporally nonconnected discourse**), and let us contrast examples of these:

(1) Temporally connected discourse
Al went to N.Y. The others were there, too.

Temporally free discourse
Al went to N.Y. The others were there once, too.

The temporally connected discourse continues talking about the "same" time, while the temporally free discourse does not. In connected discourse, times may not be out of order, while in free discourse, this is possible. (We will examine which times these are presently.)

There will obviously be different principles of temporal reference in force in these two different types of temporal discourse. Let us attempt a first formulation of these, however rough. Reichenbach claims that "the series of events recounted determines the point of reference" (in connected discourse), and the example above bears him out. The time spoken of in the second sentence in the connected example in (1) seems to be identical to the time at which Al arrived in N.Y., the event time. Some examples are different, however.

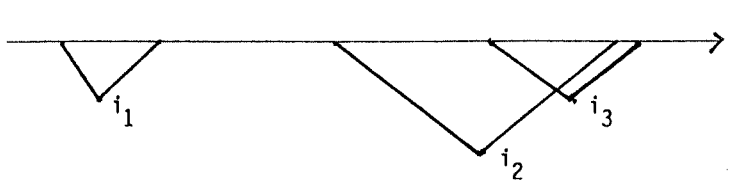
(2) Al went to N.Y. Bo had found him a room. He went directly to it.

Here it is clear that the time spoken of in the final sentence is not the event time of the previous sentence, i.e. the time at which Bo found the room. It is also clear that events have not been recounted in order, and therefore that event times are not ordered properly. Still, this has the feel of a temporally connected discourse--a story.

The not overly elusive principle of organization is based on reference time. The second sentence in (2) has an event time prior to the first's, but its reference time is fixed and non-prior to the first's. And it is again the reference time of the second sentence which is used in the third. This suggests the following codification of Reichenbach's pragmatics.

In moving toward a formalization, we note that we shall employ an "interval" semantics, following most notably Bennett and Partee (1972), Cresswell (1977) and Dowty (1979). Van Benthem (1983) investigates the model theory of tense logic based on both points and "periods" (objecting to the boundaries implied by "interval"). We retain the linguistically familiar term "interval." In this semantics propositions are evaluated as true or false not relative to points of time, but rather relative to intervals.

We first need to define some subsidiary notions. Since the times we will be dealing with may be intervals, the notion of precedence is somewhat vague. Consider the time line below:



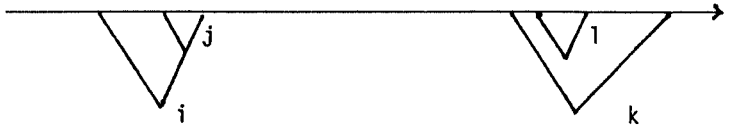
It is clear that i_1 precedes both i_2 and i_3, since every point of time in i_1 precedes every point of time in both i_2 and i_3. We shall symbolize this relation as '<':

Definition: For all intervals i,j, all points of time t,t'
$i<j$ iff $\forall t \in i\ \forall t' \in j\ t<t'$ (read: 'i completely precedes j')

But i_2 seems to precede i_3 in some sense as well, even though the relationship of complete precedence doesn't hold. This will be symbolized '$\underline{<}$.'

Definition: For all intervals i,j, all points of time t,t'
$i\underline{<}j$ iff $\forall t \in i\ \exists t' \in j\ t\underline{<}t'$ (read: 'i does not extend beyond j')

(For brevity's sake we shall occasionally write $i\text{-}\underline{<}j$ for $-(i\underline{<}j)$ and $i\text{-}<j$ for $-(i<j)$. This is especially convenient in specifying relations among three times.) Note that this definition allows that $i_2\underline{<}i_3$: i_2 does not extend beyond i_3. In the time line below, $i\underline{<}j$ even though j i. Note that $k\text{-}\underline{<}l$, however.



Using these definitions, we may formalize Reichenbach's implicit pragmatics:

Reichenbach's Pragmatics (RP) (weak version) For $S_1, S_2, \ldots, S_n$ a sequence of sentences uttered in a temporally connected discourse:

(i) $r(S_i) \leq r(S_{i+1})$

where r(S) designates the reference time of S. (Cf. Dowty, 1980:19 for a similar formulation of the relation of successive times in narration.) Let us note that this is a weaker version of connectedness; a stronger version is discussed in 1.6 below. Furthermore, the principle says nothing about reference times in temporally unconnected (free) discourse.

This principle obviously does not determine a unique reference time; in particular, it doesn't specify how r(S) is defined, or how it may be shifted by temporal expressions. The principle does provide a limit within which reference time must function, however. This is its purpose.

Let me again emphasize that "(temporally) connected" is deliberately vague. Certainly answers are connected to questions, and most traditional narrative counts as (temporally) connected, but most Linguistics dissertations certainly are not. No independent characterization of this vague notion will be offered. Hopefully, the concept will have some foundation in intuition, and examples may help to clarify the notion intended somewhat further. It is in any case worth noting that not all narrative prose is (temporally) connected in the relevant sense. Consider first:

A (temporally) connected passage

Letzhin kam ich zum Brunnen und fand ein junges Dienstmaedchen, ...Ich stieg hinunter...

--J.Goethe Die Leiden des jungen Werthers, Brief vom 15.Mai

'I recently came to the spring and found a young servant girl,...I dismounted...'

--J.Goethe The Sorrows of Young Werther, Letter of May 15

The events are recounted in order without major change in temporal perspective. The following passage begins in the same way, but then a

shift occurs:

A (temporally) nonconnected passage

Im September vorigen Jahres begab ich mich in mein Schlafzimmer, oeffnete das Fenster weit, verzauberte mich und flog davon. Ich habe es nicht bereut.

--W.Hildesheimer "Warum ich mich in eine Nachtigall verwandelt habe" in: W.Hildesheimer Lieblose Legenden

'In September of the past year I made my way into my bedroom, threw the window open wide, said the magic words, and flew away. I haven't regretted it.'

--W.Hildesheimer "Why I Changed Myself into a Nightingale" in: W. Hildesheimer Loveless Legends

The passage from Goethe recounts the series of events in temporal succession, allowing the perspective of the reader to follow the chronology exactly. Hildesheimer's passage begins similarly, but shifts abruptly in the last sentence excerpted. In another context ich habe es nicht bereut might mean 'I didn't regret it (then),' but here, where the Preterite has been established in the narrative, it clearly means 'I haven't regretted it ever since.' The connectedness of the series is broken for this comment. (This is the situation in general for High German; it is different in the southern dialects. Some speakers from the south claim that narration can switch back and forth from Preterite to Perfect, or remain in one or the other tense, without effect on the perceived temporal relations. In all spoken German, the Perfect may be used for narration; but in High German at least, once the Preterite has been established as the tense of narration, as above, the Perfect is usually felt to represent a switch in temporal perspective.)

The examples from Goethe and Hildesheimer may indicate that the distinction between the temporally connected and the temporally free really should not be understood as one between two types of discourse, since the distinction seems to cut across the usual distinction in discourse types (both of the above are literary narration and the

original examples in (1) might have been from any informal sort of discourse). Perhaps the distinction should be understood (and formulated) as one between utterance types--i.e. between utterances which assumes the reference time of previous discourse and those which do not. I have no objection to this recasting of the distinction, since, as may be seen below, the formalization of reference time will show that the distinction amounts to exactly this.[2)]

1.4 The Logic

The logic to be employed will semantically treat all temporal expressions as sentential operators. For this reason, a sentence logic is sufficient to demonstrate the treatment. As explained above, we will assume that an interpretation function I assigns truth values to atomic sentences, i.e. those simple sentences to which no sentential operators have yet been attached, with respect to intervals of time. This is encoded in (1):

(1) for t an interval, p an atomic sentence $I(p,t)=0$ or $I(p,t)=1$

(Since virtually all reference is to intervals of time, there is no need to distinguish intervals from points notationally. At those few points where both points and intervals are referred to, intervals are designated i_1, i_2, etc. and points t_1, t_2, etc. Cf. the definition of '<' and '$\leq$' in 1.3.)

For atomic propositions, only one interval of time--not three, as the full system allows--is relevant to the determination of truth conditions.

(2) for atomic p, for all models A, speech times s, event times e, and reference times r: $A_{s,e,r} \models p$ iff $I(p,e)=1$, i.e. p holds at e.

Before commenting on the substance of (2), let's demystify the formalism. A formula such as the one in (2), of the form:

$$A_{a,b,c} \models p$$

is always to be understood: sentence p is true in model A relative to speech time a, event time b, and reference time c. The model A simply encodes the truth of falsity of the atomic propositions--here, those with no temporal modification whatsoever. Speech time is always written first, normally designated by the mnemonic 's,' followed by event time, normally designated by 'e,' followed by reference time, normally designated by 'r.' Of course, other variables must be used whenever more than one speech, event, or reference time is relevant to the evaluation of a given utterance. The '$\models$,' or so-called 'turnstile,' may be read 'satisfies,' as long as this in turn is understood so that $A_{s,e,r}$ satisfies p iff p is true in A relative to a, b, and c.

Important to the substance of (2) is first the treatment of speech, event, and reference time as parameters of interpretation, and second that tenseless expressions are interpreted with respect to a single time. (I use "tenseless" here in the sense of tense logic--to designate expressions with no elements which make temporal reference, i.e. no verbal tense, no temporal adverbials or clauses, etc. whatsoever.) We shall consider the latter point first. It is important that basic expressions are still assigned semantic values with respect to single times because this preserves the intuitively persuasive notion of temporal dependence from simpler tense logics, guaranteeing us the same relatively cogent foundations. Intuitively clear foundations are required if we are to interpret the formal system. It is not immediately clear how one could interpret a basic expression with respect to pairs or triples of time. At the risk of redundancy then, let me emphasize that nothing new in the interpretation of tenseless expressions is being proposed--this proceeds the same as it does in simpler tense logics. The second and third temporal indices are used exclusively in the interpretation of temporal expressions.

There are also important consequences of treating Reichenbach's speech time, event time and reference time as "dimensions" or parameters of interpretation in a tense logic. These will be easier to appreciate after we have examined a rule using these parameters.

Moreover, no simple sentences in German are interpreted by atomic formulae. All include some temporal modification, viz. tense. Let us then turn to its analysis.

1.5 The Preterite and the Indexical Interpretation of Reichenbach

1.5.1 The Motivation for Indexical Treatments of Tense

Some sentences seem to contain no temporal modification other than tense, however, so that we do have an apparently simplest case from which to begin. Thus it seems reasonable to analyze Sam left as containing no temporal modification other than Past tense marking (or "Preterite" tense marking--these terms will be used synonymously here). Since all temporal expressions will be analyzed as sentential operators, as remarked above, we then analyze Sam left as PAST(Sam leave), where Sam leave is tenseless. Let us recall that the tenseless Sam leave holds in A at s,e,r iff it holds at e, the time of leaving. Clearly, the Past (or Preterite) tense requires that this e precedes s. The situation in German is fully parallel, and (1) formalizes the requirement as a first approximation of the actual semantic rule:

(1) (Necessary truth condition of sentences in the Preterite)

$$\text{If } A_{s,e,r} \models \text{PRET}(p), \text{ then } e<s \text{ and } A_{s,e,r} \models p$$

The use of Reichenbach's various times as parameters provides a mechanism for dealing with an aspect of temporal interpretation first noted in Partee (1973), who argued for the need for tense operators with definite interpretations in place of (or in addition to) the indefinite interpretations which the Priorean operators provide. Prior (and many others), it will be remembered, had investigated a PAST operator of a sort that PAST(p) holds at t iff there is a t'<t and p holds at t'. Thus (2) would be true if there were any time prior to speech time at which Cal forgot to turn off the stove:

(2) Cal forgot to turn off the stove

On the Priorean view, the tense is interpreted **indefinitely**: if there is any past t' at which the tenseless Cal forget to turn off the stove holds, then (2) is to be regarded as true. Partee pointed out that, on the contrary, a sentence such as (2) would normally be uttered not to assert that Cal once forgot, but rather to assert of a definite time that he forgot then. Further proof of this may be found in the interaction of tense and negation. For example, in (2')

(2') Cal didn't turn off the stove

we find neither of the likely representations under the Priorean view satisfactory:

PAST(-(Cal turn off the stove))
-(PAST(Cal turn off the stove))

The first is too weak, since it is true if there is any past time at which Cal didn't turn off the stove, and the second too strong since it is only true if there is no past time at which he did. Partee points out that (2') is rather understood to assert of a definite time that Cal didn't turn the stove off then.

Enc (1981:59-69) has extended Partee's criticism by showing that the predicted scope relations in the indefinite analysis of tense do not hold. Enc's tack is to show that NP's do not fall within the any of the predicted scope slots. She points out e.g. that in the sentence All rich men were obnoxious children, the scope analysis predicts that the sentence will either be understood about all present rich men or about all past rich men, but not both. But there is a reading available in which the sentence says something about all rich men, present and past. A similar, but more problematic case is that of sentences such as John will meet every hostage, which seem capable of saying something about past hostages in the absence of any past

tense morpheme. A third very damaging case for the scope analysis involves sentences where scopes clash. Enc considers the sentence below from Cooper (1978):

Every congressman who remembers a president will be at the party

She considers the case in which the sentence is uttered long after the abolition of the presidency when a party is to be given for those congressmen old enough to remember a president. Every congressman must be in the scope of the future tense (they're not congressman now), and a president must be within the scope of every congressman (they may remember different presidents). But since scope is transitive, this would mean that a president would be within the scope of the future tense--in which case the sentence would have to be nonsensical, which of course it isn't.

Thus tenses are not interpreted analogously to the variables introduced by existential quantifiers, i.e. **indefinitely**, but rather (more) analogously to singular terms, whose reference is fixed in any given context, i.e. **definitely**. (1) provides for the latter interpretation of the tense operator directly.

To see this, reconsider example (2):

(2) Cal forgot to turn off the stove

This would be analyzed in the present system as true of a particular (contextually specified) time, i.e. the time at which the stove should have been, but wasn't, turned off. The time is supplied by the context of utterance. (Since (1) is not a semantic rule, but only a necessary truth condition, and especially since the actual semantic rule specifies that event and reference time are the same in the Preterite, this discussion cannot be construed as an argument that we must directly provide for definite reference to event time in addition to providing for definite reference to reference time. 1.6.1 contains the argument that we ought to provide for direct reference to event time and reference time.)

We suppose then that (2) is uttered in a context where e.g. the time of utterance is 2:00 pm, the most prominent stove is Cal's, and the time spoken about is 1:00 pm. All of this information is available in the context of utterance. Let us suppose that (2) is analyzed as:

PRET(**Cal-forget-to-turn-the-stove-off**) ($\models$ PRET(p))

Rule (1) then foresees an evaluation of the following sort:

$A_{2pm,1pm,r} \models$ PRET(p)

which, by (1), requires that

1 pm < 2 pm and $A_{2pm,1pm,r} \models$ p

which, by (2) in 1.4, holds iff

1 pm < 2 pm and I(p,1 pm) $\models$ 1

i.e. iff

1 pm < 2 pm and I(**Cal-forget-to-turn-the-stove-off**,1 pm)=1

We may grant that 1 pm completely precedes 2 pm and therefore summarize that (2) holds in the context given iff Cal forgot to turn the stove off at 1:00 pm. The time is important. If Cal turned it off at 1, but forgot yesterday at 6:00 pm, the sentence is still false. The tense refers to the time given in the context--and only that time is relevant to the evaluation of the truth of (2). The time at which he was to turn it off is thus a parameter of interpretation to which "indexical" tense refers.

The problems which Enc (1981) noted about the failure of the scope predictions in the indefinite treatment simply do not arise under an indexcial treatment of tense. We are simply under no obligation to

interpret e.g. noun phrases with respect to the same contextual parameters which turn out to be crucial in evaluating tense.

This indexical conception of the definite interpretation of tense is not an ad hoc feature of the present analysis within formal semantics. (Cf. Dowty, 1982 and Baeuerle, 1979 for extended treatments of tense which incorporate this feature.) The method is moreover the accepted way of treating context dependence in formal semantics. Let us review the motivation for this. It is only reasonable to assume that the time to which definite reference is made is a feature of the context--not unlike speaker, hearer, speech time, or the denotata of demonstratives. The assumption is justified by the fact that the time to which reference is made varies in contexts independently of the sentence uttered. Thus, even though (2) is usually understood as referring to "the last time I was supposed to turn the stove off," it may also be understood as "that time," for example, in the context of a narrative, or in a courtroom.

One common way of accounting for such contextual dependence in Analytic Philosophy was to suppose that such contextually implied elements were tacitly asserted. Thus Cal left asserts tacitly Cal left at t. This sort of analysis is usually linguistically supect, however, and in any case, it has given way to a similar, but syntactically less radical proposal. The presently accepted method of accounting for the effects of context on meaning, at least since Lemmon (1966), is to suppose that the meaning of the utterance of the expression X in context c may be calculated from the conventional content of X and the relevant aspects of c. Schematically:

(3) Lemmon's Principle

the utterance of X in c $=_{\text{(semantically)}}$ X'(c)

where X' is the conventional content of X.

So e.g. the utterance of you in a given context must have the semantic value of applying the function which is the conventional content of you to the (relevant parameters) of the context. Similarly, Cal left may be said to assert that he left at time t if this time is a parameter of context. (Note that Lemmon's principle is emphatically not to be confused with Grice's (1975) program which requires that the import of an utterance be calculable from the meaning and general principles of rational purposive behavior--the conversational postulates.) The present proposal follows Lemmon's principle.

The important programmatic point is that speech event and reference times are formalized as parameters of interpretation. Let us call this **the indexical interpretation of Reichenbach.** It may be contrasted with e.g. Hornstein (1977), where Reichenbach's speech time S, event time E, and reference time R are used as the basic elements in "tense structures," without a commitment as to their interpretation. I suggest that we call this **the representational interpretation of Reichenbach.**[3)]

The indexical treatment has the immediate and substantial advantage of explaining the discourse dependency of temporal interpretation. This may be seen if one reflects that discourse constitutes part of context, so that it should be reflected in different parameters of interpetation associated with that context. The representational treatment isn't helpless in this respect, but requires additional apparatus to deal with context dependence.

To appreciate further differences in the two approaches to temporal analysis, let us regard the representational treatments more closely. In representational systems structures of S, E, and R are built up by rules of interpretation. The rules work "top-down," first creating a basic representation for the matrix tense and temporal elements, and then moving "down" into subordinate clauses, where S_1, R_1, and E_1; S_2, R_2, and E_2; etc. are added to the structure.

It is at this point that an important difference between the indexical interpretation and the representational interpretation arises. The indexical treatment is committed to interpreting every temporal expression with respect to at most three indices (or some other fixed, and pragmatically plausible--read: small--number). The representational treatment, on the other hand, allows reference in principle to the full representation built up by previous rules. (Cf. Hornstein, 1977:539 for an example of a rule which refers to six

points of representation. Most of the rules in Smith, 1978:87-92 refer to more than three points of representation.)[4] In this respect, the indexical interpretation of Reichenbach is more restrictive, so that the burden of proof ought to lie on those proposing the less restrictive, representational view.[5] On the other hand, I do not know whether the indexical interpretation is more restrictive in any absolute sense, and I certainly do not claim that here.

This might be put a slightly different way: the indexical treatment requires a more strictly compositional treatment of temporal semantics. In general, a semantics is compositional if it specifies the meaning of composite expressions as a function of the meanings of its components (and therefore without reference to the larger construction in which the composite may appear). We can often obtain compositionality where it hasn't been achieved by employing more complicated meanings in the component expressions and by complicating the model theory which evaluates the expressions (and thus the suggestion of this thesis, that three temporal indices be employed, should make compositionality easier to obtain than it was in one- or two-dimensional tense logics). The less we have to complicate basic expressions or model theory to obtain compositionality, the more compositional a trreatment may be said to be. The indexical treatment, in limiting the number of temporal parameters to which a semantic rule may refer to three, allows less complicated basic temporal meanings, and so may be said to be more compositional than the representational treatment.

Perhaps this can best be appreciated in a second distinctive aspect of indexical tense logic. Many semantic rules for temporal expressions in other frameworks take the following form:

(4) for t a temporal expression, a its argument, c and c' contexts
$t(a)(c) = a(c')$ and cR_tc'
where 'R_t' designates a relation between contexts

For example, the Priorean Past operator might be formulated:

(5) $Past(a)(c) = a(c')$ and $c'<c$
where '<' designates temporal order of the appropriate sort

Note that (4) and (5) have altered the original reference to context. In this case the event time of (c) has undoubtedly changed in going to (c'). Those aspects of context altered by semantic rule are irretrievably lost to the application of later rules. This puts constraints on allowable temporal meanings. For example, we have already seen that the indexical treatment of the definite interpretation of tense requires that the time to which definite reference is made be a parameter of context. This means that any rule which alters this parameter must have the concommitant effect of barring definite reference to that time. Some rules certainly do alter the parameter to which definite reference is made in the Past tense rule, e.g. the rule introducing futurate Perfects (4.1) and the rules introducing duratives (3.7.1). Thus it is a predicted consequence of the indexical interpretation (of tense in general, and of Reichenbach in particular) that some temporal expressions cannot be understood as definite--viz. all those within the scope of a parameter-altering expression. (I.e., such expressions with narrower scope cannot refer to the same parameter definitely.)

The fate of altered indices in representational treatments, where the old indices may become part of the "tense structure" which is built up by the rules of tense interpretation, is not written in stone. In particular, the old indices are certainly available for use in subsequent rules of interpretation--in contrast to their aloof behavior in nonrepresentational treatments, where they are forever irretrievable. Since there are not the same automatic predictions in the representational treatments of tense, machinery must be developed and deployed to generate predictions, e.g. in the case of definite reference to time, some machinery will be required to distinguish definite and indefinite pieces of "tense structures."

A third, and final point of distinction between representational and indexical treatments of tense concerns again the definite interpretation of tense (and might be regarded as a more specific conse-

quence of the first point). According to the indexical treatment of the definite interpretation of tense, definite tenses refer to parameters of context. According to representational treatments, they refer to pieces of the representational structure being created. The difference then is this: the contexts, unlike representations, normally do not change after the interpretation of each new temporal element. For example, there is no reason to think that the definite Past tense should change the context with respect to which the rest of the sentence is evaluated (in the indexical treatment), while it certainly would change the representations it is added to. Thus the indexical treatment predicts that definite tense should not affect the interpretations of adverbial elements within its scope. No such prediction is made by a representational treatment. Thus the indexical treatment will generate rather more specific predictions than the representational one, which is flexible.

1.5.2 Vagueness and Indexicality

There is no sense in denying that the added flexibility of nonindexical treatments can appear to be very attractive--especially in sentences that seem to refer definitely to more than one time. Notice that if the sentence below is evaluated at any single event time, then it could only be true in very limited circumstances.

(6) Tom left school and got a job

In particular, the sentence would be evaluated as false any time when Tom first left school and then got a job. This is counterintuitive, and it therefore suggests that the indexical treatment of tense is too strict. Since there appear to be other advantages to the indexical treatment (and since it is the raison d'etre of this work to explore the indexical treatment), however, we might search for the minimal correction consistent with the correct analysis of sentences such as (6).

The optimal explanation of this phenomenon would be a general

principle which foresaw no special apparatus for conjunction. One formulation of this sort of principle is straightforward if we keep the use of definite temporal reference in mind: in particular, we often refer definitely but inexactly to time. (6) might e.g. be uttered several years after Tom's leaving school and getting a job, when the exact date has long been forgotten. This doesn't make it indefinite. It still might pick out a definite instance of his e.g. getting a job (from many such instances), but the exact time at which he got the job cannot be regarded as available, let alone salient, within the context of utterance. (It is worth pointing out that definite nominal reference is quite parallel in this respect: one can refer definitely to e.g. Thomas Pynchon using the phrase "Thomas Pynchon" or "the author of The Crying of Lot Forty-Nine," without knowing at all exactly who that is, and certainly without being able to recognize the man. Cf. Stalnaker, 1978:317f, and Enc, 1981:26f, who make this point about nominal reference; and Barwise and Perry, to appear:43f, who make it about temporal reference.)

(7) would seem to allow for vagueness in temporal reference in a sensible way:

(7) Vagueness in Temporal Reference

$A_{s,e,r} \models p$ iff there exists e' e such that $A_{s,e',r} \models p$

Given (7), we might evaluate (6) as true with respect to an event time e as long as there are subintervals e_1 and e_2 of e at which Tom left school and got a job. This assumes that (6) would eventually be reduced to a sentence conjunction, evaluated at e, so that its two conjuncts would presumably also be evaluated at e, and that (7) would apply to one or both of their evaluations. (7) thus would have the status of a clause in the definition of satisfaction.

(7) is unacceptable, however, because it reintroduces the difficulties which Partee noted about indefinite tense operators. To see this, first note that (7) suggests that any tense might be used definitely if one were just begin from a large enough event time interval. Thus we ought to be able to use e.g. (2) to assert that

there has been at least one instance of Cal's forgetting to turn off the stove:

(2) Cal forgot to turn off the stove

(2) ought then to be able to amount to the assertion that Cal hasn't always remembered to turn off the stove. (2) doesn't seem to be able to bear this meaning, however.

Similarly, (7) seems wrong in explaining the interaction of negation and tense. Let's reconsider (2'):

(2') Cal didn't turn the stove off

There are various scope possibilities, but most of them are obviously wrong. We can symbolize the different scope relationships in the following way, using VAG to note the point at which the vagueness principle might be invoked:

VAG(PAST(-(p)))
VAG(-(PAST(p)))
PAST(VAG(-(p)))
PAST(-(VAG(p)))

(It would also be possible to invoke the vagueness principle several times in evaluating (2'), but this would not improve the derived readings as equivalences of (2').) Clearly (2') would not be taken to assert that there is some time at which Cal wasn't involved in turning the stove off, and this eliminates the first two scope relationships. Similarly, (2') couldn't mean that within the definite past time in question, there is some time at which Cal weren't turning the stove off, which the third line would imply. This leaves only the last line as a possible scope representation.

Supposing this were to be regarded as equivalent to (2'), let us consider the situation in which Cal has been cooking a large meal, so that he may have turned the stove on and off several times in the

course of an hour: the vagueness principle (7) predicts that (2') would certainly be regarded as false if asserted about the time of Cal's cooking in the example, since within this definite time there is a time at which he turned the stove off. But this is counterintuitive: (2') might be truly asserted about the situation if Cal didn't turn the stove off when he was through, or if he didn't turn it off at another time when he was supposed to (and perhaps overcooked something).

This example indicates that definite reference to time is not captured well by a system which incorporates a principle of vagueness such as (7). It reinforces the point made above in connection with (7), viz. that referring definitely need involve neither exact knowledge of what is referred to nor even ability to recognize it.[6)]

But the rejection of (7) re-poses the question of how one can deal with (6). The solution, first proposed by Cresswell (1977:16) and modified by van Benthem (1983:195), which I shall adopt is less immediately attractive than (7), because it is less general. It is presented to demonstrate that (6) does not pose insurmountable problems for indexical interpretations of tense.

(8) Let $VP_{1[+fin]},\ldots,VP_{n[+fin]}$ be verb phrases.
Then 'VP_1, VP_2,...,und VP_n' is also a VP, with the meaning:
$\lambda x(VP_1'(x)\ \alpha_t\ VP_2'(x)\ \alpha_t\ \ldots\alpha_t\ VP_n(x))$.

(Note that finite VPs have been interpreted for tense, as the tensing rules in (3.6) make explicit.) Then we need a rule to interpret temporal conjunctions:

(9) $A_{s,e,r} \models p_1\ \alpha_t\ p_2\ \alpha_t\ \ldots\alpha_t\ p_n$ iff
(i) there exists subintervals $e_1,\ldots,e_n$ of e such that
$A_{s,e1,r} \models p_1$, $A_{s,e2,r} \models p2,\ldots,$ and $A_{s,en,r} \models p_n$.
and (ii) $\forall e'(e' \subseteq e$(e' an initial or final subinterval in e $\rightarrow$
$\exists n$ (in (i)) e_n overlaps e')

First, let us note that the latter rule (9) allows that a con-

junction be true at an event time when neither of its conjuncts is true--as long as all of the conjuncts are true of subintervals of that event time. This provides a means of analyzing sentences such as (6). Second, note that, because (8) applies only to VPs which have been interpreted for tense, there will effectively be a tense marker on each of the conjuncts created by (8), so that consequently each of the subintervals $e_1,\ldots,e_n$ must satisfy whatever tense is on its respective VP.

The second clause in (9) exists only to rule out the case where a sentence is asserted to hold of an interval larger than the one required to encompass the event times of its conjuncts.[7] This pair of rules would summarize the data correctly.[8]

There are obviously several predictions about the behavior of tense in VP conjunctions implicit in (8) and (9) which would be worth pursuing. They will not be pursued here, however, because they lead astray from the main point, which is not to defend them as the correct method of dealing with the problem of tense and conjunction, but rather to illustrate one strategy for dealing with the problem of multiple relevant times in an indexical tense system, and in order to demonstrate that the problem does not, as might first be suspected, set an absolute limit on the explanatory capacity of the system. This is clearly a problem which merits further investigation.

One aspect of (8) and (9) is worthy of mention because it may indicate a flaw in the strategy of dealing with multiple relevant times in this way: the method may break up a fairly general pattern into many disparate rules. For example, quantification may similarly involve several event times, but since there need be no instance of VP conjunction, (8) and (9) have no specific application here.

(10) Every one of my brothers and sisters graduated from high school.

The problem is similar: the sentence may be true (presumably of a single event time), even though there is no single time at which each of my siblings finished high school. But since there is no conjunction involved, (8) and (9) are of no use here.[9]

1.5.3 Indefinite Reference to Time

The indices provide a neat method of modeling definite reference to time, but how may indefinite temporal reference be accounted for? The logic of indefinite reference to time is not in doubt--it is aptly described e.g. by the Priorean semantics in (5) of 1.5, which might be modified in straightforward fashion for employment within the present system. But the exact semantics of indefinite temporal reference has its twists, and its grammatical status also has to be clarified. This section argues that indefinite reference to time should not be analyzed via general pragmatic principles nor as a series of distinct indefinite tenses, but rather as a sort of temporal adverb, which is normally expressed as mal, although it may have to be analyzed as possibly inaudible.

Most of the relevant facts are quite familiar. Not all uses of tensed elements are understood indexically. Nonindexical tenses in German are marked by the particle mal 'once' as in (1):

(1) Klaus war mal in China
K was once in China
'Klaus was once in China'

It is worth emphasizing that mal seems to be required to refer indefinitely to time. Ignoring generic statements about the past, we might claim that there is no indefinite temporal reference without mal. Thus the sentence below is always understood as about a definite time and sounds peculiar in a context where indefinite reference would be expected.

(2) Klaus war in China
was in C
'Klaus was in China'

(3) Ich brauche Informationen ueber China. Kann mir wer helfen?
I need information about C can me s.o. help
'I need information about China. Can someone help me?'

?- (2) OK - (1)

This fact lends a further bit of initial plausibility to any treatment which attributes the indefinite reading to the presence of mal.

Before presenting a rule of interpretation for mal, we should note that it often cooccurs with frame adverbials such as gestern 'yesterday.' In this case the sentence has the meaning 'sometime yesterday.'

(4) Gestern war er mal da
yesterday was he once there
'He was here sometime yesterday'

This is nonetheless indefinite reference time. The only difference between (1) and (4) is that the class of times to which indefinite reference is made is more restricted in the case of (4). The rule of interpretation for mal will have to guarantee that his being there falls within yesterday in (4). This may be formally accomplished in one of two ways. We might assign very wide scope to mal and let the time indefinitely referred to be modified by tenses and frame adverbials (with narrow scope). Or we might allow e to first be modified by the (wide scope) adverbials and tense and then allow mal to pick out a subinterval of the time.

The latter approach is preferable because it is immediately compatible with the use of mal (and other frequentatives) with somewhat definite temporal reference. (5) may be used to state that Uwe has been there once (in his life) or that he was there within a particular (understood) time, e.g. since the hearer left.

(5) Uwe war mal da
was once there
'Uwe was once here' or: 'Uwe was here once'

This use of mal to indiscriminately pick out a time within a given period is exactly what is always required of mal in the second approach sketched. We can now formulate a rule of interpretation for mal.

(6) $A_{s,e,r} \models \text{mal}'(p)$ iff $\exists e' \subseteq e$ and $A_{s,e',r} \models p$.

Let us note that this rule of interpretation, together with the assumption that mal has narrower scope than tense (and frame adverbials), provides an explanation for the phenomena observed thus far. Moreover, (6) has an immediate parallel in the field of nominal reference, that of indefinite pronouns.

It would be possible to formulate semantic rules which allowed indefinite temporal reference indiscriminately as a property of utterances, or even as an alternative with certain tenses. But as long as indefinite temporal reference correlates exactly with the presence of the adverb mal, there is little need to speculate about these possibilities. Should there be a very few instances of indefinite temporal reference without (at least an implicit anaphor of) mal, we might suppose it tacitly present. Finally, if other specific temporal expressions are understood indefinitely, there is nothing in the theory here to prevent them from being interpreted with an existential quantifier, in the manner of (6).

The important result which we can carry from this section is that indefinite interpretations of tense can, by and large, be ignored. They are signalled by the presence of mal (or by the fact that its addition to a sentence would be semantically negligible), result from the meaning of mal, and are readily treated with the theory of tense developed here. The indexical theory of tense was developed to handle definite reference to time, but it adapts well to the description of indefinite reference to time.

1.5.4 Summary

It has been the purpose of this section to present and defend the analysis of tense as indexical. This analysis follows from E.J. Lemmon's principle of analyzing context dependence of utterance meaning as a case of applying the meaning of the uttered expression (as function) to the context (as argument). The indexical treatment furthermore provides an insightful way of treating the definite interpretation of tense, is compatible with mechanisms for dealing with the multiple relevant event times which may be found e.g. in conjunction or in quantification, and accommodates the facts of limited indefinite reference to time as well. The next section illustrates another advantage of the indexical treatment, viz. that it allows a characterization of the temporal "flow" found in at least most narration.

1.6 Temporal Reference in Connected Discourse

We have argued hence that an indexical interpretation of Reichenbach's speech, event, and reference times provides a satisfactory and somewhat constrained account of definite interpretations of tense. Let us now try to link this account to the description of temporal reference in discourse sketched in section 1.3 above. This sketch was founded on the principle, RP, that reference times are ordered in (temporally) connected discourse, such as traditional narrative. There we considered the discourse (1), repeated here (again as (1)):

(1) Al went to N.Y. The others were there, too.

in which we argued that the reference times of the sentences are to provide for their temporal relationship.

Suppose then that the first sentence is analyzed as equivalent to PRET(**Al-go-to-N.Y.**), to be evaluated at r = 1 pm and the second as

PRET(**the-others-be-there**), to be evaluated at r = 2 pm. Since 1 pm $\leq$ 2 pm, this discourse satisfies RP. Now we would like to show that the first sentence is true at 1 pm and the second at 2 pm. (The exact choice of times is of course irrelevant. The point is that we must guarantee that the sentences in connected discourse describe successive states of affairs. This is the sense of such discourses, and it is the purpose of RP to facilitate the proper description of this phenomenon.) But it will not do to simply say that the sentences have successive reference times: we must also guarantee that the events described in sequences such as (1) also take place in succession.

It must be obvious that the necessary truth condition for the Preterite, (1) in 1.5, is insufficient for this purpose. The problem is to specify a dependence of the Preterite on reference time, but (1) in 1.5 makes absolutely no mention of reference time. (2) remedies this:

(2) Preterite (final version)
for all A, s, e, r, and p:
$A_{s,e,r} \models \text{PRET}(p)$ iff $e=r<s$ and $A_{s,e,r} \models p$

(2) is identical to the necessary truth condition ((1) in 1.5) except that (2) requires additionally that e=r.

Using (2), we can immediately derive the desired evaluation of (1). Let us note that:

(3.1) $A_{s,e,1pm} \models \text{PRET}(\textbf{Al-go-to-NY'})$ iff $e=1pm<s$ and $A_{s,1pm,1pm} \models \textbf{Al-go-to-NY'}$

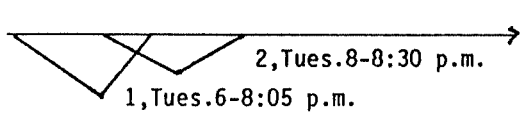
(3.2) $A_{s,e,2pm} \models \text{PRET}(\textbf{oth-be-thr'})$ iff $e=2pm<s$ and $A_{s,2pm,2pm} \models \textbf{oth-be-thr'}$

Given principle (2) in 1.4, that an atomic proposition is true at s,e,r iff it is true at e, we derive exactly the desired result: the first sentence must be true at 1 pm and the second at 2 pm. Thus (2), together with the discourse principle RP, guarantees that the times

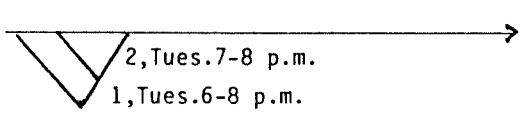
spoken of in connected discourse are successive.

Having achieved our desired result, we might wish to compare it to our intuitive understanding of discourses such as (1). We have derived the truth conditions for (1) so that the first sentence Al went to N.Y. must be true at the first reference time of the discourse, and so that The others were there, too must be true at the next. The discourse thus might be true of any of the following sequences of reference times:

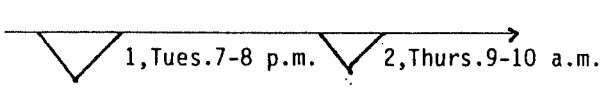
(4.1)



(4.2)



(4.3)



All of these situations are allowed by RP as presently formulated, and while I take it that everyone would agree that (1) might be felicitously uttered about (4.1) and (4.2), there may be some disagreement about (4.3), which may strike one as odd (as described by (1)). There is no difficulty given the right sort of facilitating context, however, such as (5):

> (5) The friends agreed to meet the following Thursday at 9 am in the lobby of the Ledo hotel in New York City. Al's last possible plane was Tuesday night, and he spent most of the day in indecision about whether to back out. Finally, he made up his mind and drove out to the airport. Al went to N.Y. The others were there, too.

It might be objected here that (5), as contrived as it is, simply shows that the inference that the times are not disjoint in discourse (1) is cancellable--but not that it plays no r[illegible]e whatsoever. To

accommodate this view, we would have to show how RP may be used to calculate a conversational implicature to the effect that discourse times must be nondisjoint (with some kinds of propositions, at any rate).[11] We want to guarantee the result:

(6) Reichenbach's Pragmatics (strong version):

For $S_1, S_2, \ldots, S_n$ a sequence of sentences uttered in a temporally connected discourse:

(1) $r(S_i) \leq r(S_{i+1})$

(2) it is conversationally implicated (for all atelic S_i) that $r(S_i) \leq r(S_{i-1})$

S is atelic iff it is an activity or a state. These terms are defined in the section below.

1.6.1 The Treatment of Aktionsarten

Brugmann (1904:493) seems to have introduced the concept of **Aktionsart**, defining it as "[...] die Art und Weise, wie die Handlung des Verbums vor sich geht." We will follow the tradition of German scholarship in referring to the telic/atelic distinction as a distinction among Aktionsarten; the history of this concept is discussed in Schlachter (1968:202ff) and Andersson (1972). We will also follow this tradition in viewing the distinction as semantically based, but we will look to the methods of tense logic for a formal characterization.

Taylor (1977) noted that telics are true at unique intervals, so that if e.g. 'x read Faust' is true of the interval from two to five o'clock (in the sense that x began at two, finished at five and was primarily occupied with reading in that interval), then, since this is a telic Aktionsart, it follows that 'x read Faust' is not true of any subinterval of the time in question, and it needn't be true of any other interval at all. Telic action takes place at a unique time. Atelic states, such as 'x be sick,' or activities, such 'x dance,' on the other hand, a[illegible] never true of unique intervals. If x is sick from

two to five o'clock, then he is also sick at all times between two and five. The same holds, with some qualifications, for activities such as 'x dance.' (There are also imperfective readings of telics, which will be treated in 2.6.)

1.6.2 Time in Connected Discourse

Returning to the strengthened version of RP in (6) in 1.6 above, note the effect that it will have: for states and activities S_i, this RP has the consequence that

(1) $r(S_{i-1}) \leq r(S_i)$ and $r(S_i) \leq r(S_{i-1})$

Since we are dealing with intervals, we may not therefore conclude that $r(S_{i-1}) = r(S_i)$. The definition of '$\leq$' specified that $a \leq b$ iff a does not extend beyond b. From (1) we may therefore conclude only that $r(S_i)$ and $r(S_{i-1})$ do not extend beyond each other, i.e. they must end simultaneously.

This strengthening of RP rules out (normally) situations of the questionable sort. There is clear indication that it must be limited in application to atelic Aktionsarten (be at home, talk with Jones, and not write a paper, arrive), as may be verified directly:

(2) Smith walked around. Jones was at home.
Brown talked with Jones.

(3) Smith came in. Brown wrote a letter.
Brown arrived.

I.e., the normal understanding of atelic following atelic is that they are nearly simultaneous (2), while the normal understanding of telic following telic is that the first precedes the second (3). There is undoubtedly more going on here, but at least this much ought to be accounted for.

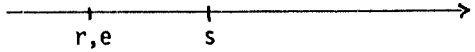
Since at least (2) in the strong RP in 1.6 is to be a conversational implicature, we need an account of its calculability. Dowty

(ms.) provides one account along the following lines: we assume that there is a principle that times in narration are successive (as in RP, though the details might differ). States and activities may be true of times, without for that reason being false of their subintervals. Thus if Jones be at home is true of 9-10 am, it isn't therefore false of 9:00-9:10 am. If this sort of sentence is S_i within a connected discourse, one may suppose it to be predicated of an $r(S_i)$ such that $r(S_i) \leq r(S_{i-1})$--even if it is also true of superinterval j $r(S_i)$ such that $j \not\leq r(S_{i-1})$. The situation is entirely different with sentences such as Sam read the book or Sam arrive. Neither of these is true at subintervals of intervals j at which they hold. Thus, even if RP allows that $r(S_i) \leq r(S_{i-1})$, this isn't very likely to hold; in fact, it holds just in case the events described in S_{i-1} and S_i end simultaneously.

If this discussion of the Preterite in discourse is clarified, then let us return briefly to the improved rule of interpretation for the Preterite (2) in 1.6. It is worth noting here that the added condition in (2) that e=r in the Preterite may be a conventional implicature. It might arise from the facts that (i) if e<r<s, then the Pluperfect is appropriate; and (ii) if r<s and r<e, then the conditional is appropriate. Thus the Preterite is appropriate only if e=r. But some of the tense information must be conventional meaning, and I see no need to take a stand on the issue here.

It is also worth noting that (2) says nothing about the distinction between iterative and noniterative readings of the Preterite. Nothing will be said here about iterative meanings, except that Carlson (1978) is an excellent source of information about their idiosyncrasies.

Let us finally note that we were forced to the adoption of (2) once we accepted RP as the principle of temporal organization in narration. It is therefore somewhat remarkable that (2) is exactly the meaning assigned to the (English) Preterite by Reichenbach (1947):



We can regard this as a confirmation of the correctness of the present work as an interpretation of Reichenbach.[12)]

Finally, let us note that filling out (5) in 1.5 to (2) above has in no way affected the account of the definite interpretation of tense in 1.5 above. There is still a time which is a parameter of interpretation fixed by context and capable of being referred to definitely. (2) does make two alternative accounts accessible, however, namely, one based on reference time, and one based on event time. They would be, at this point, minimally different, so that we may postpone a choice between the accounts until more temporal expressions have been examined.

1.6.3 Some Special Uses of the Preterite

This concludes the discussion of the Preterite in this chapter. Some apparent counterexamples to the rule proposed, viz. the futurate uses of the Preterite in sentences such as the following:

(1) Warte, bis er hier war
wait until he here was
'Wait until he's been here'

are not important to the system of temporal interpretation proposed here. Because this use is limited to a few verbs whose Perfect tenses with past meanings are also often replaced by Preterite forms, I would analyze these as Preterite forms with semantically Perfect meanings.

There is another large class of exceptions to this semantic rule, as especially Wunderlich (1970:139), but also Gelhaus (1969:17), Latzel (1977:36-37), Baeuerle and Stechow (1980:400), and Steube (1980:27-28) note. Some of Wunderlich's examples:

(2) Wie war Ihr Name?
how was your name
'What was your name?'

(3) Was gab es morgen im Theater?
what gave it tomorrow in theater
'What was playing in the Theater tomorrow?'

(4) Wir kamen [...] nach Florenz, das in einem breiten Tal lag
we came to Florence which in a broad valley lay
'We came [...] to Florence, which lay in a broad valley [...]'

Wunderlich very aptly dubs these "subjective Preterites." Thus the Preterites in (2)-(3) invite the inference that the name, or theater schedule, was mentioned earlier, which suggests that the use of the Preterite is dependent on the context of utterance, while (4) emphasizes that the subject's recognition of Florence lay in the past--and does not suggest that its geography is past, as a Preterite normally would.[13)] (2)-(4) may represent disparate phenomena which will eventually require separate accounts, but they may be grouped together here under Wunderlich's rubric because they all deviate from the account in (2) in 1.6.

These uses of the Preterite are extremely suggestive for those interested in subjectivity and discourse, but they should not make us lose sight of the fact that the Preterite meaning postulated above needn't be modified, but only extended in order to account for subjective uses. Several circumstances persuade me that this is so. First, all of the above can be understood as normal Preterites, though this is often comical in effect. Thus the first can be interpreted as 'What was your name (before it was changed) ' (The second example would of course be contradictory on the nonsubjective reading.) This is what would be expected if the Preterite were ambiguous. Second, conjunction facts indicate that we are dealing with an ambiquity, not a vagueness, in meaning. Thus in the following sentence either both conjuncts have the subjective reading, that recently mentioned information is being repeated, or they both have the "objective" reading, that a past state of affairs is being described (with the suggestion that Schmidt is dec ;ed or long absent). There is no way to mix

readings among the conjuncts.

(5) Sein Name war Schmidt und sein Beruf Ingenieur
his name was S and his occupation engineer
'His name was Schmidt and his occupation engineer'

Third, scope facts are peculiar, and different, in this use of the Preterite. Note that morgen seems to fall within the scope of the Preterite in (3) (because the sentence means 'What was it mentioned that tomorrow..,' rather than 'As of tomorrow, what will it be the case that it was to have appeared...'). Normally tense falls within the scope of frame adverbials, as 2.1 shows. It doesn't seem then that "subjective" Preterites present occasion to modify our treatment of definite Preterites. (Because the semantics of the subjective Preterites seem to involve modal and discourse notions, such as expectation, and because the phenomenon seems to be separate, as the facts above suggest, we will not attempt a formulation of the semantics here.)

1.7 The Need for Three Indices

1.7.1 The Need for at Least Three Indices

We have argued hence that an indexical interpretation of temporalia is best, and that the three-index approach advocated here is an accurate model-theoretic reconstruction of Reichenbach's remarks on tense, without, however, attempting to establish that the three temporal indices are required for descriptive purposes, and not merely for the sake of fidelity to Reichenbach's particular views. We should like to establish that three are indeed necessary.

No less an authority than Prior (1967:13f) is famous for the criticism that Reichenbach's three reference points are unnecessary so long as one keeps the scope of the various operators in mind:

> "[...] it becomes unnecessary and misleading to make such a sharp distinction between the point or points of reference and the point of speech; the point of speech is just the first point of reference."[italics in original]

But as we saw in 1.5, Partee (1973) demonstrated that Prior's method of explaining away Reichenbach's tense distinctions in terms of scope distinctions is limited to those times to which only indefinite reference is made. Since we clearly do refer definitely to more than just speech time, Prior's criticism has to be rejected. As we have seen, Baeuerle (1979) and Dowty (1982) have proposed systems in which two indices are employed in order to accommodate the definite interpretations which Partee noted.

The task of this section is to show that Partee's critique may be extended to two-index systems, since they are incapable of dealing with definite reference to more than two times. To lay the groundwork for this argument, we first note that the need for an index corresponding to speech time (in addition to a displaceable index) is universally recognized, at least since Kamp's (1971) demonstration that now continues to refer to speech time no matter how deeply embedded in the scope of tense operators it might be. Kamp's essay introduced two-dimensional tense logic. The two-dimensional systems employed e.g. by Baeuerle (1979) and Dowty (1982) have parameters which correspond to Reichenbach's speech and reference times, which allows them (i) to account for the definite interpretation of the Preterite in the manner of 1.5 above, and (ii) to account for the definite interpretation of reference time in examples such as (1):

(1) Dee hadn't ever lost

It may not be immediately clear that the reference time of (1) is understood definitely. Keeping in mind Reichenbach's E-R-S schema for the Past Perfect, we note that the reference time of (1) is the time before which Dee hadn't ever lost. Two facts argue that this reference time is understood definitely. First, (1) would be inappropriate in a context in which a reference time hadn't been established, for

example at the beginning of most discourses. This is expected if the reference time of the Past Perfect is understood definitely. If it were understood indefinitely, there is no reason to see why any such context dependence would exist. Second, (1) is understood distinctly from the Past tense. If we assumed that reference time were understood indefinitely, and that time is dense (so that between any two distinct points or closed intervals of time there is a third), then in particular, given any E<S, there would be an R such that E<R<S, so that the Past Perfect should hold whenever the Past does, and vice versa (at least given the arguments below that event time is understood definitely). This means that we have to abandon one of the two initial assumptions, either that reference time is understood indefinitely or that time is dense. The assumption that time is dense seems quite reasonable, however, so that it is best to regard reference time as understood definitely.

Given that we must provide for definite reference to both speech and reference time, it will suffice to find examples of definite reference to event time (when that is distinct from reference time) to show the need for a three-index system. We want to show therefore that we can use the Past Perfect to refer definitely to event time. (The other tenses in which event time is distinct from reference time, the Present Perfect and Future Perfect tenses, are probably not used definitely.) The alternative to the view that one can refer definitely to event time is of course the view that the Past Perfect is always indefinite vis-a-vis event time. To see that this is wrong, and that we can indeed refer definitely to event time, note first that (2) is certainly not understood to be true iff there exists some prior instance of Ed's losing; the time of his bad mood (= reference time) is definite, but so is the time of his losing. This cannot be any arbitrary prior time, but rather is taken to refer to a definite instance.

(2) Ed had lost (and was in a bad mood).

This may not seem entirely convincing because it could be maintained that the relevant interval of time within which Ed's losing must have taken place might be inferred from the context of utterance (and for example the parenthetical, since we would not normally assume that anyone would stay in a bad mood forever about a single loss). Note that the same objection could have been made against Partee's example (the context of having just left the house suggests that the remark about leaving the stove on pertains to it), and that it really misses the mark, however, since the point is not how the parameter is specified, but that it is required for the interpretation of (2).

We can also establish the possibility of referring definitely to event time by examining the effect of negation on the interpretation of the Past Perfect. Let us consider therefore (3):

(3) I talked to Fran. Gary hadn't left.

The first sentence is needed in order to provide a reference time, without which the Past Perfect is infelicitous. It is neutral enough, however, so that it shouldn't bias the understanding of the event time of the second sentence.

Is the event time referred to indefinitely? If it were, then the second sentence in (3) should be understood to mean one of the two below:

$\neg \exists t(t<r \ \alpha \ (G.\text{leave at } t))$
$\exists t(\neg(t<r \ \alpha \ (G.\text{leave at } t))$

i.e. either that there is no (prior) time at which G. left, so that he'd always stayed, or that there is some (prior) time at which he didn't leave, so that he hadn't always been leaving. The latter would presumably hold of no one, and the former only of first time-visitors (to wherever G. is). This indicates that event time isn't understood indefinitely, but rather definitely, and that we must allow for definite reference to event time even when it is distinct from reference time.

But this calls for a system of temporal logic in which speech,

event, and reference time may all be referred to definitely. The proposed system of logic in which all three function as contextual parameters allows just this.

1.7.2 More than Three Indices$_{\pi}$

If we turn our attention from the single tensed element to the temporal discourse, it is clear that more than three times may be referred to definitely:

(4) Hal got up. He walked downstairs. After breakfast, he left...

And given the ease with which such discourses may be fused into single sentences using temporal conjunctions, it seems as clear that more than three times may be referred to within complex sentences:

(5) After the man who got up late walked downstairs and before he left, he had breakfast (with the woman who had arrived early).

The same point is perhaps made better by verbs with propositional objects:

(6) Hal thought that Ike had noticed that Jan had mentioned that Ken...

There is an imbalance here, however. 1.7.1 demonstrated that the single Past Perfect form involves reference simultaneously to three distinct times, while the evidence in this section suggests that discourses, or (complex) sentences may involve reference to any number of definite times. I know, moreover, of no temporal expression which requires reference to more than three times in the statement of its semantics.[14] This suggests that, while there may be no limit to the number of distinct times to which definite reference may be made, there may be a fixed limit, viz. three, on the number of times relevant to the evaluation of any given temporal expression. Stronger hypotheses might also be maintained, e.g. that maximally three times may be employed in the evaluation of a "clause," or of a "VP."

Since the present work does not involve complementation, or complex sentences, there has been no attempt to implement the idea of the above paragraph. Since the idea is novel, however, I should like to explain it in some further depth, first by an analogy to pronouns.

Suppose we wished to present a unified theory of pronouns. First and second person pronouns seem to refer always to the respective speaker and hearer within a context, so that it is natural to formulate their semantics so that the reference of these pronouns depends on the contextual parameters speaker and hearer. Third person pronouns may refer successively to different people (or things) within a single discourse, or even complex sentence, so that its semantics would more adequately be formulated so that the nth instance of a pronoun is seen as referring to the nth element of an infinite sequence of available referents. The theory of tense I have been presenting views tenses like first and second person pronouns--fixed in their reference by contextual parameters. The question is, now that it is clear that tenses aren't limited to referring definitely to three times, must we move to the model in which reference is allowed to an infinite number of times

The answer is yes, at least to some extent, since we must allow for this variability in reference. But we might do so using mechanisms inspired by the view of tense as contextual parameter. The mechanism might reflect that while any number of times might be referred to definitely, the evaluation of any expression will make special reference to three distinguished times--speech, event and reference time.

In fact, something similar will be required in the analysis of first and second person pronouns as well, at least if the use of these pronouns in quotation is to be taken into account as well. Consider (5):

(5) Bill said to me, "I didn't recognize you."

The reference of the first person pronoun in the matrix clause is understood to be the speaker, but the reference of the "I" within the quotation clearly isn't the actual speaker, but the speaker in the event reported. I don't think that this observation would cause anyone to abandon the standard account of first and second person pronomial reference. Instead, the shift in reference surely ought to be attributed to the effect of quotation itself, so that a semantic rule ought to specify something to the effect that:

(6) $[\ \text{"p"}\ ]_{\text{A-spkr,hrr}} \models [\ p\ ]_{\text{A-spkr',hrr'}}$

That is, the semantic value of the quoted proposition equals the semantic value of the proposition evaluated at a context with another speaker and hearer--presumably supplied in this case by the matrix verb subject and indirect object, and in general by context. This solution retains the speaker and hearer indices as contextual parameters while recognizing that they may shift in some limited circumstances.

A parallel treatment for tense and other temporal expressions would seem promising. Consider the use of the Pluperfect in sentences such as (7) and (8):

(7) Moe hadn't noticed that Ned had left.
(8) " " " " " was absent.

The use of the Pluperfect in the subordinate clause in (7) suggests that a situation is being described in which E<R<S, and that R should be contextually definite. Clearly (7) is understood to mean that the time of Ned's leaving is prior to the time of Moe's failing to notice it. (8) contains a Preterite, on the other hand, so that we expect that E=R<S, and (8) is understood to mean that Ned was absent at the time that Moe failed to notice it. In each case, the event time--and only the event time--of the matrix clause functions as the reference time of the subordinate clause ((8) disqualifies the reference time of

the subordinate clause). Note that the same relationship between matrix event time and subordinate reference is found in (4) above. This suggests that a parallel to (6) might be employed to show the relationship between matrix event time and subordinate reference time:

(9) $[\ \text{that } p\ ]_{\text{As,e,r}} \models [\ p\ ]_{\text{As,e',e}}$

Note that r on the right side of the semantic equivalence has been replaced by e on the left, effecting the dependence of the subordinate reference time on matrix event time. The new subordinate event time e', if it is to be analyzed as definite, must be contextually specified in much the same way that the possible denotations of third person pronouns are (e.g. as the next in a sequence of definite referents).

An analysis incorporating a rule such as (9) would be consonant with Gelhaus (1972), who demonstrated that the sequence of tense restrictions (consecutio temporum) in German should not be viewed as restrictions on syntactic combinations. (9) incorporates the view that whatever, if any, "restrictions" there might be on sequences of tense are semantic, and (9) is fully compatible with the position that no such general restrictions (though there may be tendencies).

The sort of analysis I am suggesting now differs from one in which it is simply maintained that there may be definite reference to any number of times in that it goes on to specify that these times will play specific roles in semantic evaluation, and in that the points at which reference to new times may be introduced might be delimited (implicitly by the set of rules which introduce such times, and possibly explicitly in other ways). In this way the thesis that three temporal indices are required in the optimal tense logic for natural language differs from, and is compatible with, the position that there may be definite reference to any number of distinct times within a given discourse, or even complex sentence.

As stated at the outset of this section, there is no attempt here to flesh out the proposal in (9) to a full treatment of tense in subordinate clauses (and/or VP's). This section has been included

because the fact that one is able to refer definitely to more than three times within a single sentence might be thought to disconfirm the position of this thesis, i.e. that an indexical interpretation of Reichenbach's speech, event, and reference times provides an improved tense logic for the analysis of natural language tenses.

Notes--Chapter One

1. Reichenbach (1947:289) is responsible for the formulation that reference time is the time "from which an event is seen."

2. Nerbonne (1982) discusses examples of narratives that indicate that RP is a principle of conversational implicature. In particular, one can find examples of fairly careful narration in which reference times are nonetheless out of order. The examples there are of English prose, but German prose likewise contains occasional exceptions to RP:

> "...Auf der Insel Frauenchiemsee wurden erst in den letzten Jahren Bauteile des...Benediktinerklosters wiederentdekt...Die Gnadenkapelle in Altoetting war Pfalzkirche des spaetkarolingischen Koenigshofes..." in: Rudolph Poertner, Die Erben Roms: Staedte und Staette desdeutschen Frueh-Mittelalters Duesseldorf-Wien, 1965. Quoted in: Hoberg (1981:169).
> "...Pieces...of the Benedictine monastery weren't discovered until recent years on the island Frauenchiemsee...The chapel in Altoetting was the Palatinate church of late Carolingian royal court..."

Of course, this isn't a narrative, and I haven't noted examples of exceptions to RP in German narrative. I would still be surprised if none were forthcoming.

3. Since there are several other differences between the present use of Reichenbach and Hornstein's, some further remarks might be in order. To begin, Hornstein emphatically does not wish his system to be understood as one which directly models the times that tenses are about. For example, his system disallows that simultaneity (Reichenbach's ',') be reflexive, so that E may be simultaneous with R, but not vice versa (Hornstein, 1977, 323). (Hornstein is quite

aware of this, and even explicit about it, but it still seems problematic to me because it makes most of his system difficult to interpret; this cannot be pursued here, however.) The present system does wish to model times directly.

As a second point of divergence, note that Hornstein proposes that every tense in every natural language specifies an exhaustive linear relationship among speech, event and reference times. We indicated above why we reject the idea that (English) tenses be so specified, acknowledging at the same time that this was at least Reichenbach's practice. Hornstein adds to these conditions the condition that only simultaneity (',') and precedence ('-') be allowed in the specification, again in keeping with Reichenbach's practice. The proposal that tenses are universally specified this way is more problematic, however, because linear specifications of three parameters do not, in general, allow linear specification of complement tenses, which are a common enough feature in the world's languages. To provide an immediate concrete example, the German Past seems to require E,R-S, just as Reichenbach suggested for the English Past, but, as will be argued extensively below, the German Present tense might be more accurately dubbed a "Nonpast," since it allows either that S-R,E or S,R,E (without being ambiguous). This can easily be represented linearly, e.g. as S≤R=E, but not in a system which allows only simultaneity and proper precedence as relation terms.

4. Although Smith (1978) may be criticized on this point, her use of Reichenbach is like the one advocated here in many details. There is no attempt to specify an exhaustive linear relationship among S, E, and R (p.53), for example, and no attempt to find a universal tense scheme. The possibility of deictic specification of at least reference time is emphasized (p.47), and the need to analyze adverbials such 3 pm, tomorrow, etc. as modifiers of reference time (rather than as scope-inducing operators) is recognized (p.51), although it is suggested (p.49) that times named in adverbials such as before midday are actually reference times (i.e. midday itself in the example).

The main points of divergence are that the present treatment urges that speech, event and reference times are all deictic (except when

explicitly otherwise: cf. 1.7), and that these are to be formalized as contextual parameters in model theory. These points might be viewed as extensions of Smith's ideas, but clearly ones which allow a good deal of restructuring of the system in Smith (1978). For example, they allow us to eschew the construction of temporal representations, which Smith's (1978) system relies on.

5. Hinrichs (1981:69-70) does argue that a fourth point of reference is required in addition to the customary Reichenbachian three, but only with reference to tense in narratives.

6. There is an additional minor problem connected with (7) which pertains specifically to German, and which may be worth explaining here for the further light it sheds on the sorts of predictions that (7) makes about tensed formulas. In particular, for any temporal expression, X, that describes, but does not alter, the parameters of interpretation, (7) predicts that X will hold for subintervals of event time. This may be easier to state formally than it is in prose: Suppose X describes the parameters of interpretation without altering them, so that its rule of interpretation is of the form:

$$A_{s,e,r} \models X(p) \text{ iff } \_\_\_\_\_ \text{ and } A_{s,e,r} \models p$$

Then, (7) predicts that X will hold for subintervals of e. To see this, suppose that X(p) were under evaluation. By assumption, this holds iff

$$\_\_\_\_ \text{ and } A_{s,e,r} \models p$$

The latter half of which, by (7), holds iff

$$\exists e' \subseteq e \text{ such that } A_{s,e',r} \models p$$

The empirical prediction is that p's holding of some subinterval e' of an interval e satisfying X is sufficient guarantee of X's satisfying p at e. For most temporal expressions, this is harmless enough, since, if an terval e satisfies X, then so will its subin-

tervals, including e' (every subinterval of a past interval is also past). But not every temporal expression is so indiscriminate. A standard view of the German Present (which is defended in Chapter 2) is that it requires that a proposition hold of an interval e which is not wholly past. Some subintervals of nonpast intervals are past, however. We can therefore use the Present tense to test (7).

The result, not surprisingly, is that the German Present really does require that a proposition be true of a nonpast interval--and that a proposition's holding of a past interval within a nonpast interval is simply not sufficient to allow the Present tense proposition to be true. This holds whether we are speaking of simple sentences (which would also be covered by (7)) or conjunctions, such as (6), or (ii) below:

(i) Er schreibt einen Brief
he write a letter
'He's writing a letter'

(ii) Er isst sein Fruehstueck und schreibt einen Brief
he eat his breakfast and
'He's eating his breakfast and writing a letter'

The events described in (i) and (ii) must be simultaneous with, or subsequent to, speech time. Even we restrict (7) so that it applies only to conjunctions (and not to (i)), (ii) contradicts (7)--and it contradicts it whether or not there are two instances of the semantic operator 'PRES' in (ii). (If there are two instances, they are each immediately problematic. If there is a single instance, it must distribute to each of the conjuncts, which are then incorrectly analyzed.) Finally, note that these propositions really must be analyzed as holding of intervals, and that these must be allowed to extend into the Past. (7) presents difficulties which call for radical revision.

7. The second clause represents a slight modification of van Benthem's (1983:196) modification of Cresswell's original rule. The

present formulation allows that the event time of the conjunction might include times at which none of the conjuncts holds, so that the conjunction might e.g. be true of successive nonoverlapping times.

8. The problem discussed in Note 5 doesn't arise in connection with rules (8) and (9) because each conjunct will be independently marked for tense, which its respective e_n must satisfy. The problem would arise if there were a single tense which distributed to each of the conjuncts.

9. The predictions which I find interesting arise from the fact that (9) predicts that tense in conjunctions will be understood somewhat indefinitely (there is definite reference to an interval within which relevant event times indefinitely occur). I find this suspicious, but hard to test, and furthermore interesting because it is a point at which the present theory of tense (as deictic dependent on three parameters) may make different predictions from the theory developed in Enc (1981), in which tense is a deictic dependent on an unlimited sequence of times. I say that the theories may differ because it seems to me the present theory is compatible with a revision of (9) in which definite reference to several times within a VP conjunction might be provided for; some similar mechanism is certainly required to deal with sentence conjunction.

10. But even if the exact same rules are inapplicable here, the same technique may be applied. The following has been adapted from Cresswell (1977:12):

(i) every may combine with a common noun phrase CN, to yield an NP with the meaning: $\lambda P \forall x(CN'(x) \dashrightarrow SUB(P(x)))$, where 'P' is a variable of the VP type.

(ii) $A_{s,e,r} \models SUB(p)$ iff there is an $e' \subseteq e$ such that $A_{s,e',r} \models p$.

Taking (10) as an example, we assume that the NPs created by (i) are combined with finite VPs to create sentences, so that (ii) has the consequence that for each brother and sister, there must be an e' (not necessarily the same in each instance) which satisfies the truth

conditons of the English Past tense and which is when that brother or sister graduated. This is the needed set of truth conditions.

At the risk of redundancy, let me emphasize that (i) and (ii) and (8) and (9) are presented here not to solve all the problems of tense combining with conjunction or quantification, but to demonstrate how an indexical treatment can deal with the phenomenon of multiple relevant event times.

11. But recall Note 2, which suggests that all of RP might best be viewed as a kind of conversational implicature.

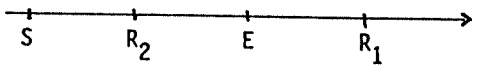
12. This also indicates that Comrie (198i:28) is hasty in attempting to dispense with all mention of reference time in the Preterite, although I accept his general point, i.e. that one need not follow Reichenbach slavishly in specify s, e, and r exhaustively for every tense (or temporal expression).

13. Dowty (1977) presents an alternative account of Preterites such as (3) which analyzes them as past variants of futurate Presents such as The train leaves at midnight. If this analysis can be maintained, there may be no need to posit a special meaning of the Preterite, but this depends on the details of the analysis. Note that Dowty's analysis depends on the use of scope-inducing operator, which are problematic (but possible) in the present approach.

14. Prior (1967:13) suggests that more than three times might be required in a Reichenbachian sort of system to handle the Future Perfect Progressive in examples such as:

I shall have been going to see John

which he diagrams:



But it isn't clear either that R_2 or E are understood definitely or that go to + infinitive ought to be regarded as a tense form (since it involves the use of the VP with complementizer rather than the bare

infinitival VP (which shouldn't be taken as a criticism of Prior, since he clearly wasn't addressing questions about the structure of natural language.) I don't wish to evaluate this issue in depth, but I would also note that Prior's remark would point at most to the need for a fourth index, and not for the need for an unlimited number.

A Tense Logical Sketch of German

The semantics proposed in Chapter 1 is illustrated here by an extended semantical sketch of German temporal reference. The particular elements of German selected for description emphasize what seem to me novel aspects of the proposed system--either because a particular analysis is required or distinctive. In addition to this, I wish to illustrate perhaps the primary virtue of the proposed system: it allows straightforward description of the complex temporal reference which may result from the interaction of even a few temporal elements. It is for this reason that the chapter closes with an examination of the interaction of schon with tense, with frame adverbials of the sort gestern 'yesterday,' and with durative adverbials. The semantics proposed for these expressions is defended, but an explicit fragment cannot be provided until Chapter 3, where the syntax of these (and other) expressions is examined.

2.1 Frame Adverbials

As Bennett and Partee (1972) propose, adverbs such as gestern 'yesterday' or morgen 'tomorrow' may function to located time within a specified frame. A variant of this is formalized in (1):

(1) for f a frame adverbial

$A_{s,e,r} \models f(p)$ iff $r \subseteq [\ f\ ]_{A_{s,e,r}}$ and $A_{s,e,r} \models p$

'$[\ f\ ]_{A_{s,e,r}}$' stands for the semantic value of f in $A_{s,e,r}$ (in the case of gestern only s is relevant). Notice that the time designated by f modifies reference time for the evaluation of the remainder of the sentence. This aspect of the analysis of frame adverbials, viz. that they specify an interval within which reference time must fall, is consistent with Bennett and Partee's (1972) term 'frame adverbial,' and it is consistent within the preformal intuition of reference time as "the time from whose vantage point the event is viewed." This was, of course, Reichenbach's position on such adverbials, which figured in his famous analysis of the English Present Perfect (Reichenbach, 1947:294f).

Let us consider an example to see how (1) functions:

(2) Es regnete gestern
it rained yesterday

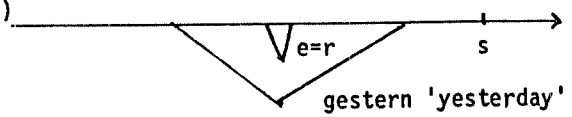
This should be assigned the analysis in (3):

(3) gestern'(PRET(es-regn-'))

$A_{s,e,r} \models$ (3) iff $r \subseteq [\text{gestern}']_{As}$ and $e=r<s$ and $A_{s,e,r} \models$ es-regn-'

(2) is therefore true in the situation sketched in (4):

(4)



The "derivation" in (3) obviously lacks some steps, e.g. how gestern is assigned the denotation of the day preceding speech time. But it illustrates how frame adverbials and tense interact. Note that relative scope is consistent with the intuitive understanding of "frame," i.e. that it is outermost. This turns out not to be crucial; however, it seems preferable in the case of the Perfect. Here we just note

that the frame adverbial has wider scope, even though this is unimportant in example (2).

Notice that (1) requires of the reference time already deictically referred to that it fall within a certain interval. We might have achieved much the same effect in (1) if we had required only as much as (1'):

(1') $A_{s,e,r} \models f(p)$ iff there is an r' such that $r' \subseteq [\ f\ ]_{As}$ and $A_{s,e,r'} \models p$.

(1') does not require that the original r fall within the time designated by the frame adverbial. But the relaxation of this requirement will have as a consequence that r is irrelevant in the evaluation of sentences with frame adverbials, and therefore, that virtually any sequence of sentences may count as temporally connected, e.g. (5) and (6).

(5) H kam Dienstag. A war Donnerstag weg. D war Mittwoch da.
came Tuesday was Thursday away was Wednesday here
'H came on Tues. A was away on Thurs. D was here on Wed.'

(6) M kam zur Tuer. Er ging am Tag zuvor weg. Er machte sie auf.
came to door he went on day before away he made it open
'M came to the door. He went away the day before. He opened it.'

But (5) and (6) don't sound at all like temporally connected discourses; they hardly sound coherent. This indicates that the stronger (1) is preferable to (1').[1] Notice that RP has thus forced the choice of hypothesis (1) over (1').

There is an additional, more important reason for rejecting (1') in favor of (1). Notice that (1') introduces its new reference time indefinitely, i.e. with an existential quantifier. This suggests that there ought to be an asymmetry between sentences with, and those without, frame adverbials. In particular, it ought to be the case that sentences with frame adverbials are always understood indefinitely (though with respect to a particular interval). I want to argue that this isn't the case. The argument takes the same form as the argument used in 1.5.2 against the possible "Vagueness Principle" discussed there, but the argument there may not be applied here without alteration (because now we must argue against indefiniteness over a restricted domain).

Consider then (7):

(7) Hans liess gestern die Tuer auf
left yesterday the door open
'Hans left the door open yesterday'

(7) seems as capable of referring to a definite time as (8):

(8) Hans liess die Tuer auf
'Hans left the door open'

That is, (7), like (8), may be used to speak of a specific past instance of Hans's leaving the door open--for example in a conversation about who is to blame that the office door was found open today at 7:30 am. (7) (or (8)) might then be used to cast doubt on Hans's innocence. In this case it would not mean there exists some one time yesterday when he left it open (since that would presumably be the case for almost anyone using e.g. a main office), but rather that he failed to close the door when he left for the day.

The argument for the definite understanding of tense even in connection with frame adverbials may be strengthened by examining the interaction of tense and negation:

(9) Hans schloss gestern die Tuer nicht ab
locked yesterday the door not up
'Hans didn't lock the door yesterday'

Were we to employ (1') as the semantic rule associated with frame adverbials, we would have the choice of assigning negation either

wider or narrower scope with respect to the frame adverbial, i.e. either (10) or (11):

(10) not(yesterday(H.lock the door)
(11) yesterday(not(" " " ")

We may ignore the role of tense at this point. But in the situation described above, where the cause of the morning's unlocked door is being sought, (9) is surely not understood as saying that there is no time yesterday at which he locked the door (10), since he may have locked it as he left for lunch. Nor is (9) understood as saying that there is at least one time yesterday at which Hans didn't lock the door (11), which would amount to saying (uninterestingly) that his day didn't consist entirely of locking doors. Both possible scopes of negation vis-a-vis frame adverbials are therefore inadequate, given the assumption that times are referred to indefinitely in sentences with frame adverbials. For this reason too, we ought therefore to prefer the analysis (1), which allows that a time may be understood definitely in a sentence with a frame adverbial.

But if this shows that tense may be interpreted definitely in sentences with frame adverbials, it nonetheless remains that it often isn't. Thus Guenthner (1979) notes that (12) seems to mean that he didn't play at any time yesterday--and not merely that he didn't play at a particular time referred to.

(12) John didn't play tennis yesterday

Cf. Kuhn (1979:247) for a similar point. This judgement about the interpretation of the sentence seems correct to me, but I believe that it arises as a conversational implicature from the definite interpretation of the sentence, i.e. that he didn't play tennis yesterday at the(±) time when he plays. Given this interpretation, it is a short step to conclude further that if he didn't play then, then he probably didn't play at all yesterday.

In defense of this account of the "indefinite" reading, note first

that it is similar to the indefinite sense of the pronoun he in:

I expected a phone company repairman, but he never showed up

He is readily understood indefinitely here--as "no one"--even though it is usually taken to be definite referring. As a second point in favor of this account, note that we can cancel (12)'s implicature, and more readily understand it as referring definitely, if we can identify the time being referred to. To see this, suppose that I regularly play tennis on my lunch hour, but that I didn't show up as expected yesterday. Then it seems to me that the following exchange would be quite natural:

(13) John, you didn't play yesterday±
- No, I had a league match last night.

It is more difficult to use the exact original, 'play tennis,' because in any situation where interlocutors know the time that John plays, they certainly know what he's playing. But (13) shows that the inference that John didn't play at all is cancellable, as is expected of conversational implicatures.

I conclude therefore that temporal reference in sentences with frame adverbials is as (semantically) definite as it is in sentences without.

An alternative analysis, in which temporal reference is normally definite, but indefinite in sentences with frame adverbials, has been proposed in Baeuerle (1979) and Baeuerle and Stechow (1980). Since their analysis also treats German temporal reference in depth, this is an opportune point at which to describe their work.

Before turning to their work, a further point about (1) is worth noting. We might have achieved the effect of (1) e.g. in sentence (2) if the adverbials interpreted by (1) were to place event time within a specified frame directly, rather than by requiring that reference time fall within the frame. The subsequent application of the Preterite tense rule, which requires that e=r, would then no longer be needed to

ensure the desired consequence. As far as the interaction of frame adverbials with the simple Preterite tense is concerned, we might just as effectively stipulate that frame adverbials require that e [frame adv.]$_{As}$, since the Preterite requires that e=r<s. This would be satisfactory as far as the simple Preterite were concerned.

In fact, the Perfect tenses, which do not require that r=e, seem to show the wisdom of analyzing these adverbials as modifiers of event time rather than analyzing them as modifiers of reference time. Frame adverbials may modify event time in the Perfect tenses. Consider the second sentence in (14):

(14) Ich habe A gestern gesehen. Er hatte den Brief vorgestern
I AUX yesterday see(prt) he AUX the letter day before

schon bekommen.
already receive(prt)

'I saw A yesterday. He had received the letter the day before.'

In (14) the adverbial vorgestern is understood to specify the time at which he received the letter--the event time (at least by most). The situation is more complicated with the future use of the Prefect in (15), but here, too, we find adverbials modifying event time.

(15) Morgen um diese Zeit habe ich die Stadt schon vor zwei
tomorrow at this time AUX I the city already ago two

Stunden verlassen
hours leave(prt)

'At this time tomorrow I'll have left the city as of an hour before.'

The vor zwei Stunden phrase is understood as specifying the time at which 'I' will actually leave in (15).

But the Perfect tenses do not provide unambiguous evidence in favor of the analysis of frame adverbials modifying event time. In this connection, note (16) and (17):

(16) Naechsten Freitag hat er es geschrieben
next Friday AUX he it write(prt)
'He'll have it written by next Friday'

(17) Ich habe A gesehen. Er hatte den Brief damals schon bekommen.
I AUX see(prt) he AUX the letter then already get(prt)
'I saw A. He had already gotten the letter then'

The adverbials in (16) and (17) are understood to refer to reference time, not to event time. Thus (16) may be true if he writes it before Friday, and (17) may be true if he received the letter before then. (Sentences such as (16) suggest, but do not force, the assignment of wider scope to frame adverbials. Without the future reference time, guaranteed here by the frame adverbial, the Perfect has the same temporal meaning as the Preterite. This suggests the scope assignment: frame adverbial - tense. The reverse scope assignment is as adequate semantically, but does not mirror the dependence as nicely. Because of these sorts of examples, we allow the generalization that frame adverbials specify reference time.

Thus, although there are examples where frame adverbials are seen as modifying event time, there are also examples where they are seen as modifying reference time. It therefore seems necessary to allow that frame adverbials modify either event time or reference time; the only possible dispute would then be about whether one of the uses is limited to the Perfect tenses.

Two very minor points favor regarding the reference time adverbials as the more general. First, some speakers have difficulty interpreting the adverbs in sentences such as (14) as event time modifiers. Second, the general conception of reference time as the time from whose vantage point the event is viewed suggests that it ought to be the ubject of frame adverbials. At this point, there

seems little sense in pushing this question. We adopt (1) as a necessary rule for the interpretation of frame adverbials.

2.2 Baeuerle and Stechow's Analysis of German

Rather than develop all of Baeuerle and Stechow's considerable semantical apparatus, the relevant parts of their analysis will be translated into the notation that has been developed here. To justify the translations, note that their semantic definitions take the form:

(1) $t \trianglelefteq [p]_{As}$ iff _____

Cf. (S3) in Baeuerle and Stechow (1980:400f). Speech time is retained as a parameter of interpretation. We can see that the 't' on the left of the epsilon in (1), which Baeuerle and Stechow call Betrachtzeit, parallels event time in the present description because it is the time at (subintervals of) which temporally atomic sentences must hold ((S1) in Baeuerle and Stechow (1980:396)), and because it is a time to which deictic reference can be made (as can be seen in Baeuerle and Stechow's (1980:397) discussion of their treatment of Partee's example, and as the term Betrachtzeit 'examined time' might suggest. This means that we can write (1) as (1'):

(1') $A_{s,e} \models p$ iff _____

In fact, Baeuerle and Stechow (1980:412f) introduce a third parameter to keep track of temporal relations in the Perfect tenses (Baeuerle's (1979:51) dismissal of three-parameter systems such as Reichenbach's notwithstanding), so that we can simply continue to write semantic rules in the form of (1''):

(1'') $A_{s,e,r} \models p$ iff _____

Their treatment of frame adverbials, rules (S10) and (S11) in

Baeuerle and Stechow (1980:408), assumes that a frame adverbial such as heute 'today' denotes the entire present day, and proposes the rule in (2):

(2) $A_{s,e,r} \models f(p)$ iff $e=[f]_{As}$ and $A_{s,e,r} \models p$

It may seem counterintuitive e.g. that the entire time specified by the frame adverbial is to be equal to event time. But (2) never operates except in tandem with a rule interpreting the implicit frequentative mindestens einmal 'at least once,' whose semantics are given in Baeuerle and Stechow (1980:405) as the following:

(3) $A_{s,e,r} \models$ **m.einmal'**(p) iff $\exists e' \trianglelefteq e$ and $A_{s,e',r} \models p$

Given the fact that (2) and (3) always operate in tandem (in the absence of an explicit frequentative), and that frame adverbials have wider scope than the implicit frequentative, this treatment will obviously be equivalent to (1') in 2.1, repeated here for convenience:

(4) $A_{s,e,r} \models f(p)$ iff there is an e' such that $e' \trianglelefteq [\ f\ ]_{As}$ and $A_{s,e,r'} \models p$.

Baeuerle and Stechow's Preterite rule (p.400) is rendered in (5):

(5) $A_{s,e,r} \models$ PRET(p) iff $\exists e' \trianglelefteq e(e'<s)$ & $A_{s,e'',r} \models p$, where e'' is the maximal subinterval of e before s.

Baeuerle and Stechow must complicate the semantic rules for tenses with reference to "maximal subintervals" of times referred to because of their decision to analyze frame adverbials as specifying exactly (event) time. To see this, reflect that in (6), reference is made to the entire present day:

(6) Heute war Arnim da
today was A there
"Arnim was there today"

Since the interval consisting of the entire day clearly isn't past, and since the subintervals picked out in connection with the implicit frequentative mustn't allow a nonpast interval to affect the truth conditions of a Preterite sentence, the reference to the maximal past interval is required.

2.1 presents my case against the idea that temporal reference must be indefinite in sentences with frame adverbials. To that point I should like to add three criticisms on points specific to Baeuerle and Stechow's implementation of the idea. First, it seems especially counterintuitive to allow that deictic reference might be to the entire nonpast interval consisting of today (or this entire week) in a sentence such as (7)--but exactly this is required if both (6) and (7) are to be treated in Baeuerle and Stechow's system:

(7) Arnim war da
was there
'Arnim was there'

Second, the same principle that allows that a sentence with a frame adverbial is true when uttered about an interval i when it is properly true only of a subinterval of i (i.e. true even without an implicit frequentative) will predict that sentences without frame adverbials will have this same property. But this is just the prediction about vagueness in temporal reference that was rejected in 1.5.2. That is, Baeuerle and Stechow predict that e.g. (8) would be true in any situation in which Arnim did any more than turn the stove on and off (during the time referred to):

(8) Arnim liess den Herd an
left the stove on
'Arnim left the stove on'

But consider the situation in which Arnim was cooking and turned the stove off when he was through. If he is any sort of normal cook, he certainly left the stove on while he was cooking, so that he left it on at some time within virtually every interval one might care to refer to. But then, as we maintained in 1.5.2 as well, the sentence is simply false, at least in the situation in which we are complaining about finding the stove on later in the day.

Third, the assumption of the implicit frequentative requires a Present tense rule which is less than adequate:

(9) $A_{s,e,r} \models \text{PRES}(p)$ iff $\exists e' \subseteq e\ s<e' \alpha A_{s,e'',r} \models p$ where
e'' is the maximal subinterval of e after s

Given the rest of Baeuerle and Stechow's system, this semantic rule is required. In particular, we can't allow e'' in the rule above to extend beyond s into the past, since that, in combination with the implicit frequentative, would predict that a Present tense sentence could be true of a past time.

The difficulty with this rule is that the Present tense is used about times which extend into the past. Consider e.g. (10) and (11):

(10) Er ist schon zwei Stunden da
he is already two hours there
'He's been there for two hours'

(11) Er baut ein Haus
he build a house
'He's building a house'

(10) is true only of intervals which extend two hours into the past, and (11) may be true of intervals which similarly extend into the past. Particularly in the case of (10), there are ways in which one could try to preserve the analysis, but (i) there is at least at prima facie difficulty here, and (ii) although one can attempt to

preserve the analysis, the attempt hasn't been made, and is not straightforward. The difficult case is that of (11). If this sentence has a reading which requires that he finish bulding the house for (11) to be true, as it almost certainly does, then we must allow him to have begun before speech time. It is not clear way how to analyze these sentences properly within Baeuerle and Stechow's system.[2)]

Because of these three additional difficulties with this implementation of the idea that temporal reference is only indirectly definite, it would seem worthwhile to explore alternative analyses.

This concludes the discussion of Baeuerle and Stechow's work on the semantics of German tense and temporal adverbs, easily the most sophisticated on this subject.

2.3 The German Present Tense

2.3.1 The Semantics of the Present Tense

A first formulation of the semantics of the Present tense might be (1):

(1) Preliminary Present Tense Rule (Reference Time Insensitive)

$$A_{s,e,r} \models \text{PRES}(p) \text{ iff } e\text{-}<s \text{ and } A_{s,e,r} \models p$$

An alternative, which the analysis of the Preterite in 1.6.0 should certainly suggest, is (1'):

(1') Present Tense Rule (Reference Time Sensitive)

$$A_{s,e,r} \models \text{PRES}(p) \text{ iff } r=e\text{-}<s \text{ and } A_{s,e,r} \models p$$

This stipulates that the meaning of the Present tense is not that e-<s, but rather that r=e-<s, which is a more exact complement of the Preterite's r=e<s.

We shall adopt (1'), but the choice is conditioned largely by the choice of frame adverbial rules made in 2.1. (1) is a live, but less attractive option. We shall first discuss both rules.

The proposal for the analysis of the Preterite in 1.5 (and continued in 1.6) is likely to be a great deal less controversial than any proposal about the meaning of the Present tense. For this reason, some immediate comment: First, although a number of variations will be discussed, they will all be very close in spirit. They will all view the present and futurate uses of the Present tense as derived from a single nonambiguous tense (rather than as an ambiguous marking of present or future). This decision will be defended in 2.3.2 below. Second, none of the examined refinements can be applied to cases of the so-called "historical present" or "present of vivid narrative," which is available in German as in many other languages. There does not seem to be much point in regarding these uses of the Present tense form as anything but distinct. They constitute a marked use limited to narration. Third, iterative readings are ignored here, just as they were ignored in considering the Preterite.

Fourth, and most important, the refinements differ in whether they allow that any Present tense sentence may be understood as about a future time. The reason for this is quite simple: many Present tense sentences seem to disallow future readings. For example, (2), in the absence of preceding discourse, would only be understood about present time, even though the sentence is fine with a future adverbial, as in (2'):

(2) Jo ist krank
is sick
'Jo is sick'

(2') Morgen ist er krank
tomorrow is he sick
'He'll be sick tomorrow'

Of course, one is free to try to attribute this to pragmatics, as indeed the present treatment eventually will.

Before taking up this point, let us first note that under both accounts the Present is not a Priorean "Nonpast tense," true whenever

there is a nonpast time which satisfies the radical p. (Such an account would conflict with the account of frame adverbials given in 2.1 in any case.) Both (1) and (1') allow definite reference to time, which is in their favor. Either rule, together with the rule introducing frame adverbials (in 2.1), has the further immediate consequence of explaining how it is that (2') refers to the future. The frame adverbial rule will require that event time fall within the time denoted by morgen, i.e. the day after speech time, while both rules allow that reference time > speech time.

The choice of (1') over (1) is forced by the choice of frame adverbial analyses made in 2.1. To see this, consider (1)'s interaction with frame adverbials. Morgen requires only that r fall within the time it denotes, i.e. the day after speech time. But then (1) predicts that the sentence er kommt morgen 'he is coming tomorrow' is true when r is in the day following s (the contribution of morgen) and e-<s (the contribution of the Present). But surely the semantics must somehow require that e also fall within the day following s. The sentence is simply false unless the time of his coming really is sometime tomorrow. Because (1) says nothing about reference time, the modification of reference time by frame adverbials ends up having no effect on the truth conditions of sentences in the Present tense.

It is true, but irrelevant that frame adverbials are eventually analyzed as possible modifiers of event time, because the problem here is not to provide another reading, but to block an incorrect one. This could be done e.g. by restricting the rule which allows frame adverbials to modify reference time, but there does not seem to be any other motivation for doing this. (In contrast, note that the adoption of (1') does not commit us to restricting the rule which allows frame adverbials to modify event time since r=e according to this rule.)

There is a further potential disadvantage of (1) as opposed to (1'), viz. that it would make our account of temporally connected discourse, Reichenbach's Pragmatics in 1.3 above, inapplicable to nonpast discourse. This may be seen from the fact that RP calls for an ordering of reference times, while (1) makes reference time irrelevant to the truth conditions of Present tense sentences. This is

probably not fatal: narrative, our only closely examined example of temporally connected discourse, is rather rare about nonpast time. But e.g. (3) has the feel of temporally connected discourse:

(3) Ich fahre Dienstag weg. Linda faehrt mit. Bis dann hat sie
I drive Tuesday away drive along by then AUX she

ihre Arbeit geschrieben.
her paper write(prt)

'I am going away Tuesday. Linda is coming along. By then she'll have her paper written.'

This discourse obeys the principle formalized above as RP. If there is a class of such examples, then we should prefer to analyze them of a piece with the examples of temporally connected discourse about past time. This provides a second bit of motivation for the choice of (1') over (1).

2.3.2 Sample Derivation of Complex Truth Conditions

It may be helpful to sketch the analysis of some examples where the interaction of tense and frame adverbials is important. These examples are straightforward:

(1) Er kommt morgen
he come tomorrow
'He is coming tomorrow'

(1') **morgen'**(PRES(**er-komm-'**)

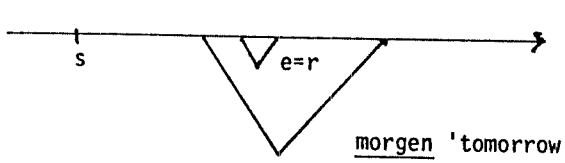
$A_{s,e,r} \models$ (1') iff $r \subseteq [\textbf{morgen'}]_{A_s}$ and $A_{s,e,r} \models$ PRES(**er-komm-'**)
(by (1) in 2.1)

To this we apply th present tense interpretation rule, obtaining:

iff $r \subseteq [\text{morgen}']_{A_s}$ and $r = e \prec s$ and $A_{s,e,r} \models$ er-komm-'

Thus (1) holds in situations such as the following:

(2)



Other examples are as straightforward since the reference time modification illustrated by (1) is general.

(3) Er ist morgen da
he is tomorrow here
'He'll be here tomorrow'

(3') morgen'(PRES(er-da-sei-'))

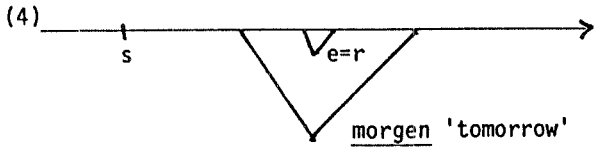
$A_{s,e,r} \models$ (3') iff $r \subseteq [\text{morgen}']_{A_s}$ and $A_{s,e,r} \models$ PRES(er-da-sei-')

(We note again that even though this is the main verb sein 'to be,' as in the example in (2) in 2.3.1 above, so that one might expect there to be some conflict between the future adverbial and the tendency of some verbs to be understood as referring to Present time, there is none.) Using the Present tense interpretation rule, we obtain that the above holds iff

$r \subseteq [\text{morgen}']_{A_s}$ and $e = r \prec s$ and $A_{s,e,r} \models$ er-da-sei-'

i.e. in the following sort of situation:

(4)



2.3.3 Why Atelics are Presumed to Refer to Speech Time

But we still have no explanation of why the Present tense of some verbs, and (2) in particular, refers only to present time (in the absence of future adverbials or strong pragmatic indication).

(2) Jo ist krank
is sick
'Jo is sick'

(2') Morgen ist er krank
tomorrow he
'He'll be sick tomorrow'

We noted in 2.1 that the approach taken here to the analysis of definite temporal reference entails that frame adverbials are analyzed as modifiers of contextual parameters rather than as substitution operators which introduce new times to which reference would be definite. Given this analysis of frame adverbials, we cannot say that (2') refers to future time because of the future frame adverbial. The frame adverbial does not change the context with respect to which the rest of the sentence is semantically evaluated, as e.g. a scope-inducing operator would. If the future reading of the Present tense is possible with a frame adverbial, it ought to be possible, within the present treatment, without one.

We must instead explain the distinction between (2) and (2') in terms of a preferred reading for atelics in the Present tense, i.e. in

terms of a (cancellable) implicature. This doesn't mean, however, that we must adopt one sort of explanation for the lack of future readings that one often hears. Acccording to this sort of explanation, it is unlikely that a speaker would know about future illnesses, for example, so that the hearer may infer that a present illness must be the one being reported (in (2)). But this explanation in terms of conversational implicature is unsatisfactory. Its premise, that one is unlikely to be able to know about certain future events and therefore be unable to report about them, is probably false. After all, one can know about future illnesses if e.g. one knows about the causes of illnesses. The hypothesis is furthermore clearly wrong about other examples, as the minimal pairs in (3) demonstrate (the minimal pairs don't differ in predictability).

Finally, the predictability hypothesis leaves unexplained the fact that there is a definable class of sentences which lack the futurate reading, viz. the class of atelic Aktionsarten. (The distinction between telic and atelic Aktionsarten was introduced in 1.6.1.) Thus we have minimal pairs such as the following:

Telic - Ready Future Reading

(3) Er baut ein Haus	Es gibt Regen
he build a house	it give rain
'He is building a house'	'There will be rain'
	or: 'There is rain'

Atelic - No Ready Future Reading

(3') Er baut an einem Haus	Es regnet
at	rain(verb)
'He is building a house [now]'	'It's raining'

Atelic - Future Reading with Future Adverbial

(3'') Morgen baut er an einem ..	Morgen regnet es
tomorrow	
'He's working on a house tomorrow'	'It'll rain tomorrow'

A somewhat redundant caution on (3'): The fact that there is no ready future reading must not be taken to mean that these sentences cannot be used to refer to future time in the right context. Even though atelics do indeed normally refer to speech time in the Present tense, they can refer to other nonpast time if the context strongly indicates this. Since they can, we shall look to a explanation that depends on context. Let us examine one such case. We will then attempt an explanation of the special dependence of atelics on speech time.

(4) is understood to be about the present (and note, for the sake of the hypothesis, quickly discarded above, that present time is assumed because it is too difficult to predicate anything about the unknown future, that one clearly could predict it):

(4) Er ist bei seinen Eltern.
he is at his parents
'He is at his parents' house.'

--unless, of course, (4) is used in a context which strongly indicates that the future is the relevant time. That is, (4) is normally understood to mean that he's there now, not that he's to be there in the future. Strong pragmatic indication allows the futurate reading, however. (4) would be appropriate in answer to a question about the future.

(4') Was macht er morgen# Er ist bei seinen Eltern.
what do he tomorrow he is at his parents
'What is he doing tomorrow# -He'll be at his parents'.'

Similarly, (4) might follow another sentence about the future, and in this case also be understood about the future.

(5) Morgen gehen wir zur Karin. Der Christoff ist da.
tomorrow go we to K the C is there
'Tomorrow we are going to K's. C. will be there.'
'Tomorrow we are going to K's. C. is there.'

(The Present tense may indicate present time as well in (5).) Vater (1975:87-90) confirms the ability of atelics to refer to future time.

Of course, the dependence on context to determine exact temporal reference is reminiscent of the the dependence we noted in the Preterite, especially as it is used in narrative. Given the reference-time sensitive formulation of the Present tense semantic rule in (1'), we can explain this parallelism by describing the phenomena using the same principle for past and nonpast time. We would assume then that (4') and (5) are temporally connected discourses. We would suppose more specifically that the reference time (of the second sentences) in (4') and (5) is "inherited" in the manner of RP (cf. 1.6) and that the German Present tense is dependent on reference time in much the same way that the German Preterite is (contrary to the initial formulation of Present tense semantics in (1)). The dependence is less obvious in the Present than it is in the Preterite, it might be argued, simply because narrative is less common, indeed less possible, about nonpast time than it is about past time.[3)]

This suggests that the proper way to explain the tendency of the Present tense of atelics to refer to nonfuture (nonpast) time is through a condition on reference time. We shall argue for the following principle:

Default Value of Reference Time
Where reference time is not explicitly stipulated, or indicated by context, assume that r=s (as long as this is plausible).

An immediate remark on the status of this default principle is in order. Since this is, in effect, a normally allowed inference which may be explicitly contradicted (cancelled), it is something on the order of a conversational implicature. This means, however, that the

principle ought to be calculable from the conventional content of the utterances involved together with general principles of conversational interaction--which means, in turn, that the principle has no status of its own in the theory.

There is no particular difficulty in seeing how the default value of reference time would be arrived at. When in doubt about the intended referents in any speech situation, we look to salient items. Thus Lewis (1973) suggested that definite reference was in general sensitive to a parameter indicating "salience." Surely speech time is the salient time in any speech situation. The default value of reference time thus needed be stipulated as the principle formulated above might suggest.

One isn't completely comfortable calling this sort of principle a "conversational implicature." It is the sort of general rule which certainly ought to justifiable (calculable), but it differs from well accepted instances of this concept in the manner in which cancellability may be demonstrated. We can demonstrate the cancellability of the inference from a question about ability to a request by conjoining the question with an explicit denial that a request is intended:

(6) I don't want you to open it, but can you open the window?

The same sort of conjunction sounds hopelessly garbled in the case of the inference that speech time is the intended reference time in Present tense atelics:

(7) ? Er ist zu Hause, aber nicht jetzt, erst morgen.
he is at home but not now only tomorrow
? 'He is at home, but not now, not until tomorrow'

We can "cancel" the default context only by including temporal expressions in the same clause which rule that context out (such as the frame adverbial in the original example (2')). For this reason I would prefer not to insist on the designation "conversational implicature"; there is a distinction between cases such as (6) where one pos-

sible inference about the motivation for an utterance is denied, and (7) where the default context must first be assumed, then rejected.

The default rule is more closely analogous to the principles which determine nominal reference. Thus, we normally take the reference of he to be the same as a most recently used NP (with a male referent):

(8) Susan spoke with Sam. He was furious.

He is taken to be coreferential with Sam. But (8) may be embedded in a context in which another referent would be plausible, in which case the (default) rule that he refers the same as a most recently used NP is inapplicable:

(9) Susan's boyfriend is insanely jealous. Unfortunately, he happened to arrive while Susan spoke with Sam. He was furious.

Thus, even if the default principle is not exactly a conversational implicature, I think that it is a natural principle determining the understood temporal import of sentences which is, in the sense outlined above, "cancellable."

On the other hand, the principle is not very widely applicable among the tenses. The tenses whose semantics were investigated in Chap. 1, the Preterite and the Past Perfect, stipulate that e=r<s and that e<r<s respectively, so that the possibility that r=s is in both cases excluded. Of the tenses examined, only the Present allows the principle any application whatsoever.

For the purpose at hand, it is most important to note that it would be implausible to assume that r=s in the case of telic Aktionsarten in the Present tense. The Present tense requires that e=r, as 2.3.1 establishes. Thus, assuming the default value of the reference time as r=s has the immediate consequence that e=s, i.e. that the telic Aktionsart should hold of exactly the interval (or point) of time which constitutes the speech time. This is a consequence of the position proposed by Taylor (1977) (and presented in 1.6.1 above) that telics are true of unique intervals of time. It would be implausible

to assume that this unique interval coincided exactly with speech time.

For atelic Aktionsarten, on the other hand, we find no implausibility in the assumption that r=s. This is also related to the Taylor (1977) characterization: if an atelic Aktionsart holds of an interval i, then it holds of subintervals $i' \subseteq i$. Thus to assume that the event time of an atelic coincides with speech time is not to commit oneself to anything very strong. The atelic may also hold of superintervals of s without contradiction.

Let us note that the hypothesis that the default value of reference time is speech time explains the data we have encountered so far. It allows (i) that any sentence can have a futurate reading with strong pragmatic indication, or with a futurate adverbial (as e.g. the original (2') in 2.3.1 indicated, and (ii) that all and only telics may have future readings in the Present tense in the absence of either future adverbials or strong pragmatic indication. This is exactly the pattern of meanings which we set out to account for.

Nor is the hypothesis that the default value of reference time is speech time without further consequences. Schon (2.6), the future use of Perfects (4.1), and noch (4.3) are all sensitive to reference time. In each of these cases, further tests of the hypothesis are possible; in the case of schon, rather striking confirmation of the principle is possible (2.6.3).

Let us turn now to some special issues concerning the Present.

2.3.4 Kratzer's Speech Time Pragmatics

The following phenomenon was noted by Kratzer (1978:81-82).

(1) "Wenn ich den Satz Heute gehe ich ins Abnormitaetenkabinett aeussere, so habe ich das Gefuehl, dass ich etwas falsches gesagt habe, wenn ich vor ein paar Stunden schon da war und jetzt natuerlich nicht noch einmal hingehe. Mein Gefuehl schlaegt sich in die andere Richtung, wenn ich mir einen anderen Fall ansehe:
Ich kann mich nicht mehr so recht an den Dreitagesplan von Rumpelstilzchen erinnern. Ich weiss, dass es vorgestern gebacken

und gestern gebraten hat, aber was in aller Welt es heute tut, das habe ich vergessen. So frage ich halt jemanden: 'Was macht Rumpelstilzchen heute?' Wenn dieser mir nun antwortet: 'Heute holt Rumpelstilzchen der Koenigin ihr Kind,' so wuerde ich nicht der Meinung sein, dass mein Gespraechspartner etwas falsches gesagt hat, wenn Rumpelstilzchen das Kind bereits vor der Zeit der Aeusserung geholt hat.

Was die beiden Faelle unterscheidet ist das:

Beim ersten Fall zieht mir eine Situation durch den Kopf, bei dem mein jetzt recht klein ist, auf keinen Fall den ganzen Tag einschliesst, vielleicht nur die paar Augenblicke der Aeusserung selbst. Es geht darum, wie ich den restlichen Tag verbringe. Und diesen restlichen Tag sondert hier das Praesens aus, wenn wir die paar Aeusserungsaugenblicke vernachlaessigen, die vorne an diesem Intervall noch haengen. Daher kommt der Eindruck, dass diese erste Aeusserung etwas Futurisches an sich hat. Anders steht es mit dem zweiten Beispiel: dort zaehle ich im Tagesrhythmus: Am ersten Tag wird gebacken, am zweiten gebraten, am dritten das Kind geholt. So umfasst in diesem Fall mein jetzt das gesamte heute. Und dies ist dann auch das Intervall, das durch das Praesens ausgesondert wird."

Given a context where plans have been made for times that needn't be past, the Present tense may be used appropriately--so long as the speaker doesn't definitely know whether the plans have materialized yet. The situation is no different in English: if A knows that Cathy is to pick up her parents at the airport today, but doesn't know when, then he might respond as he does below:

(2) Q: What's Cathy doing anyway?
A: She's picking up her parents at the airport today.

If it later turns out that A knew that she had already picked them up, the answer might be regarded as deceptive (depending on whether the exact time of Cathy's activities is important to (Q) in (2)). Kratzer (1978:82) opts for regarding the sentence in (2A) as true in this situation, which is accomplished by allowing the entire day to count as the time of utterance in such contexts with "plans." According to this scheme, A might still be regarded as deceptive is it turns out that he knew the prior time of arrival, but this is because he would then have offered less than the relevant information--not necessarily

because he told an untruth.

Kratzer's position on the truth value of these statements seems entirely correct. To see why this is so, let us consider the other case, i.e. where the parents have arrived before speech time in (2) without A's knowledge. In this case, a third, better-informed interlocutor might offer:

(2') B: I think she has already picked them up - this morning

to which (A) might plausibly respond:

(2'') A: Perhaps she has, but she's picking them up today in any case

If these continuations of (2) are possible, they demonstrate that the inference from (2A) that Cathy has not yet picked her parents up is cancellable in Grice's (1981) sense. This indicates that (2A) implicates, but doesn't entail Cathy's not having picked her parents up yet. This is consistent with Kratzer's position, but not with one which regarded (2A) as false in the situation in which Cathy has picked up her parents at the time of utterance.

In my opinion, Kratzer's is correct about the truth value of these sentences and reasonable about the mechanism she suggests to account for it. I mention her observations here not to improve upon them, but only because in the sort of situation one finds in her examples, i.e. one in which a plan has been made, and is "now" being carried out, a special sense of the Present tense evolves, and special interpretations are possible that have heretofore been ignored. This will be important in the following section.

2.3.5 The Nonambiguity of the Present Tense

One further aspect of the Present tense semantics, (1') in 2.3.1, deserves some attention. It might be supposed that each form of the

German Present tense is ambiguously a designator of a Present or a Future tense, rather than an unambiguous nonpast tense, as (1') requires.[4] Hendricks (1981:60) cites evidence which might be regarded as indicating that the German Present tense is ambiguous (though Hendricks uses this data to argue, not for an ambiguity of tense, but rather one of aspect).

(1) Harald wartet auf dem Wilhelmsplatz und Susanne auch.
wait on the square and too
'Harald is waiting at Wilhelm square and Susanne is, too.'
(=both now)
'Harald will wait at Wilhelm square and Susanne will,too.'
and normally:
≠ 'Harald will wait at Wilhelm square and Susanne is waiting [now]'
≠ 'Harald is waiting at Wilhelm square and Susanne will wait'

Either both conjuncts are interpreted as referring to present time or both are interpreted to refer to future time (iterative readings are to be ignored). Readings which involve one future and one present interpretation are strained--maybe impossible. This follows automatically from the assumption that the morphological marking 'Present' stands ambiguously for PRESENT or for FUTURE tense, and that the rule of ellipsis responsible for the truncated second conjunct is sensitive to which of the two tenses is involved.

Before attempting an explanation of Hendricks's data, let us take care to note its nature. Kratzer's point about the elasticity of "intended speech time" must be kept in mind. Imagine e.g. in connection with (1) above the following situation: we are traveling to Berlin and will be picking up people in various cities along the way. The driver is unsure of whom he is to pick up next, so that he is told:

(2) Harald wartet hier auf dem Marktplatz und Susanne vor dem
wait here at the market square and before the
Museum in Darmstadt
museum in D
'Harald is waiting here at market square and Susanne in front of the museum in Darmstadt' [allowing the possibility that he is there now and she will be there in the future]

(2) is true in the cross-temporal interpretation, and in general, all four combinations are possible in this use of the Present tense. Most respondents claim that (2) could not be true with a cross-temporal interpretation simply because the context involving a plan does not occur to them. The cross-temporal interpretation is nonetheless available here--and in most other cases. But, as Kratzer explains, this is simply due to the fact that the time planned is taken to be the time of utterance in such situations. Given this, the truth conditions for (2) etc. follow directly from the Present tense rule (1') in 2.3.1.

There is still something to be explained here, however, namely why the cross-temporal readings are impossible unless we envision some sort of schedule, or otherwise engage in speech-time contortions. After all, we normally do not. Given this, we may reexamine the hypothesis that the Present tense is ambiguous.

Further evidence refutes this hypothesis convincingly, however. In particular, if there were two separate tenses, then one should never serve as the antecedent for the other in a deletion rule. As (3) indicates, however, this is anything but impossible:

(3) Ich arbeite jetzt am ersten Kapitel, und morgen am vierten
I work now on first chapter and tomorrow on fourth
'I'm working on the first chapter now, and on the fourth tomorrow.'

If the tense is unambiguous, what could account for the pattern of

readings in (1), however

Hendricks (1981:61) makes a case for postulating a sort of aspect for German which needn't be marked on the surface, but which the rule of ellipsis is sensitive to. This would account for the pattern in (1). It might also allow the pattern in (3), if one were willing to assume that the frame adverbials jetzt and morgen were optional aspectual markers (in connection with the Present tense). But this additional assumption would not be a natural addition to Hendricks's proposed analysis, according to which aspect correlates with durative and frequentative adverbials--so that Present + (durative) = present time reference and Present + (frequentative) = future time reference. No provision is made for aspect correlating with various sorts of frame adverbials.

Other aspects of Hendricks's system are less than satisfactory, as well. For example, the distinction in aspect is said to correlate with the distinction between frequentative and durative adverbials. "The only principle which always holds is that the aspect denoted by the adverbial phrase never changes." (Hendricks, 1981:34) The explicit inclusion of one of these adverbials in (1) would be expected to force one of the readings, then. But it doesn't.

(4) H wartet eine Stunde auf dem Mktplatz und Susanne zwei Stunden
wait one hour at the Mtsquare and two hours
'Harald will wait an hour at market square and Susanne two hours.'
'Harald is waiting an hour " " " " " " "'
(the cross-temporal readings are more accessible, too)

Hendricks can allow for this by relinquishing the principle that aspect correlates immutably with adverbial type and Hendricks (1981:87-88) foresees some weakening of this principle in any case in order to account for other data. But then the predictions of Hendricks's postulation of aspect require some clarification.

There are several ways of attempting to account for the readings in (1), but let us first note that the pattern is not general. Consider (5).

(5) H schreibt eine Arbeit ueber L und S eine ueber Klopstock
write a paper about L and one about K
'H is writing a paper about L and S one about Klopstock'

(5) is true whenever H completes a paper about Lessing in nonpast time and S completes one about Klopstock in nonpast time as well. In particular, H may be writing his now, while S is procrastinating, or vice versa. This essentially structureless pattern seems to hold generally for all telic Aktionsarten. This is exactly what our semantic rule (1') of 2.3.1 predicts (at least in conjunction with the sort of rule of conjunction discussed in 1.5.2). It is only when we turn to atelic Aktionsarten that we find the pattern of two futurate or two present readings and nothing else. (6) is a near-minimal contrast to (5):

(6) Hans schreibt ueber Lessing und Susanne ueber Klopstock
write about L and about K
'Hans is writing about Lessing and Susanne about Klopstock'
[both now]
'Hans will write about Lessing and Susanne about Klopstock'
and normally:
≠ 'Hans is now writing about Lessing and Susanne will write about Klopstock'
≠ 'Hans will write about Lessing and Susanne is now writing about Klopstock'

Given the default principle for reference time in 2.3.2, we expect an asymmetry in the behavior of telic vs. atelic Aktionsarten in the Present tense. Moreover, we normally expect that the context with respect to which the conjuncts are evaluated is the same. But this would mean that we either assume that r=s for both activities, yielding the first reading above, or that we do not make that assumption. But in the latter case, if r≠s and r=e-<s, then s<e=r, and the tense (in both conjuncts) receives a future interpretation. When speakers

report that they understand the conjuncts as either both about the present or both about the future, they have in mind that the sentence is used either in a context in which there is no future reference time, or one in which there is. In this way the only putative evidence for an ambiguity in the Present tense is accounted for.

At the same time, although we normally expect the parameters of evaluation to be the same, they needn't be, and certainly wouldn't be taken to be the same if this were explicitly contradictory. By appealing to a rule of conjunction which allows conjuncts to be true at nonidentical times, we may admit (3) with its cross-temporal readings. This means that the conclusive evidence for the nonambiguity of the Present tense can be derived as well.

It may also be worth noting (a) that we didn't appeal specifically to the Present tense rule (1') in 2.3.1 in explaining these facts, but only to the default principle for reference times; and (b) that (3), the strong case against the putative ambiguity of the Present tense, would retain its force no matter what Present tense rule were adopted.

2.3.6 Conclusion

(1') is a defensible rule of interpretation for the German Present tense. It analyzes the tense form as unambiguous, in accordance with standard tests, handles the interaction of the Present tense with frame adverbials correctly, and allows a reasonable explanation of the sensitivity of the Present tense to Aktionsart. It can nonetheless only be regarded as correct after it has been shown that it operates satisfactorily in interactions with other temporal expressions, to which we turn directly.

2.4 Duratives

The class of durative adverbials includes tagelang 'for days,' lange 'for a long time,' and drei Jahre (lang) 'for three years.' As evidenced in (1), these combine freely with atelic verbs, but not with telic verbs:

(1) atelic Er wohnte tagelang / lange / drei Jahre bei uns

He lived for days / for a long time / for three years with us

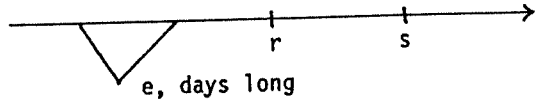
'He lived with us for days'
' " " " " " a long time'
' " " " " " for three years'

telic * Er erledigte die Sache tagelang / lange / drei Jahre

he handled the matter for days / for a long time / for three years

Note that the Pluperfect (2) is true just in case e is of the specified length--days.

(2) Er hatte tagelang bei uns gewohnt
he AUX for days with us live(prt)
'He had lived with us for days'



Thus we see that these adverbials specify the length of event time. This suggests the following semantic rule:

(3) Durative Rule (Preliminary Version)
for d a durative adverbial, $A_{s,e,r} \models d(p)$ iff
1. e is of $[d]_{A_{s,e,r}}$ length
2. $\forall t \subseteq e\ A_{s,t,r} \models p$

The formulation (3) is deceptive in that it ignores the composi-

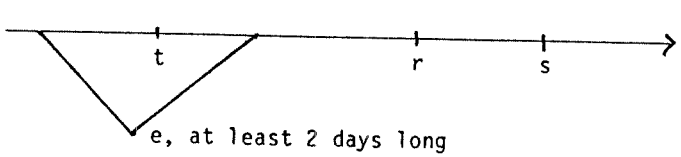
tion of the durative phrases themselves (which is not of great interest). (3) does allow a correct analysis of (2), however, which is sketched in (4):

(4) PLUP(**tagelang'(bei-uns-wohn-'(er'))**)

(5) $A_{s,e,r} \models$ PLUP(**tagelang'(bei-uns-wohn-'(er'))**) iff
e<r<s (PLUP) and 1. e is of $[$**tagelang'**$]_{As}$ length and
2. $\forall t \subseteq e$ $A_{s,t,r} \models$ **bei-uns-wohn-'(er')**

I.e. (2) is true in situations such as the following:

(6)



This is correct.

Let us note that tense is of necessity assigned scope over the durative in (4). That this is required may be seen from examples where duratives are used with the Present tense, e.g. in er wohnt tagelang bei uns where it may be used to predicate something about a nonpast interval which may include past subintervals. If Present tense were within the scope of duratives, then clause (2) of definition (3) immediately above would require that all subintervals of e' be nonpast--but this is clearly impossible. The consequences of this (and its further justification) are resumed in 3.6.

Before adopting (3), however, let us note an interesting interaction of durative adverbials with frame adverbials in sentences (7):

(7) Morgen wohnt er drei Jahre bei uns
tomorrow live he three years with us
'As of tomorrow, he'll have lived with us for three years'

The interpretation rule for frame adverbials, (1) in 2.1, specifies

that r fall within the time denoted by the frame adverbial, i.e. tomorrow. The Present tense requires that r=e. If we analyze duratives as merely specifying the length of event time (as we have in (2)), then (7) would seem true only in situations in which a three year period falls within tomorrow. But (7) is quite sensible even though no such situations exist.

We might at this point consider revising the interpretation of frame adverbials. Rather than require that r fall within the time specified by a frame adverbial, we might require only that r end within this time. This would provide a correct set of truth conditions for (7). But such a rule would have some quite counterintuitive consequences as well, since it would allow that e.g. (8) would be true in a situation in which Thomas finishes writing his dissertation tomorrow, although he may have been writing it for some time.

(8) Thomas schreibt morgen seine Dissertation
write tomorrow his dissertation
'Thomas will write his dissertation tomorrow'

(8) is quite clearly false in this situation, however. It is true if, and only if, he writes it tomorrow, i.e. substantially begins and ends. This suggests that it will have to be the durative rule which receives the more refined analysis.

(9) Durative Rule (Final Version)
for d a durative adverbial, $A_{s,e,r} \models$ d(p) iff there exists e' such that 1. e is a final subinterval of e'
2. e' is of $[d]_{A_{s,e,r}}$ length
3. $\forall t \subseteq e'$ $A_{s,t,r} \models$ p

(9) allows the derivation of (7)'s correct truth conditions:

(10) morgen'(PRES(∃J'(er-bei-uns-wohn-'[=p])))

(11) $A_{s,e,r} \models$ (6) iff $r \subseteq [\text{morgen}']_{A_{s,e,r}}$ and $A_{s,e,r} \models$ PRES(∃J'(p))

which, by the rule for the Present, holds iff

$r \subseteq [\text{morgen}']_{As}$ and e=r-<s and $A_{s,e,r} \models$ ∃J'(p)

Now we can apply the definition in (9):

$A_{s,e,r} \models$ ∃J'(p) iff there is an e' such that
1. e is a final subinterval of e'
2. e' is $[\exists J']_{A_{s,e,r}}$ length

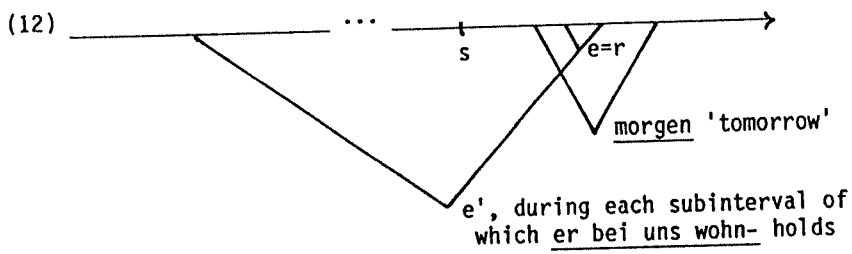
and 3. $\forall t \subseteq e'$ $A_{s,t,r} \models$ p

Let us summarize the truth conditions of (10).

$A_{s,e,r} \models$ (10) iff (a) $r \subseteq [\text{morgen}']_{A_{s,e,r}}$
(b) e=r-<s
(c) there is an e' such that
1. e is a final subinterval of e'
2. e' is $[\exists J']_{A_{s,e,r}}$ length
3. $\forall t \subseteq e'$ $A_{s,t,r} \models$ er-bei-uns-wohn-'

We can sketch the truth conditions of (7) as in (12):

(12)



Each of the truth conditions derived in (11) seems correct, and together they provide a sufficient guarantee of the truth of (7). (9) thus improves on the account of duratives in the simpler (3).

It is worth noting that clause (3) of definition (9), like clause (2) of definition (3), effectively prohibits anything but atelics from combining felicitously with durative adverbials since only atelics hold generally of subintervals of intervals at which they are asserted to hold (1.6.1). This aspect of (3) is taken from Dowty (1979:333). It is also worth attending to the predictions that this treatment makes about the Aktionsart of propositions which include duratives. Note that if a proposition which includes a durative is true at i, then it is not true of subintervals of i. Thus, somewhat surprisingly, atelic propositions to which duratives are added are not atelic, but rather telic. That is, er wohnt bei uns is atelic, but er wohnt tagelang bei uns is telic. This is an automatic consequence of Taylor's (1977) proposal on Aktionsart, given any reasonable position on duratives.

We have encountered two points at which telic and atelic Aktionsarten semantically differ: (i) in their understood reference in temporally connected discourse, and (ii) in their understood reference in the Present tense. This account of Aktionsarten and durative adverbials predicts that propositions which include duratives will behave as telics in these situations (even though the propositions with which the duratives combine are atelic). Both of these predictions seem to hold, with some qualification. Thus the second sentence

in the mininarrative below is not understood to be about a time which overlaps with the first. The nonoverlap is what we expect of telics:

(13) Hans ging hinaus. Er war stundenlang sauer.
went out he was for-hours annoyed
'Hans went out. He was angry for hours.'

This may be compared to the following, where the second sentence is understood to refer to the same time:

(14) Hans ging hinaus. Er war sauer.
'Hans went out. He was angry.'

The second prediction of the classification of propositions with duratives as telics can also be shown to be true, though with a trifling qualification. Present tense sentences with duratives do tend to be understood as referring to present time, much as atelics. Thus the sentence below is understood to be about the two years up to the present (in the absence of an established future reference time), much as the sentence without the durative would be.

(15) Ich arbeite zwei Jahre hier
I work two years here
'I have worked here for two years'

Ich arbeite hier
I work here
'I work here'

It is interesting to note that these facts are incompatible with the preliminary version of the durative rule, given in (3), but fully compatible with the final version, given in (9). We can see this in the following way. Our account of the tendency of atelics to be understood as referring to speech time postulated that it resulted from a general presumption that r=s, which however would be relinquished if

explicitly contradicted, or otherwise made implausible in the assertion (as in the case of telics, because of the fact that they are true of unique intervals). Given that e=r in the Present tense, the assertion that e is two hours long would imply that s is likewise two hours long--which is surely implausible enough to warrant relinquishing the presumption that r=s. Thus the proposition with the durative ought to be understood as referring to speech time. The facts, as we have seen, are otherwise.

(9) does not have this flaw, however, because the event time of which it is asserted that e=r, and presumed that r=s, needn't be two years long--but only the final subinterval of e', which must be two years long. Since speech time may always be regarded as the final subinterval of an interval of arbitrary length, the actual reading of (15) is predicted, providing an additional bit of support for (9) over (3), and for the account of the telic/atelic distinction in the Present (from 2.3.3).

Let us turn to the alternative means of specifying the duration of event time.

2.5 Frist Adverbials

One specifies the duration of a telic process using adverbials such as in einer Stunde 'in an hour,' which I will call Frist (meaning "term within which something happens") adverbials here (for lack of a suitable designation already in use). The treatment follows Dowty (1979:333) in requiring that this sort of adverbial be predicated of a proposition at an interval such that the proposition be true of that interval, but at no subinterval within it (cf. 1.6.1 for the use of this condition in defining telic Aktionsarten).

(1) for f a Frist adverbial
$A_{s,e,r} \models f(p)$ iff (a) e is at most $[f]_{A_{s,e,r}}$ in length and
(b) $\exists t[t \subseteq e \wedge A_{s,t,r} \models p]$

Let me clarify immediately that (1) is intended as a sort of garbled logico-English paraphrase of the truth conditions which will eventually be derived (at greater length) for Frist adverbials. In particular, the manner in which $[f]_A$ specifies a length will be described by rule, and the requirement that the adverbial be true of a unique interval will be ascribed to the lexical semantics of in. (1) is provided here to display enough of the semantics of such phrases to demonstrate their interaction with other temporal elements.

Given this understanding, (1) predicts correctly that Frist adverbials do not combine with atelics felicitously. This is ensured by the second clause, which requires that there be a unique subinterval t satisfying p. As Dowty (1979:335) points out, however, there are cases in which adverbials such as 'in an hour' (in einer Stunde) do combine with atelics, but this treatment may plausibly be extended to these cases as well. (2) provides the relevant sort of example:

(2) Er schlief in einer Stunde
he slept in an hour
'He was asleep in an hour'

If we assume either (implausibly) that time isn't dense or (plausibly) that we may deal with closed intervals (which contain a last moment of time), then (2) may be analyzed as true if it is evaluated at an interval e, the last subinterval of which uniquely satisfies the radical er schlaf-. This predicts that the sentences will be regarded as true about an event time an hour long at the very end of which the "he" in question was asleep.

On the other hand, it seems to me somewhat more plausible to posit an ambiguity in the Frist adverbials for reasons as follows. They have the above meaning, to be sure, but they may in addition designate an inchoative proposition with any Aktionsart. This might be formalized in the following sort of rule:

(3) for f a Frist adverbial,
$A_{s,e,r} \models f(p)$ iff (a) there is an e' which follows r after a duration of $[f]_A$ length
(b) there is an e'' such that e' is the initial subinterval of e''
(c) $A_{s,e'',r} \models p$

(3) predicts that (2) is true evaluated at reference time r just in case "he" slept an hour later (where there is probably an implicature to the effect that he didn't sleep any earlier). (3) predicts that there will be a felt ambiguity in combinations of telics with Frist adverbials. For example, (4) has two distinct readings:

(4) Wir fahren in zwei Tagen nach Lissabon
we drive in two days to Lisbon
'We're driving to Lisbon in two days'
= 'We'll take two days to drive to Lisbon' or
'In two days we'll set out for Lisbon'

The second reading certainly isn't predicted by (1). In particular, it is compatible with the actual driving taking more (or less) than two days. Nor could one straightforwardly account for the second reading in the same way that the combinations of atelics with Frist adverbials are explained away. This is impossible because the telic wir nach Lissabon fahr- will simply be false of the last moment of the interval of evaluation--which is too short for a complete drive to Lisbon.[5)]

(3) also predicts that a single reading will be available where a second instance of the Frist adverbial is deleted under identity. This also seems to be the case:

(5) Wir fahren in zwei Tagen nach L, und die anderen in vier
we drive in two days to L and the others in four
'We're driving to L in two days, and the others in four'
= 'We'll take two days and the others four' or
'We'll set out in two days and the others in four'
but: ≠ 'We'll take two days and the others will set out in four' nor
'We'll set out in two days and the others will take four'

This pattern of readings is not incompatible with the explanation of the "special readings" of Frist adverbials in terms of predication about closed intervals, since in that sort of an explanation the conjunction would be evaluated at a single event time, which would then presumably condition the same sort of reading for both conjuncts. This assumes that a satisfactory explanation of the second readings could be shown to depend on the interval event time of evaluation, which was argued above to be unlikely.

For these two reasons I prefer to analyze the class of Frist adverbials as systematically ambiguous; they have both the meanings described by (1) and (3).

2.6 (Temporal) schon

2.6.1 Preliminaries

We can now turn our attention to the adverbial particle schon, which has already attracted a good deal of scholarly attention: cf. Bartsch (1969), Altmann (1976), Koenig (1977), Koenig (1980), Frank (1980), Hendricks (1980), and Hoepelman and Rohrer (1981). Although some have maintained that it makes no contributions to truth conditions, but only to the presuppositions of sentences, this is clearly wrong.

(1) Thomas schreibt eine Seminararbeit
write a paper
'Thomas is writing a paper'
[i.e. he is now or will later]

Thomas schreibt schon eine Seminararbeit
already
'Thomas is already writing a paper'

In any case, none of the above treatments has noticed this truth-conditional contribution of schon. The first sentence is true if Thomas is now writing the paper or will later write it, while the latter requires that he be writing it now.

The analysis of the contribution of schon to truth conditional semantics is the present task; we will ignore that presuppositional component of schon's meaning which is responsible for the inference that the sentence holds earlier than expected.[6] Ignoring this aspect of schon's meaning exposes this treatment to the objection that something is being attributed to truth-conditional semantics which properly belongs to conventional (or even conversational) implicature; I am aware of this, and will be at pains to avoid misattribution, but still do not wish to tackle all of the tangled issues of (i) accounting for conventional implicature and (ii) sorting out exactly what it is that schon's conventional implicature amounts to. Hendricks (1980) is a valuable recent source on the latter, and shows how difficult it is to formulate a general statement of schon's presupposition.

2.6.2 Other Uses of schon

In examining "other" uses of schon, i.e. those which do not fit the analysis to be presented below, it may be useful to know what's in store for schon even before I present and defend the analysis. The important aspect which distinguishes the temporal schon, the focus of interest here, from the other two sorts of uses I examine is summed up in the following preliminary version of the rule:

Preliminary Semantic Rule for schon

$A_{s,e,r} \models$ schon'(p) iff $e \leq r$ and $A_{s,e,r} \models p$

This analysis maintains that the import of (temporal) schon is to specify that event time does not extend beyond reference time. There are, however, instances of the form schon which do not bear this meaning.

There are two sorts of apparent counterexample to the analysis of schon proposed here. First, there are examples of the sort cited by Hoepelman and Rohrer (1981) such as (1) (their (28), p.108):

(1) Die Oper fing an und schon schlief Hans
the opera began and already slept H
'No sooner had the opera begun when Hans slept [fell asleep]'

This constitutes a counterexample to the analysis of schon proposed here because the event time of Hans's sleeping begins after the reference time established in the first clause, i.e. $e \not\leq r$. But this is clearly a special use of schon. This is best indicated by the fact that schon has this meaning only in sentence-initial position. (1) contrasts with (2):

(2) Die Oper fing an. Hans schlief schon.
'The opera began. Hans was already asleep.'

The meaning of schon in (2) accords with the treatment proposed here. The special status of the schon in (1) may also be indicated by the fact that it is marked as belonging to a narrative style.

Second, there are uses of schon such as (3) in which event time clearly follows reference time (in this case speech time):

(3) Gehe weg! -Ich gehe schon.
go away I go already
'Go away! -OK, I'll go.'

These uses of schon are concessive or confirmatory in meaning. They may be distinguished from the temporal schon in several ways. First, nontemporal uses of schon differ in their presuppositional import from the temporal schon, which always invites an inference of the following sort:

> the utterance of [an expression meaning] schon p invites the inference that p holds earlier than expected.

Cf. Koenig (1977), Hendricks (1981) and Hoepelman and Rohrer (1981) for various, and more exact formulations and for further discussion. The important point here is that none of the nontemporal uses of schon share this conventional implicature.

Among the class of "concessive or confirmatory" schon's I would include the following, brought to my attention by Ron Hendricks, in which schon p means approximately 'it is now certain that p.' First, the context (4):

(4) Ich habe mir sagen lassen, dass der Tom entweder nach Luebeck oder nach Berlin faehrt. Wenn ich ihn ueberreden koennte, nach Luebeck zu fahren, wuerde ich mitfahren.
'I've been told that Tom is either driving to Luebeck or to Berlin. If I could persuade him to go to Luebeck, I'd go along.'

(5) Zu spaet. Er faehrt schon nach Berlin. Morgen faehrt er ab.
too late he drive already to B tomorrow drive he away
'Too late. He's definitely driving to Berlin. He's leaving tomorrow.'

If this were a temporal use of schon, it would counterexemplify my claim that $e \leq r$ in such cases. But note that it completely lacks the invited inference of temporal schon that Tom's driving to Berlin is taking place earlier than expected. There is at most an invitation to infer that the knowledge that he is driving to Berlin is available

earlier than expected, but this is another matter.

Second, although nontemporal uses of schon may occur in questions, they may never be the focus of questions, as Frank (1980:20) notes. Suppose e.g. the speaker in (5) continued with (5b) and was answered with (5c).

(5b) Oder faehrt er schon nach Berlin?
or drive he sure to B
'Or is he driving to Berlin (for sure)?'

(5c) Nein.
no (= No, he's not going to Berlin.)
(≠ No, it's not sure that he's driving to Berlin.)

If the schon of (5) could be the focus of the question, we would expect the latter, impossible meaning. Temporal schon may be the focus of a question.

(6) Faehrt Tom schon nach Hause?
drive T already to home
'Is Tom already driving home?'

-Nein.
'No.' (= No, he's not driving home already. (Perhaps later.))

Third, some nontemporal schon's co-occur with noch, which is never possible with temporal schon.

(7) Ich gehe schon noch einkaufen
I go sure yet shop(inf)
'I'll certainly still go shopping.'

Fourth, they often bear a markedly falling (concessive) intonation:

(8) Er arbeitet schon
he work sure
'Granted, he does work.' ['...but he never gets anything done.']

Fifth, many speakers allow the preposing of temporal schon, but nontemporal schon may never be preposed:

(9) Schon drei Stunden arbeitet er
already 3 hours work he
'He's been working for three hours.'

But it would be impossible to e.g. prepose the schon in (5) and have it retain its confirmatory meaning:

(10) * Schon faehrt er nach Berlin
sure drive he to B

(The preposing of schon by itself results either in the marked sort of case (1), or in the sort of temporal schon which has the meaning analyzed below. The concessive or confirmatory meaning is lost.) And in general, any preposed schon is temporal, never concessive or confirmatory:

(11) % Schon arbeite ich drei Stunden
already work I three hours
only: 'I have been working for three hours.'
never: 'Certainly I work for three hours'

Of these points of distinction between the temporal schon to be analyzed below and other schon's, only the first two are tests. The third point, the ability to cooccur with noch comes closer to a neceesary and sufficient test for the concessive or confirmatory schon, but it is complicated by the temporal meaning of noch itself.

Not all nontemporal schon's bear falling intonation, and only some speakers of German find some temporal schon's felicitous in fronted position. I will not make frequent or extensive appeal to these points of distinction between temporal schon and other lexemes schon, but offer them as a caution against thinking that the analysis below has obvious and numerous counterexamples.

2.6.3 The Truth Conditions of Temporal schon

The contribution which schon makes to truth conditions may be seen in the second sentence in (1) in 2.6.1, where schon ties event time to speech time. The sentences are repeated below for convenience.

(1) Thomas schreibt eine Seminararbeit
write a paper
'Thomas is writing a paper'
[i.e. he is now or will later]

Thomas schreibt schon eine Seminararbeit
already
'Thomas is already writing a paper'

This tie, however, is not direct, but rather via reference time, as may be seen in examples where reference time is distinct from speech time, for example where a sentence with schon is preceded by another sentence in connected discourse about the past, such as the following:

(2) Ich bin um vier gekommen. Er war schon da.
I AUX at four come(prt) he was already there
'I came at four. He was already there.'

The indication in the second sentence in (2) is not that his presence was contemporaneous with speech time, but rather that it overlapped with the reference time (and event time) of the preceding sentence. Rule (3) specifies a first approximation of the semantics of schon:

(3) Preliminary Semantic Rule for schon
$A_{s,e,r} \models$ **schon'**(p) iff $e \subseteq r$ and $A_{s,e,r} \models p$

Let us explicate (3). As we have seen, reference time is to be construed as the time from whose vantage point the event is viewed. This is normally provided by the context of discourse, as in (2), or it may be fixed by the shared knowledge of interlocutors, as in the case where (4) is uttered about a time known to speaker and hearer:

(4) Er war schon da
he was already there

In discourse about nonpast time, the presumption is that speech time essentially functions as reference time (in the unmarked case, e.g. in the absence of such explicit marking as frame adverbials).

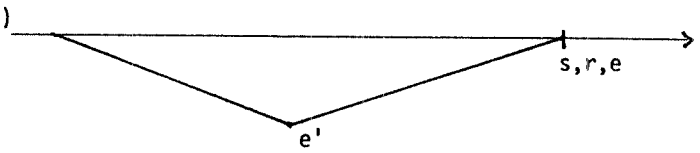
The addition of duratives to Present tense sentences with schon is likewise unproblematic. Consider (5):

(5) Sie arbeitet schon drei Jahre hier
she work already three years here
'She has worked here for three years'

(6) PRES(**schon'**(**3Y'**(**sie-hier-arbeit-'**)))

(7) $A_{s,e,r} \models$ (6) iff (a) $r = e \prec s$ (Present)
$r = s$ (default r)
(b) $e \subseteq r$ (schon)
(c) there is an e' such that
1. e is a final subinterval of e'
2. e' is of $[\exists Y']_{As}$-length
3. $\forall i \subseteq e'$ $A_{s,i,r} \models$ **sie-hier-arbeit-'**

(8)

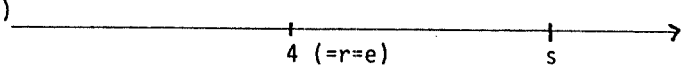


Sentences in connected discourse about the past, such as the second sentence in (2), are evaluated not with respect to a reference time identical to speech time, but rather with respect to a reference time provided by the preceding discourse, in accordance with RP. In this case that reference time is four o'clock.

(9) PRET(**schon'(er-da-sei-')**)

(10) $A_{s,e,4} \models$ (9) iff (a) e=r<s (Preterite)
(b) e≤4 (schon)
(c) $A_{s,e,4} \models$ **er-da-sei-'**

(11)



Note that since it must hold that e=r, the analysis does not allow the case in which e completely precedes r, i.e. the situation in which he had been there, but had left before four. (2) does not allow this reading. The Pluperfect, rather than the Preterite, would be appropriate in cases where e<r<s.

Let us note the temporal configurations which result from the combination of schon with the various tenses. In particular, note that, for all e, r:

(12) e<r
∴ e≤r

(13) e=r
∴ e≤r

But all the German tenses require either that e<r (the Perfect tenses) or that e=r (the nonperfect tenses). This predicts that schon should

be appendable salva veritate to any German sentence. Let us first note that schon may indeed be added to all Pluperfects, Perfect Infinitives, and (futurate) Perfects with no change in truth conditions.

(14) Ich sprach mit Hans. Er hatte Marie gesehen.
I spoke with he AUX see(prt)
'I spoke with Hans. He had seen Marie.'

∴ Er hatte Marie schon gesehen.
'He had already seen Marie'

Er gab zu, es geschrieben zu haben.
he admitted it write(prt) to AUX
'He admitted having written it'

∴ Er gab zu, es schon geschrieben zu haben.
'He admitted already having written it'

Naechsten Freitag habe er die Arbeit geschrieben.
next Friday AUX he the paper write(prt)
'He'll have written the paper by Friday'

∴ Naechsten Freitag hat er die Arbeit schon geschreiben.
'He'll already have the paper written by next Friday'

As a second indication that the prediction is not without merit, we note that schon may be added to atelics in the nonperfect tenses without changing truth conditions.

(15) Er ist da
'He is there'

∴ Er ist schon da
'He is already there'

Er war da
'He was there'

∴ Er war schon da
'He was already there'

Finally, we note that the addition of schon to sentences with frame adverbials will likewise not affect truth conditions. This follows directly from the fact that frame adverbials only specify reference time and therefore have nothing to say about the relative chronology of event and reference time. (In 2.6.4 we return to the examples where schon may not be added without affecting truth conditions.)

It was probably with sentences such as those in (14) and (15) in mind that it was proposed that the only contribution of schon was to conventional implicature since the validity of these inferences is compatible not only with the meaning proposed in (3), but also with the hypothesis that schon is devoid of truth-conditional meaning. Positive evidence in favor of something like (3) must therefore take the form of demonstrating that schon is (truth-conditionally) incompatible with some temporal expressions. In this connection, note that although there are no tenses in German which stipulate anything incompatible with e<r, there is one use of the subjuctive mood, that of past anticipatory narration, which apparently does (in calling this 'mood' modus, I follow standard and traditional terminology, as in Heidolph et al., 1981:520f; the term 'past anticipatory narration' is my own). Consider (16):

(16) Er sagte, er wuerde helfen
he said he would help
'He said he would help'

Er verzog sich, ohne das Angebot anzunehmen. Er wuerde
he withdrew self without the offer accept he would

es sich ueberlegen. Die anderen diskutierten weiter.
it self think-over the others discussed further

'He withdrew without accepting the offer. He'd think it over. The others kept talking.'

The second example illustrates the use of the this form in temporally connected discourse to signal an event posterior to those being recounted in the simple Past. Given that reference times are ordered in this sort of discourse, the Anticipatory must be analyzed as requiring that r<e. This use has a literary flavor, and the tone of prophecy, but that doesn't affect the point at hand, viz. that it specifies that r<e.

The first sentence in (16) is similar in temporal import, even if more obviously subjunctive (the clause does not refer to his actually helping). Note that the subjuctive "flavor" of this use of wuerde does not (at least not obviously) conflict with the conventional implicature associated with schon. We therefore would expect this tense/mood to combine felicitously with temporal schon if temporal schon has no truth-conditional meaning. If, on the other hand, temporal schon has the temporal meaning hypothesized in (3), e<r, then it should not combine felicitously with the anticipatory, which requires that r<e.

Let us therefore examine the combination of schon with the examples of wuerde in (16):

(16') Er sagte, er wuerde schon helfen
'He said he'd certainly help'

(16') has the expected meaning of the confirmatory schon, and lacks the expected presuppostion of temporal schon that his helping is to occur earlier than expected. There is likewise no possibility of making this schon the focus of a question:

(16'') * Hat er gesagt, dass er schon helfen wuerde?
AUX he say(prt) COMP he help would

It seems therefore that temporal schon cannot combine with this example of the subjunctive mood/tense.

Let us examine the second example in (16) as well.

(17) Er verzog sich...Er wuerde es sich schon ueberlegen
'He withdrew...He would certainly think it over.'

We find again the expected meaning of the confirmatory schon, and no conventional implicature that his thinking will take place any earlier than expected. The attempt to make schon the focus of a question is likewise unsuccessful:

(17') Wuerde er es sich schon ueberlegen#
would he it self think-over
'Would he think it over already?' [i.e. now]

That is, we may combine schon with the wuerde- form, but only in a different, more clearly subjunctive sense. The fact that the anticipatory sense of the form is impossible here confirms the hypothesis that the temporal import of schon is e<r, since it is this meaning which would contradict the meaning of the Anticipatory sense of the subjunctive, i.e. r<e.[7)]

2.6.4 schon with Telic Aktionsarten

We found at least three sort of evidence confirming the analysis of schon's meaning as e<r, so that we can proceed to further cases with a modicum of confidence. Let us recall the effect of using schon together with telics, as in the second sentence in (1) in 2.1:

(1) Thomas schreibt eine Seminararbeit
write a paper
'Thomas is writing a paper'
[i.e. he is now or will later]

Thomas schreibt schon eine Seminararbeit
already
'Thomas is already writing a paper'

The application of the proposed truth conditions for sentences with schon to the second sentence in (1) in 2.6 is straightforward. The sentence receives the analysis:

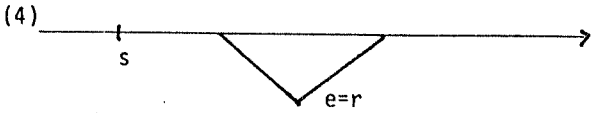
(2) p = Pres(schon'(er-eine-Seminararbeit-schreib-'))

which is evaluated in (3):

(3) $A_{s,e,r} \models$ p iff
(a) e=r-<s (Present tense rule)
(b) e<r (schon's meaning)
(c) $A_{s,e,r} \models$ er-eine-Seminararbeit-schreib-'

These conditions hold jointly in situations such as (4):

(4)



(a) and (b) in combination require that e not completely precede s and that e not extend beyond r. These conditions are jointly met in situations such as (4). The difficulty, as we noted in 2.6.1, is that such sentences are understood to refer to present time, and not to arbitrary nonpast time.

Since we have found some support for the hypothesis that schon requires that e<r, let's not immediately discard it, but instead try to reconcile it with the fact that sentences such as that in (1) are understood to refer to present time. We introduced a pragmatic principle in 2.3.3 to explain why atelics are understood to refer to present time in spite of the fact that the Present tense requires only that they be understood to refer to nonpast time. We suggested there that the default value for reference time is speech time, so that sentences would be understood as about speech time in the absence of indication to the contrary. Suppose then that this were the cause of

the present time understanding of sentences such as that in (1). Then we would derive the following set of truth conditions:

(3') $A_{s,e,r} \models$ p iff
- (a) e=r-<s (Present tense rule)
- (b) e≤r (schon's meaning)
- (c) r=s default value for r
- (d) $A_{s,e,r} \models$ **er-eine-Seminararbeit-schreib-'**

This set of truth conditions would require the second sentence in (1) to be true in situations such as (5):

(5) 

I.e. the event time of the telic would have to coincide with speech time for the sentence to hold. Of course, this consequence is unacceptable simpliciter. But it might well hold of an imperfective reading for the telic, which suggests the following modification of the semantic rule for schon:

(6) schon's Semantic Rule (Final Version (for stricter varieties))
$A_{s,e,r} \models$ **schon'**(p) iff e≤r and
if e≠r, then $A_{s,e,r} \models$ p
and if e=r, then $A_{s,e,r} \models$ PROG(p).

where 'PROG' is to be given the meaning of the English progressive marker.

The important point about (6) is that it licenses an imperfective reading for telics in combination with schon for those tenses where e=r, i.e. the Present and the Preterite. In doing this, it explains how the (imperfective reading of the) telic could be thought to hold of speech time, since it characteristic of imperfective readings (be writing the book) that they may hold of smaller intervals than the

intervals at which perfectives hold. Thus, he may be writing the book from 3:00 to 3:05 even if he certainly cannot write the book during that time.

(6) makes a further prediction, however, that we may find an analogue of the "Imperfective Paradox" in telics with schon. Dowty (1977) coined the termed "Imperfective Paradox" to describe the invalidity of the inference from Imperfective to Perfective that we see in (7):

(7) Tom was reading Finnegan's Wake

Tom read Finnegan's Wake

Tom is reading Finnegan's Wake

Tom will read Finnegan's Wake

The prediction that German telics with schon will display an analogue of the imperfective paradox is not forced on us by the model theory, but it is nonetheless expected because it is the linguistic concomitant of allowing a telic to be true of a subinterval.

The prediction holds, as (8) documents:

(8) Ich lernte ihn 1980 kennen. Er schrieb schon die Diss.
I met him [met] he wrote the diss.
'I met him in 1980' 'He was already writing his dissertation'

∴Er schrieb die Diss (fertig)
'He wrote his dissertation'

Das Orchester spielt schon den zweiten Satz
the orchestra play the second movement
'The orchestra is already playing the second movement'

∴Das Orchester spielt den zweiten Satz (zu Ende)
'The orchestra will play/is playing the second movement'

(There is a difficulty with the data here, prompting the parenthetical

material, to which we return below.)

Dowty (1977, 1979:149) provides a semantics for the Progressive marker by first defining a function Inr from possible worlds w and times i to sets of possible worlds which represent the "natural possible outcomes" of w at I. Then the Progressive is defined as follows (ignoring complications which are irrelevant here):

(9) $A_{e,w} \models PROG(p)$ iff $\exists e' \supset e (\forall w' \in Inr(w,e)(A_{e',w'} \models p))$

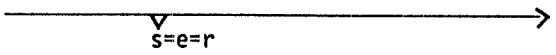
(This definition is not legitimate in the present framework since it appeals to intensional semantics, which haven't been provided for. But it indicates the sort of definition required in a more elaborate treatment.) The important point for the present purposes is that this semantics allows that a Progressive sentence PROG(p) might be true at an interval even if there is no actual superinterval at which the sentence p itself is true. This happens whenever a natural outcome is somehow frustrated--when a book is begun but not finished, or when a movement is interrupted. Let us accept this semantics for the subinterval readings we noticed in connection with schon's use in the Present so that we can provide a sketch of these semantics.

We had progressed to the point that the sentence Er schreibt schon eine Seminararbeit would be analyzed as true at s,e,r (in a situation without a well established future reference time) iff

(10) $A_{s,s,s} \models PROG(\textbf{er-eine-Seminararbeit-schreib-'})$

i.e. in the situation in (5), repeated here:

(5)

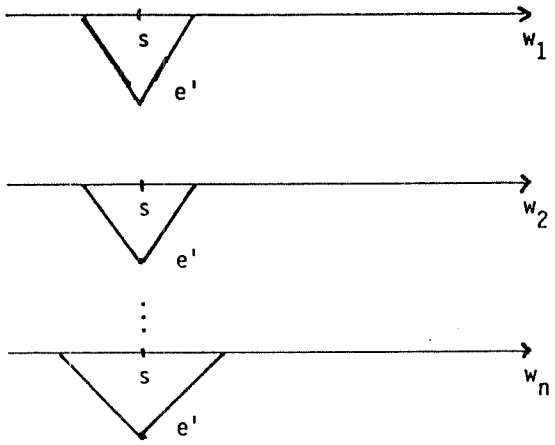


(9) prescribes the evaluation of (10). (10) thus holds iff there is a superinterval of s, e', such that **er-eine-Seminararbeit-schreib-'** holds at e' in every natural outcome of the (actual) world at s. (9) foresees that **er-eine-Seminararbeit-schreib-** must hold in series of

alternative worlds at superintervals of actual speech time:

(1) Er schreibt schon eine Seminararbeit
he write already a paper
'He's already writing a paper'

(11)



-natural outcomes of actual w at s

Thus the original sentence (1) may hold of the the speech interval even though the sentence to which schon is added may never hold (in the actual world).

We were led to this prediction by the noticing that Present telics with schon are understood to refer to speech time; given that, the assumption that the default value of reference time is speech time, and the improbability that a telic could hold exactly of the speech time interval, it is a short step to the hypothesis that these sentences must be referring imperfectively to speech time. The fact that this turns out to be the case should be taken to confirm the assumption that speech time is the default value for reference time. But more interesting in this account is the fact schon plays absolutely no role in the explanation of the phenomenon, even though it occasioned the observation, and it seems to be the reliable concomitant of the imperfective readings of the telics.

The question arises at this point as to why schon forces this present time reading, and [illegible] (and whether) it doesn't arise without

schon. (Addressing the first question, we might note that since the sole effect of schon is to order event time with respect to reference time, reference time ought to be readily identifiable, and the default value is there for cases where no other times are identifiable.) The logically prior question is clearly whether there are imperfective readings without schon. This question returns us to the data in (8), and, with qualifications, the answer seems to be positive:

(12) % Als ich ihn kennenlernte, schrieb er die Diss
when I him meet(prt) wrote he the diss
'When I met him, he was writing his dissertation'

Some speakers insist that (12) is impossible, and that it should end as (13):

(13) ...schrieb er an der Diss
at
'...he was working on his dissertation'

For these speakers (who do accept (8)), schon does indeed seem to be the license for the imperfective reading, so that the truth conditions for schon in (6) do seem to be fully correct. Imperfective readings are possible only with schon, and only in the Present and the Preterite, those tenses where e=r. This is just as (6) specifies (and we call (6) the rule for the "stricter" variety, because this variety disallows (12)).

For speakers who do accept (12), on the other hand, other provisions for imperfective readings of telics must be made. For these speakers, we may replace (6) with the simpler (14):

(14) $A_{s,e,r} \models$ **schon'**(p) iff $e \leq r$ and $A_{s,e,r} \models p$

and the provision for imperfective readings of telics must be elsewhere. A first approximation might be (15):

(15) If p is an atomic telic sentence, then $A_{s,e,r} \models p$ iff
(i) I(p,e)=1 or
(ii) e=r and $\exists e' \supseteq e(\forall w' \in Inr(e,w)(I(p,e'_{/w'})=1))$

(As we noted above, this definition is not completely legitimate in the present treatment since we haven't made provision for intensional semantics. It indicates how we would provide for the imperfective reading in a more elaborate semantics.)

It is important to note that (15) does not allow that telics are generally imperfective--and that the condition for telic readings, i.e. that e=r in (15), might be made more restrictive. This is important because the distinction between telic and atelic Aktionsarten, formulated in 1.6.1, depends on telic Aktionsarten not generally holding of subintervals. If telics in general allowed imperfective readings, the distinction (as formulated) there would become rather empty.

This concludes the discussion of the use of schon with telic Aktionsarten. The rules in (14) and (15) account for the imperfective reading of telics in the Present and the Preterite for those (more liberal) varieties which allow this, while (6) accounts for the (stricter) varieites in which imperfective readings occur only in combination with schon.

I conclude then that the employment of the Reichenbachian concept of reference time allows a correct and quite simple formulation of this adverbial particle's semantics.

2.7 Summary of Semantic Rules Presented Thus Far

This closes the introductory sketch of the semantics of German temporal expressions. Chapter Three embeds the semantical sketch just presented in a formal fragment. We have introduced the rules below:

From 1.3:

Definition: For all intervals i, j, all points of time t, t',
$i<j$ iff $\forall t \in i\ \forall t' \in j\ t<t'$ (read: 'i completely precedes j')

Definition: For all intervals i, j, all points of time t, t',
$i \underline{<} j$ iff $\forall t \in i\ \exists t' \in j\ t \underline{<} t'$ (read: 'i does not extend beyond j')

Reichenbach's Pragmatics (RP) (weak version) For $S_1, S_2, \ldots, S_n$ a sequence of sentences about the past uttered in a temporally connected discourse:
(i) $r(S_i) \leq r(S_{i+1})$
where r(S) is the reference time of S.

From 1.4:

(1) for t an interval, p an atomic proposition I(p,t)= 0 or = 1

(2) for atomic p, models A, speech times s, event times e, and reference times r: $A_{s,e,r} \models p$ iff I(p,e)=1, i.e. p holds at e.

From 1.5:

Indefinite Temporal Reference
$A_{s,e,r} \models mal'(p)$ iff $\exists e' \subseteq e$ and $A_{s,e',r} \models p$

From 1.6:

(2) Preterite (final version)
for all A, s, e, r, and p:
$A_{s,e,r} \models PRET(p)$ iff $e=r<s$ and $A_{s,e,r} \models p$

From 1.7:

Pluperfect
$A_{s,e,r} \models PLUP(p)$ iff $e<r<s$ and $A_{s,e,r} \models p$

From 2.1

Frame Adverbials
(1) for f a frame adverbial
$A_{s,e,r} \models f(p)$ iff $r \subseteq [\ f\ ]_{A_{s,e,r}}$ and $A_{s,e,r} \models p$

where '$[\ f\ ]_{A_{s,e,r}}$' stands for the semantic value of f with respect to $A_{s,e,r}$

From 2.3:

Present
(1') $A_{s,e,r} \models PRES(p)$ iff $r=e-<s$ and $A_{s,e,r} \models p$.

If $A_{s,e,r} \models PRES(p)$ and p is atelic, then it is conversationally implicated that r=s (for an account of calculability, cf. 2.3.3)

From 2.4:

Duratives
(5) for d a durative adverbial,
$A_{s,e,r} \models d(p)$ iff there exists an e' such that
1. e is a final subinterval of e'
2. e' is of $[\ d\ ]_{A_{s,e,r}}$ length
3. $\forall t \subseteq e'\ A_{s,t,r} \models p$

From 2.5:

(1) for f a Frist adverbial

$A_{s,e,r} \models f(p)$ iff (a) e is at most $[f]_{A_{s,e,r}}$ in length and

(b) $\exists! t \subseteq e\ A_{s,t,r} \models p$

(3) for f a Frist adverbial,

$A_{s,e,r} \models f(p)$ iff (a) there is an e' which follows r after a duration of $[f]_A$ length

(b) there is an e'' such that e' is the initial subinterval of e''

(c) $A_{s,e'',r} \models p$

From 2.6:

(3) schon (Stricter Variety)

$A_{s,e,r}$ = **schon'**(p) iff $e \leq r$ and

if e=r, then $A_{s,e,r} \models PROG(p)$

if $e \neq r$, then $A_{s,e,r} \models p$.

Notes--Chapter 2

1. This position has its problems, however. Adverbials "off the time line" are occasionally used quite felicitously, as in:

Arno kam Montag vorbei. Am Samstag war er beim Friseur
A came Monday by on Saturday AUX(Pret) he at barber

gewesen. Er sah noch frisch geschlachtet aus.
be(prt) he look yet fresh slaughtered out(Pref)

'Arno came by on Monday. He had been at the barber's on Saturday. He still had that freshly slaughtered look.'

The am Samstag in the second sentence clearly doesn't refer to reference time, which, by RP, must not precede the reference time in the first sentence. Am Samstag is understood to modify event time here: normally the sentence would be taken to mean that the haircut took place on Saturday. This is incompatible with (1) and is in marked distinction to the adverbials in (5) and (6), which place an upper bound on event time.

If we analyze the Pluperfect as requiring that e<r<s, as Reichenbach suggested, and retain (1) as presently formulated, we have no choice but to allow that there exists a second class of adverbials which modify e directly. In particular, in this framework we haven't the option of analyzing sentences such as the one above as differing from (5) and (6) only in scope (i.e. of having the scope relations:

tense(frame adverbial(p))), for this would imply that r in the second sentence above is on Saturday, and therefore that the sequence of r's isn't properly ordered in the sense of RP. The other, standard order of frame adv.(tense(p)) would imply the same and that the haircut took place before the time modified by am Samstag in (15). Neither of these options is tolerable.

Of course, we always have the option of trying to revise radically. In this case, with the goal of obtaining a single principle of interpretation for adverbials, we should probably insist that all adverbials be taken to modify one index. Let's examine the possibility formalized in (1), i.e. where the adverbials are taken to modify r. The same sorts of problems arise if we take the adverbials to modify e consistently. (1) can be of use, as we have seen in the examination of (3)-(6). How might (1) be applied then to cases such as the one above? We note that this is a temporally connected discourse, so that we might suppose that $r(S_1) \leq r(S_2) \leq r(S_3)$. But then it cannot be, as (1) stipulates, that $r(S_1) \leq$ Monday and $r(S_2) \leq$ (the previous) Saturday, for any time within Monday must extend beyond any time within Saturday. Since the principle of ordering of reference times (RP) couldn't be relinquished without great loss, we would be forced to give up the claim in (1) that frame adverbials modify r and replace it with the weaker claim that they only shift r. But this is just (1'), which we rejected earlier because it, too, is incompatible with the characterization of temporally connected discourse we have in (RP). It seems that in order to win a unified principle of interpretation for frame adverbials, we have to sacrifice our characterization of temporally connected discourse. A Pyrrhic victory, at best.

The required analysis must recognize a second class of temporal adverbials (or perhaps a special interaction of frame adverbials and the Perfect tenses), whose introduction and formal semantics will be postponed until 4.2, after the Perfect tenses have been introduced. We can note even now, however, that a second class of adverbials would creates no new readings in connection with the Present and Preterite tenses because it would consist of adverbs which modify event time. The reference-time-modifying adverbials described in (1) have the same

effect in the Present and Preterite tenses because reference and event times there are the same. It is also uncomplicated to restrict the occurence of the adverbials to clauses with Perfect tenses (since these will bear distinct features).

2. The obvious move to take to try to preserve Baeuerle and Stechow's analysis in view of (10) would be to try to analyze the durative so that the reference to past time may be traced to its use in (10). For example, one might propose that a sentence with a durative is true at an event time just in case there is a time of the length specified by the durative which ends at the event time being evaluated. This analysis is formalized, and dismissed, in 2.4.

3. Connected discourses formulated in the Present tense about the future are much less felicitous than those formulated in the Preterite about the past, however. Many native speakers, when confronted with a sequence such as the following, spontaneously revise:

Wir holen Claudia ab. Mit ihr fahren wir nach Koeln. -->
" " " " Dann fahren wir mit ihr nach Koeln.

No such revisions are ever required in Preterite narratives, however. This asymmetry indicates that connected discourse (such as the above, or (5) in the text) is different in the Present and the Preterite, and that the two shouldn't be conflated. The fact that such sequences are interpreted as describing sequences of times (where they are interpreted) may be attributed to general conversational principles to the effect that one is to construe one's conversation partner as purposeful, and that it is more likely to serve a purpose to tell a single connected story than it is to list a series of unconnected events.

On the other hand, some native speakers accept the minidiscourses without complaint, and everyone agrees on their sequential understanding, if pressed to interpret them somehow.

4. Hornstein (1977), which is presented briefly in Chapter 1 above, is committed to regarding any nonpast tense as ambiguous.

5. Note as well that it would be impossible in this system, at least without very extensive revision, to allow that a proposition

might formally count as true at a subinterval at which it is, in fact, true. That is, if we allowed that He reads the book were true of each moment at which he were reading it, rather than only of the entire interval at which he reads it, then we would simultaneously allow that the telic proposition true at i is true of subintervals i' i. The characterization of the telic/atelic distinction would collapse.

Nor, interestingly enough, would there be room for allowing a proposition to count as true at a superinterval at which it in fact holds. But this is the subject of 1.5.2, on the vagueness principle.

6. erst makes the same contributions to truth conditions, but has the opposite presuppositional meaning--that something is happening somewhat later than expected.

7. There is a instance of the form schon used in sentences with indefinite Preterite sense, in which schon does not locate event times with respect to a past reference time, but rather with respect to speech time.

(i) C war schon mal in Luebeck
was already once in L
'C has been in Luebeck'

We could accommodate the reading in which schon locates event time with respect to speech time by using a rule which combined schon and mal in a special way (allowing that the other reading, in which reference time equals event time, is alright). But it is worth noting that this need not be analyzed as an instance of temporal schon in my analysis.

Note that schon adds nothing to the truth conditions of the sentence above; it is truth-conditionally equivalent to the same sentence without schon.

C war mal in Luebeck
was once in L
'C has been in Luebeck'

Chapter 2.6.2 introduces several tests to distinguish temporal from nontemporal schon, by means of which we can show that the above is nontemporal. Note e.g. the ill-formedness of

* Schon mal war C in Luebeck

The original sentence (i) could be uttered in the absence of an established past reference time, however, so that it might be taken as evidence against my claim (in the text) that (temporal) schon is inappropriate in the absence of an established reference time. Even if this claim is rejected, however, principle (2) still cannot stand.

Suppose then that schon has a consistent semantics amounting to approximately "**schon**(p) is true iff p is true as of the reference time," and that (i) is an example of temporal schon (the tests in 1.12 notwithstanding). Then sentences such as (i) indicate that the reference time of sentences with indefinite Preterites is speech time, not event time. But this contradicts the definition of the Preterite in 1.5, so that (2) is wrong.

A Fragment of German

Chapter 1 implicitly contains a number of promissory notes. In suggesting that German temporal reference arises from the interplay of the primitive temporal reference of tense and various sorts of adverbials (and pragmatics), the chapter foresees not only a description of the primitive temporal terms but also an account of their interaction. And while a number of temporal elements are described exactly there, their interaction has been specified only in the roughest of approximations. Some required scope relationships have been noted, but there is no account yet of how these arise, nor how they interact with non-temporal semantics. It is the task of the present chapter to provide this account, by providing a rigorous description of a fragment of German. This is accomplished in standard fashion: a set of recursive rules is provided whose combined effect is to define an infinite number of expressions and to assign a model theoretic interpretation to each expression. It is predicted that these expressions (under appropriate conditions) will be regarded as well formed in German and as having the meanings assigned by the rules.

The choice to describe a fragment rigorously, rather than e.g. to provide a less exact description (as in Chapter 1), represents a choice of detail over scope, and an emphasis on fine structure rather than extent. The peril that one might adopt solutions appropriate to the fragment but which would prove inadequate in a more ambitious project, is ever present. The only safety would lie in considering **all** potential data, including that which is beyond the actual fragment. Since this is impossible, there is no absolute security in this matter.

The choice to describe a fragment further necessitates a choice of

grammatical apparatus. Rules are not written neutrally. The fragment below is described in Generalized Phrase Structure Grammar (GPSG), which admits only context-free (CF) rules, and consequently, only context-free grammars. GPSG is of interest because its basic assumption, that human languages are context-free, is the strongest of seriously entertained by linguists presently. It has furthermore been persuasively argued that this strong hypothesis about the range of possible human languages needn't be obtained at the cost of complicated or inelegant grammatical descriptions. Two further factors actuate my choice of GPSG as grammatical theory. First, there is little work on German in this framework,[1] and no extensive work on temporal phenomena at all so that the fragment to be presented represents new testing ground for the theory, and is therefore of some immediate intrinsic interest. Second, context-free rules are a sort of common denominator in linguistic descriptions. Virtually all theories use context-free rules at one point or another. If the rules below are worth using, then they can be used by grammarians of all persuasions, since they are readily translated into other frameworks.[2] This wouldn't be generally true of the rules in any other (less restrictive) framework.[3]

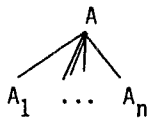
3.1 GPSG: Formalism and Notation

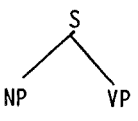
(Gazdar (1981) and Gazdar (1982) are the sources of the material in this section.) In place of the customary notation for syntactic rules, given in (1), GPSG uses the notation in (2). Either one or two justifies the (partial) trees in (3).

(1) $A \text{ -- } A_1 \ldots A_n$ S -- NP VP

(2) $[_A\ A_1 \ldots An\ ]$ $[_S$ NP VP]

(3)





The rules in (2) are phrase structure rules, or PS rules.

GPSG makes extensive and critical use of syntactic features, much as many other theories. Cf. e.g. Jackendoff (1977). For example, to handle number agreement between subject and verb, rule (2) is actually written as (4):

(4) $[_S\ NP_{[+n]}\ \ VP_{[+n]}]$

where n ranges over singular and plural. Thus (4) effectively abbreviates the doubleton set of rules in (5):

(5) $[_S\ \ NP_{[+sing]}\ \ VP_{[+sing]}\ ]$ $\quad [_S\ \ NP_{[+pl]}\ \ VP_{[+pl]}\ ]$

Transformational Grammar has criticized the use of sets of PS rules such as (5), based on the fact that, while the two rules are obviously closely related, they are nonetheless two distinct rules as formalized in (5). This glaring deficiency is quite absent in (4), however, which demonstrates that it is not a fault of PS rules *per se*, but rather a fault of PS rules which forbid the use of syntactic features.

The use of metarules is a second important GPSG innovation. A metarule always has the following form:

(6) If R_1 is a rule of G, then R_1' is a rule of G.

Consider as an example--not an analysis--how a metarule might be employed in the description of agentless passive . We first assume that we have rules in our grammar of English which might be used to describe active verb phrases. Among these might be the rules in (7):

(7) $[_{VP}\ \ V\ \ NP\ ]$ — see a ghost

$[_{VP}\ \ V\ ]$ — die

$[_{VP}\ \ V\ \ NP\ \ PP\ ]$ — compare him a bird

Given these rules, the metarule (MR) in (8) has the consequence that the rules in (9) are also part of our grammar.

(8) If $[_{VP}\ \ V\ \ NP\ \ X\ ]$ is a rule, so is $[_{\substack{VP\\ [+pass]}}\ \ V\ \ X\ ]$ a rule.

(9) $[_{\substack{VP\\ [+pass]}}\ \ V\ ]$ — seen

$[_{\substack{VP\\ [+pass]}}\ \ V\ \ PP\ ]$ — compared to a bird

We suppose that all features in the inputs of (8) are retained in its outputs unless specifically mentioned in the rule. In particular, the lexical class of the verb (which is a feature of a special type in GPSG) doesn't change.

The crucial difference between a rule such as (8) and a transformational rule of passive concerns the status accorded the rule in the derivation of sentences. Transformations map phrase structure trees into trees and thus apply in the course of derivations. MRs do not. Instead, they license PS rules on the basis of other rules. At no point in the derivation of a sentence is a MR applied. It is applied instead to map (sets of) rules into (sets of) rules, thus deriving new grammars, and is therefore best conceived as distinct from the rules of a grammar proper. Hence the term "metarule" in the "metagrammar."

A third important innovation in GPSG concerns the treatment of lexical classes. The rules in GPSG are numbered, so that e.g. the rules in (7) might bear the numbers as indicated in (10). The number may be thought of as a marker for a lexical class, which bears the same number; cf. (11).

(10) <1, [$_{VP}$ V NP] >

<2, [$_{VP}$ V] >

<3, [$_{VP}$ V NP PP] >

(11) V_1 - see, hear, love,...
V_2 - exist, die, laugh,...
V_3 - compare, send, remind,...

V_n may be inserted only into trees licensed by rule n. This procedure may be generalized to other lexical items.

We noted above that MR's do not change the lexical class affected by the rule undergoing the MR, at least not generally. This is accomplished simply by stipulating that the number of a rule, like other features mentioned in the rule, is retained in the output of a metarule. As an example, consider the output of the MR in (8) as applied to the rules in (10), given below in (12):

(12) <1, [$_{VP}$ V] >
[+pass]

<3, [$_{VP}$ V PP] >
[+pass]

The verbs in V_1 and V_3 may be inserted into the trees licensed by these rules, as well as those licensed by the rules in (10).

The final GPSG innovation relevant to the exposition below concerns the treatment of word order. PS rules specify word order and constituency simultaneously, as is well known. Gazdar and Pullum (1981) suggest that these two tasks be separated formally, so that a rule such as that in (13) be represented as in (14):

(13) [$_X$ A B C]

(14) 1. [$_X$ A, B, C]

2. A < B < C

(14.1) says only that A, B, and C form a constituent X without saying whether any order is required, or, if so, which. It is thus purely a statement of **immediate domination, ID.** (14.2), on the hand, states only the required order of constituents. It is thus purely a statement of **linear precedence, LP.** Rules given this way are said to be in **ID/LP format.** We shall employ the ID/LP format here. Since this means that nearly all the rules discussed will be ID statements, we shall occasionally omit the commas in statements such as (14.1) where space or readability warrants. No confusion should result.

It is very important to note that (14.2) is to be taken as statement of linear precedence for all instances of A, B, and C within a single constituent, and not merely those instances created in (14.1). The existence of (14.2) in a grammar thus prohibits all of the following nodes, even though these would be compatible with (13) in grammars without the ID/LP format.

(15)


The adoption of the ID/LP format thus represents a tighter hypothesis about the class of possible grammars. Gazdar and Pullum (1981) hypothesize that all human languages may be described using ID/LP format. This hypothesis will be explored in the fragment of German below.

Nothing has yet been said about semantics, merely because its treatment isn't radically different in GPSG. In brief, GPSG accepts Bach's (1976:2) "rule-to-rule" theory of semantics, which foresees the semantics of complex expressions arising in ways which may be specified together with the rules responsible for syntactic combination. The rules in the fragment itself will amply illustrate how this is

effected. Cf. e.g. 3.2, (1).

3.2 German Syntax

3.2.1 Constituents of the Sentence

For the purpose of presentation, let us assume that something like PSR (1) is correct for German (in fact, the structures specified by the rule in (1) are isomorphic to those in the fragment proper, in which (1) itself plays no role). The rule certainly generates correct syntactic structures and, as shall be seen, would not by itself enshrine "the nominative complement" too firmly:

(1) $\langle 1, [_S\ NP_{[+nom]},\ VP_{[+fin]}\ ],\ VP'(NP') \rangle$

(The third element of the rule provides the semantics as promised in (3.1).) (1) will aid presentation in this section because it is a familiar sort of rule. The alternative to a rule such as PSR1 is a rule which simply allows that a verb and its specified complements form an S, thus denying any special status to the nominative NP. This is popular in the literature on valence theory, e.g. Helbig (1971) or Engel and Schumacher (1978), and we shall accept something very close to this view as well. Within the GPSG model there can be little doubt about the need for something like PSR1, however. The fact that verb phrase conjunctions exist indicates that verb phrases form constituents.

(2) Karl war da und hat nach dir gefragt
K was here and AUX about you asked(part)
'K was here and asked about you.'

In a PS grammar conjunctions such as (2) cannot be the product of the subsequent application of transformations. They may, however, be readily accounted for if one postulates a general conjunction schema which allows that any like constituents may be conjoined. Cf. Gazdar

(1981:57). But this account would assume that the VP's in (2) are constituents (and that their conjunction is as well), in which case something like PSR1 is required to add Karl to complete the sentence.

But, as suggested already, the GPSG framework is not therefore committed to the analysis of German as generally--or basically--of the form NP-VP. In fact, based on sentences such as those in (3), and arguing just as above, we may establish that many other PS configurations may function as sentences.

(3)a. Accusative Object
Den Ahorn hat Herr Uhlmann gepflanzt und wird Herr N.
the maple(acc) AUX Mr. U plant(part) α AUX Mr. N
pflegen
cultivate
'Mr. U planted the maple and Mr. N will cultivate it'

b. Predicative
Schoen war Alt-Bochum nie und wird Neu-Bochum nie werden
pretty was old B never α AUX new B never become
'Old B. was never pretty and new B. will never get pretty (either)'

c. Dative Object
Dem kannst du nicht widersprechen sondern musst du
him(dat) can you not contradict rather must you
glauben
believe
'You can't contradict him; rather, you must believe him'

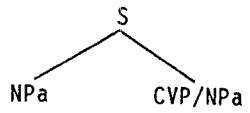
In (3a) we find the constituents hat Herr U gepflanzt and wird Herr N pflegen conjoined by und, and combined with the required accusative object. There is no standard designation for constituents of this sort: anticipating the analysis below, I propose to call them **(complete) verb phrases lacking accusatives**, abbreviated **CVP/NPa**. The parenthetical "complete" is included to distinguish them from **partial verb phrases lacking accusatives**, abbreviated **PVP/NPa**, e.g. hat ge-

pflanzt or wird pflegen. This latter sort of phrase has often been called a "transitive verb phrase," which is always one requiring both an accusative and a nominative NP complement. (Complete) VP's lacking accusatives, on the other hand, already contain nominative complements and only require accusative complements to functions as sentences.

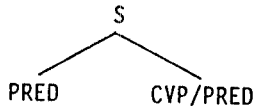
We might have called CVP/NPacc's "sentences lacking accusatives," but it turns out that we will shall want to distinguish the sort of sentence which results from combining α with S/α from the sort of sentence which results when no use is made of slash categories. We reserve the term "sentence" for the former, and apply the coinage "CVP" to the latter. I prefer to designate this sort of constituent as 'CVP,' because it shares with standard VP's (lacking only nominative NP complements) the property of allowing modification by temporal elements, i.e. tense and temporal adverbs. 'VP' is reserved for standard verb phrases, which may also be designated 'CVP/NPnom.'

Similarly, the conjuncts war Alt-Bochum nie and wird Neu-Bochum nie werden in (b) are **(complete) verb phrases lacking predicatives**, i.e. **CVP/PRED**, while the conjuncts in (c), kannst du nicht widersprechen and musst du glauben are **(complete) verb phrases lacking datives, CVP/NPd**. PS rules must therefore provide for sentences of all of the following structures:

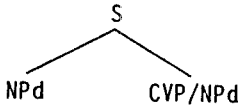
(4a)



(b)

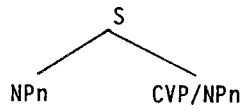


(c)



The analogue to PSR1 is (4d):

(4d)



In this important respect the present GPSG analysis is not committed to the analysis of German as generally--or basically--of the form NP-VP.

The evidence that German ought to be analyzed so that subjects are not "distinguished complements," but rather complements much like any other, concerns fronting. In particular, we find the same range of frontable constituents in constructions with subjects as we do in constructions without subjects, e.g. the impersonal passive (the evidence that these are subjectless is summarized in 4.4 below). If we were to construe fronting as somehow replacing the subject with another constituent (while accommodating the subject elsewhere), then we should expect to find differences (and perhaps no fronting whatsoever) in subjectless sentences, since these contain no subjects to replace. In fact, however, we find exactly the same range of frontable constituents:

(5)

Gestern	haben sie getanzt
Hier	AUX they dance(prt)
Stundenlang	wurde getanzt
Ausgezeichnet	AUX(pass)
Fuer uns	
Bis Mitternacht	war nicht zu tanzen
:	was not to dance
:	
Yesterday	they danced
Here	
For hours	there was dancing
Excellently	
For us	there could be no dancing
Till midnight	
:	
:	

Even more striking, we find the same marking for "zero-fronting"

in both constructions. Zero-fronting is the name we shall use for cases where no element has been fronted. In each case an es appears holding the initial position. This is quite easy to account for if we suppose that a nominative complement is added to a verb phrase much like any other, and that a verb with its full battery of complements (a CVP) is subject either to fronting, in which case we get the range of data above, or to combination with es. This analysis predicts the parallelism below:

(6)	Impersonal Passive	Other Zero-Fronting
	Es wurde geredet it AUX talk(prt) 'People talked'	Es ist der Tom gekommen it AUX T come(prt) 'Tom came'
a. *	Dann wurde es geredet then	* Dann ist es der Tom gekommen
	Dann wurde geredet	Dann ist der Tom gekommen
b. *	...ob es geredet wurde. whether	* ...ob es der Tom gekommen ist.
	...ob geredet wurde.	...ob der Tom gekommen ist.
c. *	Wurde es geredetπ	* Ist es der Tom gekommenπ
	Wurde geredetπ	Ist der Tom gekommenπ
d. *	Geredet wurde es±	* Gekommen ist es der Tom± come(prt) AUX it
	Geredet wurde±	Gekommen ist er±

Moreover, the es of the impersonal construction es ist nicht zu

tanzen is exactly parallel. If we analyzed German as basically NP-VP, so that fronting were analyzed as replacing the subject NP (position) with another (while accommodating the subject elsewhere), then the existence of this construction with es apparently indicates the need to provide for replacing the subject with nothing. A different account would be required, however, for the "nothing" we find in impersonal constructions, since these constructions have no subjects to be replaced. The parallelism is clear, however, in the analysis which postulates a CVP.

In fact, the analysis just sketched pedicts not only the parallels between personal and impersonal constructions in the matter of fronting and zero-fronting, it also predicts some of the exact behavior of the es we find in fronted position. The generalization is that this es is limited to matrix initial position. It appears post-verbally neither in declarative sentences (6a), nor in questions (c), nor even in exclamations (d). But if es is introduced only in initial position to combine with CVP's, its failure to appear post-verbally follows immediately. The fact that this es fails to appear in any embedded sentence (b) follows from Fourquet's (1971) observation that German fronting is limited to matrix clauses. (The nominative/accusative neuter singular pronoun es shares none of these peculiar properties, as any handbook can verify. There is therefore no reason to take the superficial similarity of the two words as evidence for the es in impersonal passives being a subject.)

Arnim von Stechow (1979) credits Emil Drach for the first observation that the subject is not distinguished by privilege of occupying initial position, given all the other complements and modifiers which may appear before the finite verb. Drach noticed that any of a class of these may appear before the finite verb--or may fail to. The case where they all fail to is simply that of the "presentational" es (for this is clearly misguided about the grammatical function of es, if its real purposes is only to hold first position). Drach was thus apparently the first to adopt the view the es is not a special case of Ø fronting, but rather an alternative used when fronting is not.

Stechow implements Drach's law in a fragment in Montague-style

categorial grammar (allowing rules with transformational power). His rules combine all the arguments and modifiers into a single SOV string, which is used, as is, in subordinate clauses. In matrix clauses two further rules apply, first one fronting the verb, and then (optionally) a second which fronts a major constituent. The alternative is to insert es before the matrix verb. Although Stechow employs transformations to do this, the insight is available to a nontransformational treatment as well. The task of 3.4 will be to formalize an analogue to Stechow's treatment in GPSG.

This completes my justification for the postulation of a matrix α-S/α structure in German rather than the familiar NP-VP. There are constructions where VP's play an important role in German, e.g. the complementation system. But we can handle these quite easily since we have a category VP (= CVP_{-NPnom}) in the grammatical system.

It is only (1) above, the S --> NP VP rule, which we lack.

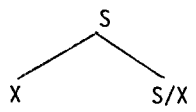
Before turning to the formal apparatus for describing fronting, let us note that we haven't yet stipulated an order for sentences of α-S/α structure, which, however are strictly ordered as given. The PSR's responsible for the trees in (4) will specify only constituency, not order, in the ID/LP format. The following LP statement provides the correct order for all of the envisioned rules:

(7) X < CVP, for all X.

3.2.2 Fronting (of Several Kinds)

Let us note that all of the CVP's in (4) in 3.2.1 have "gaps," i.e. they are "missing" an accusative complement, a predicative complement, and a dative NP complement, respectively. These are, in turn, supplied by the S-expansion rule. Note further that we might have called the CVP/X an 'S/X'--either case is one of categorial (or terminological) innovation. But then we can see that all of the trees in (4) in 3.2.1 are of the structure:

(1)



where A/B denotes a phrase which only lacks a B to be an A. This is a **slash category.**

The structure in (1) has been used in GPSG extensively, e.g. to handle questions and topicalizations in English. Uszkoreit (1982) has proposed that it also be employed to treat German fronting. His defense of this proposal is elegant and convincing. Slash categories are the only means within GPSG of treating unbounded dependencies. German fronting is potentially unbounded, as Uszkoreit's sentence, (2) below, demonstrates:

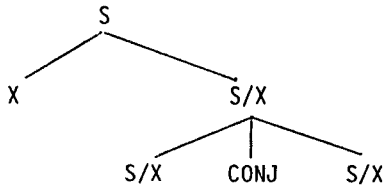
(2) In dieses Zimmer sagte er, dass er den Stuhl gestellt hat
in this room said he that he the chair put(prt) AUX
'He said he put the chair in this room'

To my knowledge Uszkoreit (1982) is the first to point this out.[5] The unbounded use of fronting is not particularly common in German, but within GPSG it is positive proof of the need to employ slash categories in describing fronting.

It is of course conceivable that several grammatical mechanisms converge to create the structures in which various complements and modifiers may occupy the initial position in S, but I won't argue that this is so. I shall, however, note some facts which haven't been incorporated into Uszkoreit's account, even though these are certainly consistent with his proposal.

First, list (3) in 3.2.1 cannot be extended very far. That is, when operating with structure (3),

(3)



X may be NPacc, NPdat, PRED (and NPnom, of course), and perhaps some other complement types. Modifiers of all sorts are impossible values for X, however, as (4) might suggest:

(4) * Gestern war Tom im Buero und habe ich zu Hause gearbeitet
yesterday was T in office and AUX I at home work(prt)

To my knowledge, no such sentennce with preposed modifier and conjoined (complete) VP's is possible. Examples with temporal adverbials of other sorts or with locatives are unacceptable.[6] But let us take care to note that this has nothing to do with fronting. Gestern is perfectly appropriate when moved to the fore of unconjoined VPs, as (5) demonstrates:

(5) Gestern war Tom im Buero
yesterday was T in office
'Tom was in the office yesterday'

Gestern habe ich zu Hause gearbeitet
yesterday AUX I at home work(prt)
'I worked at home yesterday'

(4) is ungrammatical because it includes an illicit conjunction of two CVP/TEMP nodes. The proper way to guarantee that (4) be left out is to disallow this conjunction, while changing nothing about fronting.

Second, there exists a rule which effects noncoordinate VP conjunction in German. As (6) indicates, this can give rise to sentences in which it appears that fronting has operated as a movement rule.

(6) Schon 5 Jahre wohne ich hier und kenne trotzdem niemanden
already 5 yr live I here and know still no one
'I've lived here for 5 years and still know no one'

The temporal adverbial schon 5 Jahre is understood as modifying only the first conjunct; it cannot be understood to modify both, so that (6) shares no reading with either sentence in (7):

(7) Ich wohne schon 5 J hier und kenne trotzdem nmdn. schon 5 Jre.
I live already 5 yrs here and know still no-one already 5 yrs
'I've lived here for 5 yrs and there's no one whom I've known for 5 yrs.'

Ich wohne schon 5 Jre hier und kenne trotzdem schon 5 Jre nmd
I live already 5 yrs here and know still already 5 yr noone
'I've lived here for 5 yrs and for 5 yrs I haven't know anyone'

The second conjunct in (6) simply means 'I know no one now.' Thus it is stronger than the first putative paraphrase in (7) (since if I know no one now, then clearly there's no one whom I've known for five years) and weaker than the second (since (6) is perfectly compatible with my having had acquaintances which have since lapsed). A structure for these sentences is proposed in the appendix to this chapter.

We turn now to a sort of fronting which has resisted treatment in transformational analyses. Consideration of its peculiarities will motivate our formulation of basic rules in the fragment.

3.2.3 Phantoms and Some Recalcitrant Sorts of Fronting

In a recent study using a large corpus, Hoberg (1981:155-181) presents evidence which confirms the generalization that only single major constituents (Satzglieder) may be fronted. As she notes, single major constituents may contain (i) complements (notably in the case of adjectivals and adverbials), (ii) modifiers, (iii) parentheticals, and (iv) conversational particles.

(i) Groesser als der Hans ist hier niemand
bigger than the H is here no one
'No one here is bigger than Hans'

(ii) Gut "gezielt" hatte auch die iranische Regierung
well aimed AUX also the Iranian govern.
'The Iranian government also "aimed" well' (Hoberg(1981:181))

(iii) Der President--wie denn sonstπ--sagte ab
the president how Q-prt else cancel
'The president--so what's newπ--cancelled'

(iv) Seiner Tochter aber kann er kein Maerchen erzaehlen
his daughter but can he no story tell
'But he can't tell his daughter a story'

These are exactly the sorts of exceptions which do "prove" rules. That is, they hardly challenge the generalization, and, if they are the only apparent counterexamples, then the generalization would appear to be sound. Hoberg (1981:181) nevertheless regards it as faulty in view of sequences of constituents which may be fronted. The following appear in her corpus:

(1)1. Den Strafantrag zuruecknehmen kann der, der ihn gestellt hat
the charge withdraw(inf) can he who it place(prt) AUX
'He who brought charges can drop them'

2. (Der professionelle Habitus ist der beste Schutz.)
Professional status is the best protection.

Auf Leben und Tod zu treffen sind nur Heilige und Amateure
on life α death to hit(inf) are only saints and amateurs
'Only saints and amateurs can be mortally wounded'

3. Von den Sowjets verhaftet wurde in Leningrad der deutsche...
by the Soviets arrest(prt) AUX in L the German...
'The German ... was arrested in Leningrad by the Soviets'

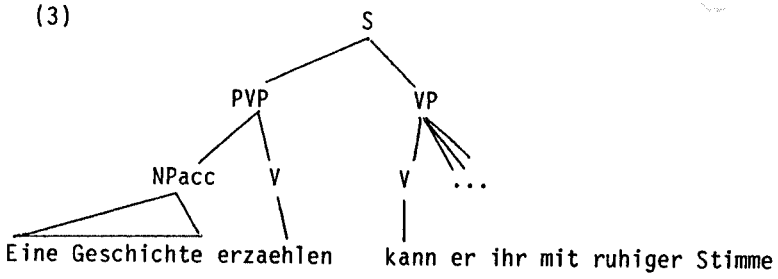
That is, we find examples of nonfinite VP's in fronted position as well, either with (1.2) or without (1.3) adverbial modifiers. It is not in general possible to front sequences of constituents--e.g. one can never front the subject with the accusative object, as indeed, one can never front just two nominal complements of any sort. We are therefore quite tempted to try to preserve without qualification the generalization that only single constituents may be fronted.

As (1.3) might suggest, it is not just entire nonfinite VP's which may be fronted. For example, Heidolph et al. (1981:720-21) note that one can also front the verb with an accusative complement to the exclusion of its dative complement:

(2) Eine Geschichte erzaehlen kann er ihr mit ruhiger Stimme
a story tell(inf) can he her with calm voice
'He can tell her a story with a calm voice'

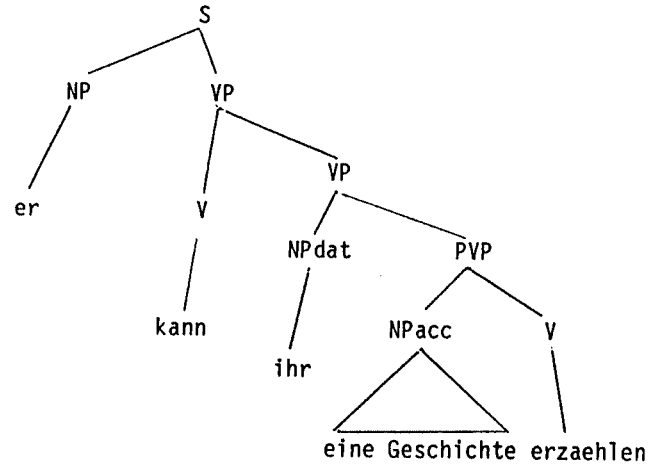
We must therefore provide for less-than-entire VP's in the position before the finite verb. If we are to do this, and preserve the generalization that it is single constituents which appear preverbally, then we must allow that a (nonfinite) verb may form a constituent with some of its complements to the exclusion of others. Calling these "partial verb phrase," or PVP's, we need a structure such as the following:

(3)



The question arises: do these constituents play a role in unfronted position To remain with the concrete example, does (4) represent the structure of (4')

(4)



(4') Er kann ihr eine Geschichte erzaehlen
he can her a story tell
'He can tell her a story'

I don't wish to argue that (4) cannot be a structure of (4'), but there is at least one reason to be suspicious of its being the only such structure. If it were, then (5), where the accusative NP has been fronted alone, would represent a violation of the left branch constraint (cf. Gazdar, 1982:176, for a formulation of the left branch constraint in GPSG):

(5) Eine Geschichte kann er ihr erzaehlen
'He can tell her a story'

And the left branch constraint seems well justified in German: one cannot e.g. front genitive interrogative or relative words, which would be explained by the left branch constraint:

(6) * Wessen hast Du ___ Arbeiten gelesen
whose AUX you papers read(prt)

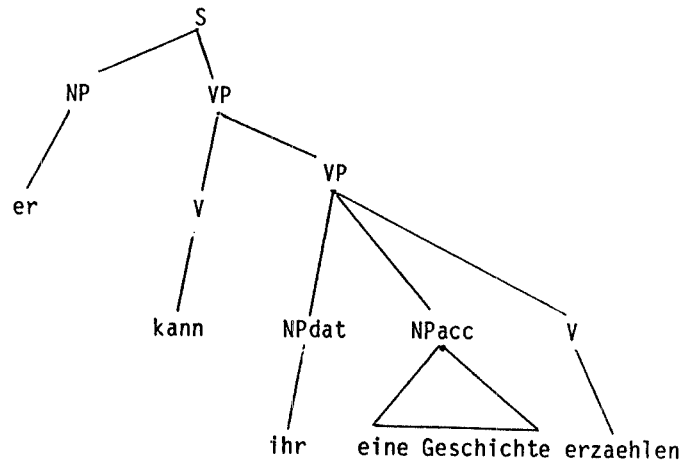
Du hast wessen Arbeiten gelesen
'You read whose papers '

(6') * Ich sah Prof. X, dessen Du ___ Arbeiten gelesen hast
I saw whose you papers read(prt) AUX

Ich sah Prof. X, dessen Arbeiten Du gelesen hast
'I saw Prof. X, whose papers you read'

If this is so, then we will need to account for (5) by postulating another possible structure, in which the accusative NP needn't be a left branch. (7) seems the most likely candidate for this:

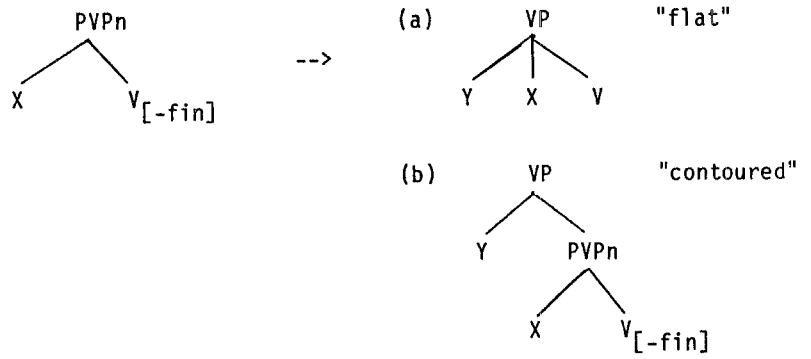
(7)



Since I am not prepared to argue that the left branch constraint is irrelevant to the analysis of German, and since the structure in (7) seems unobjectionable, I am going to assume that we ought to provide for both phrase structure trees.

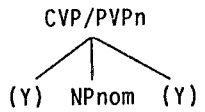
This will be accomplished using a generalization of the methods introduced by Gazdar and Sag (1980), building on work by Bach (1982) and Dowty (1978). In skeleton, the procedure is as follows: rather than regard the VP rules such as (1) in 3.2 as basic, VP's will be built up complement by complement, beginning with the verb alone. In GPSG this is done with metarules. At any stage of the derivation of a VP rule one can apply either of two MR's: one can regard the element added in the MR as a sister to the daughters of the input rule, yielding a flat structure (in this case it is correct to regard the input rule as defining a "phantom category"), or one can retain the constituent defined by the input rule, yielding a flat structure (in which case the phantom materializes--poltergeist-like---perhaps even in fronted position). Graphically, we have the two possibilities in (8).

(8)



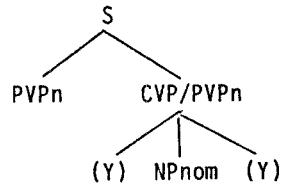
(PVP's are partial verb phrase, i.e. constituents lacking one or more of the complements required in standard VP's. The TVP's used by Dowty (1978) and Bach (1982) are an example of PVP's.) The fronting metarule will then allow that for any rule of the form (8b), there is a rule of the form (9):

(9)



and this constituent may then combine with a PVPn constituent to form a sentence, which will then have a structure such as (10):

(10)



(3) above is an example of this sort of structure, while the VP node in (4) provides an example of the flat structure we see in (8a).

It is worth noting that there is probably no convincing transformational solution to the problem. Consider the variants in (11):

(11) 1. Auf Einzelheiten ist er nicht eingegangen
into details AUX he not in-go(prt)
'He didn't go into detail'

2. Auf Einzelheiten eingegangen ist er nicht
as above

The problem for the transformational analysis is obvious: whenever the rule should apply, auf Einzelheiten eingegangen either is or is not a constituent. If it is, then at least its left branch shouldn't be frontable, and (11.1) is underivable. But if it is not, then (11.2) is underivable.

A transformational solution to the problem is equally obvious: some sort of restructuring rule, applying optionally, is required to break up an existing constituent, or to create a new one. But this is only to say that if one insisted on a transformational solution, then one would posit a rule which effectively allowed alternative constituent structures, both of which might feed the fronting rule. I don't doubt that this is workable, but it is still unconvincing because it amounts to first adopting a canonical structure and then allowing it to be deformed (optionally). (As 3.4 will demonstrate, this canonical order may have to be rigid at points.)

Allowing the alternative constituent structures through distinct (but predictable) phrase structure rules thus seems to be the most desirable treatment. This is predicted in a framework which eschews the added power of transformations.

3.3 Basic Rules

The presentation of the motivation for the grammar proposed will give way to a presentation emphasizing its formal structure in this section.

3.3.1 Features for Complements

We regard as part of the lexical information associated with a

verb the specification of the number and sorts of complements it requires. Thus erzaehlen 'to tell, narrate' normally requires both an accusative and a dative object. This will be represented by means of features, so that the lexical entry associated with erzaehlen will include the following:

(1) $PVP_{\substack{-NPacc \\ -NPdat}}$: erzaehlen, spenden,...

The complement features encode the same information as the "slashes" of categorial grammar; thus (1) indicates that these verbs are partial verb phrases which require (and do not yet contain) both accusative and dative objects to form verb phrases.

Since all basic verbs in contemporary colloquial require nominative subjects, this complement feature need not be redundantly marked. But (1) might be more completely written:

(1') $PVP_{\substack{-NPacc \\ -NPdat \\ -NPnom}}$: erzaehlen, spenden,...

We will normally suppress the mention of the nominative complement. (The policy of regarding nominative complements as automatic would be ill advised if we were treating very formal language as well, which has retained a very few basic subjectless verbs, such as hungern 'hunger,' which requires only an accusative, and is incompatible with nominatives.)

Once the complement has been added, the feature will be marked '+,' so that we obtain:

$PVP_{\substack{+NPacc \\ -NPdat}}$: eine Geschichte erzaehlen, eine Kleinigkeit spenden,...

This raises the question of the value of the feature [_NPacc] in phrases, e.g. lachen 'laugh,' which neither require accusative NP

complements nor already have them. Unfortunately, I know of no evidence which determines whether this phrase is marked [+NPacc] (which might seem plausible since it certainly isn't "looking for" an accusative complement), or whether it is simply unmarked for this feature. The relevant evidence would effectively show whether we must distinguish syntactically between phrases alike in the complements they require, but distinct in the complements that they already contain. Since the matter seems to be empirically undecidable, and not of great theoretical moment, we adopt the typographically more aesthetic solution: the features will be left unmarked where the complements are not required.

The entire rule condensed in (1) will be part of a list which is indexed by rule number, as explained in (3.1). The use of complement features in tandem with rule numbering may be regarded as suspicious, since Gazdar (1982:143145) justified the use of rule numbering partly on the grounds that it obviates the need for subcategorization information in the lexicon. Complement features reintroduce subcategorization information into the lexicon, duplicating syntactic information, and apparently nullifying the advantage of rule numbering.

Several remarks are relevant here. First, if there is a loss incurred by the system which includes complement features, there is also a gain. Using these complement features, we shall no longer need to regard the VP expansion rules as basic--instead, we shall be able to predict the form of these rules from the lexical form of the verb, in particular, from its complement features.

Second, lexical classes of verbs are not distinguished only by the complements they take. Verbs which take identical sets of complements may have distinct semantic effects. For example, versprech- 'promise' and befehl- 'order' both require dative NP's and infinitival VP's (with zu), but differ semantically in that it is the subject of versprech-, but the object of befehl-, that controls the VP infinitive. Rule numbers may still serve to distinguish these classes, and thus serve a purpose.

A third, and final remark is related to the second. If semantic distinctions among verb classes were somehow predictable, one might

then dispense with rule numbering, and eliminate even this amount of apparent duplication of information. Klein and Sag (1981) have proposed such a system, and Johnson (ms.) has employed it to suggest the use of complement features without rule numbers. If the Klein and Sag proposal is successful, then Johnson's proposed elimination of rule numbers (in connection with the adoption of complement features) is a desirable modification of the system proposed here.[7)]

There may be an implicit hierarchy in complement features, which is reflected in the sorts of PVPs which may be fronted. According to Heidolph et al. (1981:720-21), erzaehlen shows the following pattern:

(2) 1. Eine Geschichte erzaehlen kann er ihr mit ruhiger Stimme
a story tell(inf) can he her with calm voice
'He can tell her a story with a calm voice'

2. Seiner Tochter eine Geschichte erzaehlen kann er schon
his daughter certainly
'He certainly can tell his daughter a story'

3. *Seiner Tochter erzaehlen kann er sie schon[8)]
it(acc)

That is, in this variety we find the following PVP's with erzaehlen:

NPacc + V NPdat + NPacc + V but: * NPdat + V

Moreover, there seems to be a general preference for the accusative object over the dative object in forming PVP's. All verbs which take multiple objects may form constituents with their accusative objects alone, and with dative and accusative objects together, but less readily with dative objects alone. Let us examine the rules required under the assumption that this pattern is indeed general. We'll then consider the modifications which would be needed if the generalization turns out not to be pure.

It is clear that the rules which add complements to PVP's are of

very similar structure. They add complements of type X to (partial) verb phrases lacking complements of type X. We should therefore like to posit a general metarule such as the following:

(3) $\langle n, [_{\substack{(P)VP \\ -X}} \ldots], F\rangle \dashrightarrow \langle n, [_{\substack{(P)VP \\ +X}} \ldots X \ldots], F\rangle$

The derived rule may be a rule admitting further PVPs, such as the rule admitting NPacc + V in (2.1) above, or it may be a rule admitting VPs, such as (2.2) above. It may even be a rule admitting CVP's. This depends on the input rule. A CVP is simply a PVP where for all complement features Xn, a positive value may be shown, while a VP is one which is [-NPnom], and which, for all other complement features X_n, a positive value is shown.

(4)

VP =	PVP_{+X1}	CVP =	PVP_{+X1}
	⋮		⋮
	$+X_m$		$+X_n$
	-NPnom		

Thus the derived rule in (3) shows: '(P)VP.'

If the judgement in (2.3) is incorrect, and a verb may in general form a PVP with any of its complements, then the schema in (4) is essentially correct. But if the judgements in (2) represent a genuine variety of German (cf. note 8), then (3) runs into a problem. Suppose erzaehlen has the features suggested in (1). Then we could apply the MR in (3) to derive:

(4) $\langle n, [_{\substack{PVP \\ -NPacc}}$ NPacc, $PVP_{\substack{-NPacc \\ -NPdat}}], PVP'(NP')\rangle$

But this yields the undesired constituent in (2.3).

To avoid this problem, we may suppose that there is a hierarchy of complement features, i.e. one that might be given in a sequence such

as (5):

(5) X1, X2,...,Xn

Supposing that all complement features are listed in an order such as (5), we subsume all the complementation MR's under the schema in (6):

(6) Flat Adding of Complements (FAC)

$\langle n, [_{\substack{(P)VP \\ (+X_a) \\ \vdots \\ (+X_i) \\ -X_j \\ \vdots \\ -X_m}}$ Y], F $\rangle \dashrightarrow \langle n, [_{\substack{(P)VP \\ \alpha agr \\ \vdots \\ +X_j \\ \vdots \\ -X_m}}$ Y X_j], $F(X_j')\rangle$ (αnom, αagr)

((6) assumes that $X_a \ldots X_m$ exhaust the complements required, and that they are ordered as in (5).) This would be sufficient to rule out the undesired (2.3), providing NPacc < NPdat in (5).[9)]

It may even turn out that **some** PVPs are NPdat + V (to the exclusion of a required NPacc). This may also have to be accommodated. In that case, we clearly have to give up the postulation of a single hierarchy of complement features, as in (5). Rather, we would assume that the complement features of each verb are ordered (sometimes differently from one another). If we again assume that the features are listed in the required order (under the lexical entry for each verb), then schema (6) provides the necessary range of metarules for adding complements to verbs to form verb phrases and partial verb phrases.

Turning now from the question of how one accommodates the various patterns of acceptability judgements with PVP's, we note that (6) provides for subject verb agreement in case the complement being added is nominative. The feature [_agr] is dormant until it takes a positive value (in the above rule, when the complement being added is

[+nom]). The positive value of [_agr] triggers the values of person and number to agree throughout the rule in which it appears. We suppose a rule to the effect that:

+agr ==> βpers.
Δnumb.

Let us note the structure which (6) assigns: it provides only for the "flat" structure in (8) in 3.2.3. (7) provides for the contoured structure:

(7) Contoured Adding of Complements (CAC)

$\langle n, [_{(P)VP}\ Y\ ], F\rangle \dashrightarrow \langle n, [_{(P)VP}\ X_j,\ (P)VP_{-clitic}\ ], F(X_j')\rangle$

$(+X_a)$		$(+X_a)$
⋮	⋮	⋮
$(+X_i)$		$(+X_i)$
$-X_j$	$+X_j$	$-X_j$
⋮	⋮	⋮
$-X_m$	$-X_m$	$-X_m$
	-mc	
	αnom	αagr
	αagr	

The feature [-mc] is required to prevent the application of this rule to create a constituent consisting of the finite matrix verb and one or more of its complements. This might be introduced on the head of the node admitted by the rule rather than on the node itself, as above.

The (P)VP constituent within the (P)VP on the right in (7) may not contain clitics such as es which must encliticize as far left within the VP as possible (but after the nominative). The feature [-clitic] (together with further principles) is required to account for the following pattern of well-formedness:

(8) 1. * Sie wollte Tom's geben
she wanted T it give

2. * Tom's geben wollte sie

3. Sie wollte's Tom geben
she wanted-it T give
'She wanted to give it to Tom'

4. Tom wollte sie's geben
'She wanted to give it to Tom'

The feature [-clitic] is required because otherwise we would allow that geben could combine with its accusative complement es to form a PVP, in which case the es should appear next to its sister whether that is after the finite verb (as in (8.1)), or in fronted position (as in (8.2)).

(In addition to ruling out these otherwise possible constituents, we will need LP statements to guarantee the position of the es in (8.3) and (8.4). For example, the following would be appropriate:

+clitic < -fin

+clitic < -nom

These specify that the clitic es must precede nonfinite verbs and nonnominative complements in its constituent. Cf. Vater (1979) for ordering constraints among the pronouns.)

The other features in (7) are used above as they are in (6). With these syntactic mechanisms in mind, we can examine several basic rules:

$\langle 2, [_{VP}\ V\ ], V'\rangle$: schlafen, lachen, existieren,...
-fin

<3, [PVP V], V'> : lieben, treffen, bauen,...
-fin
-NPacc

<4, [PVP V], V'> : schmeicheln, helfen, gratulieren,...
-fin
-NPdat

<5, [PVP V], V'> : beduerfen, entbehren, gedenken,...
-fin
-NPgen

<6, [PVP V], V'> : erzaehlen, verschreiben, beweisen,...
-fin
-NPacc
-NPdat

<7, [PVP V], V'> : warten, hoffen, achten,...
-fin
-PPauf

<8, [PVP V], V'> : bitten, betruegen, beneiden,...
-fin
-PPum
-NPacc

<9, [PVP V], V'> : sein, bleiben, werden,...
-fin
-PRED

There are, of course, as many basic rules as there are subcategorization classes of verbs (though these may be eliminable if semantics is predictable, as noted above). I've neglected verbs subcategorized for duratives, locatives, directionals, most preositional phrases, modifiers (e.g. sauber-, dreckig-, kaputt-, fertig-, etc. machen), als 'as' + modifier (fungieren, gelten, etc.), and even most verbs subcategorized for combinations of the elements which have been examined. It is to be hoped that the classes examined exhibit principles which extend to the unexamined ones.

Several comments on the form of the BR's are in order. First, the proposal to specify the choice of preposition using on a feature on the prepositional phrase, e.g. [+um], is what is intended in the notation [+PPum], and is due to Gazdar (1982:141-2), who points out that prepositions which verbs require differ semantically from those which occur freely. There are further points in favor of this treatment of preositions, as well. Thus, although it might be neater to subcategorize verbs simply as [-PP], and then let the exact choice of preposition depend on the verb, this will not work in general. The empirical generalization this would have to be based on is false: some verbs are subcategorized for more than one preposition. Cf. e.g. von X schwaermen 'to talk excitedly about X' and fuer X schwaermen 'to idolize X, to be giddy about X.' (Similar examples may be found in English. Cf. wait on vs. wait for. (It is technically possible to account for the lexical conditioning in the semantics by assigning "impossible" meanings to incorrect V + PP combinations--but this would be entirely ad hoc.)

Second, the BR's above admit only [-fin] (P)VP's, i.e. ones which aren't yet interpreted (or marked) for tense. Tense isn't introduced until the VP level for semantic reasons. Cf. the discussion in 3.7.2 on the need for this. The BRs (and the complement-adding MRs) operate on untensed elements, which must nonetheless later bear tense marking and tense interpretation.

Third, BRs (2)-(9) together with the MR's allowing the Flat Adding of Complements allow the derivation of a number of ID statements for which no appropriate LP statements have yet been formulated. The following, absolutely standard generalizations about German word order, are the most important:

(9) 1. $V_{\substack{+fin \\ +mc}} < X$

2. $X_{-verb} < V_{-fin}$

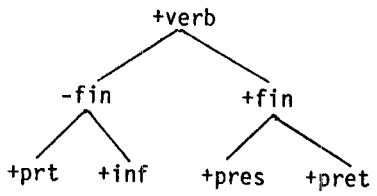
3. $X < V_{\substack{+fin \\ -mc}}$

The finite verb in a main clause is always first in its constituent (9.1); all nonfinite verbs follow all nonverbal elements in embedded clauses (9.2); and finite verbs follow everything else in subordinate clauses.[10] The last LP statement requires some refinement in view of clauses such as (10), but this will not be pursued here.

(10) ...dass er lange hat schlafen muessen.
COMP he long AUX sleep(inf) must(prt)
'...that he had to sleep for a long time.'

(9.1)-(9.3) are provided here to illustrate somewhat more exactly the GPSG strategy of separating ID and LP statements and the strategy of the present fragment which derives some "flat" VP rules with a large number of constituents. It is worth noting that (9.1)-(9.3) are not yet applicable within the present fragment, since there is no provision yet for tensed verbs. (That is, we have been assuming the following division of features:

(11)



Finite verbs are marked for tense, person, and number. Nonfinite verbs are either infinitives or participles. We treat only Perfect participles in this work.)

Fourth (and related to the third comment), some statement(s) on the order of the nonverbal elements are required. Some of these statements are not difficult to provide; we can state reliably e.g. that

NP < PP

But the order of nominal complements is more flexible. Lenerz (1977) is the most careful of studies on this issue, but it is beyond the scope of the present work to investigate how the relevant (still quite complicated) principles might best be expressed in ID/LP format. Indeed, given the pragmatic factors (e.g. theme, emphasis) to which Lenerz and others have made appeal, one surely does not wish to commit oneself to any purely grammatical account of the order of these elements.

It is probably nonetheless worth noting that the standard remarks about the order of German noun phrases may readily be expressed as LP statements. That dative NP's precede accusatives amounts to

$NP_{+dat} < \begin{matrix} NP+acc \\ -pro \end{matrix}$

while that accusative pronouns precede dative pronouns may be stated:

$PRO_{+acc} < PRO+dat$

If these were the correct generalizations about nominal complements in German, we might simply list them. But Lenerz (1977) and Vater (1979) note that things are more complicated. This will not be pursued here.

Fifth, it should be noted that nothing has yet been said about separable prefix verbs. These are treated in the next section.

Here are two examples of the application of the complement adding MR to BR (6):

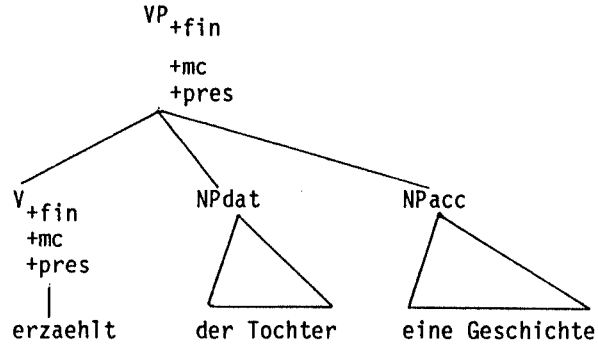
(12) 1. <6, [$_{PVP}$ V], V'> --> (via "flat" AC-MR)
-fin
-NPacc
-NPdat

2. <6, [$_{PVP}$ NPacc, V], V'(NPa')> --> (FAC-MR)
-fin
-NPdat

3. <6, [$_{VP}$ NPdat, NPacc, V], V'(NPa')(NPd')>
-fin

Anticipating the rule introducing Present tense, this PSR will admit subtrees such as the following:

(13)



The verb phrase that is actually used in a sentence such as er erzaehlt der Tochter eine Geschichte will be a CVP/NPnom, but it will consist of the same elements as the above.

(14) 1. <6, [$_{PVP}$ NPacc, V], V'(NPa')> (=(12.2)) --> (via CAC-MR)
-fin
-NPdat

2. <6, [$_{VP}$ NPdat, PVP$_{-fin}$], PVP'(NPd')>
-fin -NPdat

These two rules have been derived here in order to suggest how the

present system can eventually provide a generation of (2.1), repeated here for convenience:

(2.1) Eine Geschichte erzaehlen kann er ihr
a story tell(inf) can he her
'He can tell her a story'

We return to this below (in 3.4).

3.3.2 Separable Prefix Verbs

Separable prefix verbs display prefixes which appear before their associated verbs stems in nonfinite form (and in [-mc] contexts) and at the end of the [+mc]VP when the associated verb is in finite form. The pattern below is general:

Er kommt bald an	...,dass er ankommt	Er ist angekommen
he come soon on	COMP	AUX
'He arrives soon'	'...that he arrives'	'He arrived'

It's important to note that there are two classes of verb prefixes in German: separable and inseparable. Verbs with inseparable prefixes display no behavior syntactically distinct from unprefixed verbs, so that both appear in the basic rules in 3.3.1. Cf. BR 6, which introduces not only verschreiben, erzaehlen, and beweisen, but also the unprefixed geben, schenken, and spenden. The present section concerns exclusively the other class of prefixed verbs, those with separable prefixes.

My strategy of analysis for these verbs will first be defined negatively: the verbs will not be introduced by the same basic (syntactic) rules which admit the unprefixed verbs, nor will they be syntactically derived from these rules. I acknowledge that the prefixed verbs are related to unprefixed stems, but maintain that this is a lexical relationship, at least in general. The idea that the relationship between verb and prefix is lexical explains the often

unpredictable (syntactic and semantic) relationship between an unprefixed verb and its prefixed counterpart.

But even if the relationship is lexical, it certainly is not purely morphological, as the possible separation of verb and prefix by several phrases demonstrates (they appear at opposite ends of the VP). The treatment accommodates the fact that the prefix and stem have relatively independent syntactic behavior by allowing them to be introduced under separate syntactic nodes. This requires a somewhat novel view of the interaction of lexical insertion and semantic composition, but no new apparatus.

The best method of further explaining the analysis is to examine some rules introducing separable prefix verbs. Examples of these:

<10, [$_{VP}$ PREF, V], PREF+V'> : an-kommen, weg-gehen,
-fin an-fangen,..

<11, [$_{PVP}$ PREF, V], PREF+V'> : aus-nuetzen, fort-jagen,
-fin zu-lassen,...
-NPacc

<12, [$_{PVP}$ PREF, V], PREF+V'> : bei-wohnen, bevor-stehen,
-fin zu-laecheln,...
-NPdat

<13, [$_{PVP}$ PREF, V], PREF+V'> : Herr-werden,...
-fin
-NPgen

<14, [$_{PVP}$ PREF, V], PREF+V'> : vor-werfen, zu.ueck-bringen,
-fin nach-erzaehlen,...
-NPacc
-NPdat

<15, [$_{PVP}$ PREF, V], PREF+V'> : ein-gehen, hin-weisen,
-fin auf-passen,...
-PPauf

<16, [$_{PVP}$ PREF, V], PREF+V'> : auf-fordern, ein-laden,
-fin an-stiften,...
-PPzu
-NPacc

<17, [$_{PVP}$ PREF, V], PREF+V'> : auf-treten, aus-sehen,...
-fin
-PRED

The novelty here is that prefix and verb are semantically interpreted as a unit, which is why the prefix/verb combinations are written together in the lists of verbs on the right side above. These are the lexical entries for the purpose of semantics. Let's note that there is no intrinsic difficulty with this proposal: there is a finite number of prefix + verb combinations, so that we can list them in the lexicon. There will be lexical rules which will reduce the number which must be learned independently, but in principle, they might all be learned this way.

The major semantic advantage is that the analysis is not committed to predicting the meaning of prefixed verbs as a function of the meanings of the prefix and unprefixed stem. The meaning is predictable in many cases, but counterexamples remain. Schmeissen and werfen 'to throw' are cognitively synonymous, i.e. true of the same pairs (or triples) of objects in all possible situations, although they differ in stylistic level, while vorschmeissen 'to throw to the front' and vorwerfen 'to reproach' or 'to throw to the front.' Similarly, gucken and schauen 'to look,' but ausgucken 'to look out' and ausschauen 'to look out' or 'to appear'; kriegen and bekommen 'to get, receive,' but unterkriegen 'to take care of, accommodate' with *unterbekommen, and kleinkriegen 'to beat, take the starch out of' with * kleinbekommen. We accommodate this lack of compositionality by assigning the meaning to the prefixed verb directly, rather than via a function based on the meaning of the prefix and stem. This is the sense of PREF+V' in the rules above.

This limited predictability of meaning is, of course, expected of word formation. It is usually taken as evidence that a construction

is lexical, and it legislates against any syntactic introduction of separable prefixes. (It would also seem to weigh against introducing separable prefixes by MR in the GPSG framework though I'm not aware of any explicit principle forbidding MR's from effecting noncompositional semantic changes, and I could imagine requiring that rules be compositinal while allowing that metarules might not be.)[11]

A stronger argument against the syntactic treatment (and the MR treatment) of these prefixes is the fact that prefixed verbs do not derive their subcategorizations from their unprefixed stems. If prefixes were added in the syntax we would expect the effect on subcategorization to be predictable. Sometimes it is, as when subcategorizations don't change, e.g. in the case of erzaehlen 'to tell' and nacherzaehlen 'to retell,' which both take accusative and dative objects. But wohnen 'to reside' requires a locative, while beiwohnen 'to be inherent in, or to attend' requires a dative. Similarly, ad libitum. The present treatment foresees no necessary connection between the subcategorizations of prefixed and unprefixed verbs derived from a single stem.[12]

The above arguments are intended establish that at least some separable prefixes must be introduced lexically. This is not to say that no rules exist which derive prefixed verbs syntactically, only that there are prefixed verbs which are not so derived. There may exist a large number of (regular) rules introducing prefixed verbs with predicted meanings--but these will not account for all prefixed verbs.

The only novel aspect of the present treatment is that it must allow that some items be lexically inserted even though they are not semantically interpreted. Neither the prefixes nor the verb stems, both of which appear under syntactic nodes, are interpreted semantically. Instead, their combination is. This means, in turn, that although they must appear in the lexicon, there is no reason for these lexical items to be assigned a meaning in the lexicon.

This means that the lexicon must contain, e.g. in connection with BR 14, repeated here, the entries immediately below.

(1)

$$\langle 14, \begin{bmatrix} PVP \\ -fin \\ -NPacc \\ -NPdat \end{bmatrix} \text{PREF, V], PREF+V'} \rangle : \underline{\text{vor-werfen}}, \underline{\text{zurueck-bringen}}, \underline{\text{nach-erzaehlen}}, \ldots$$

(2) Sample Lexicon

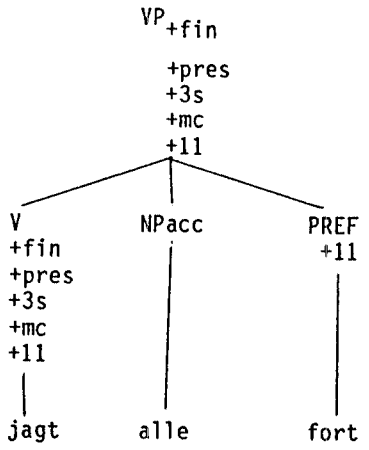
V	V	PREF+V
-pref	+pref	
:	:	:
+14	+14	+14

bring-	: Ø	nach	: Ø	nach+bring-	: **nachbring-'**
erzaehl-	: Ø	vor	: Ø	nach+erzaehl-	: **nacherzaehl-'**
werf-	: Ø	zurueck	: Ø	nach+werf-	: **nachwerf-'**

This use of empty lexemes is novel, to my knowledge, but it involves no new syntactic (or lexical) apparatus.

We should take note of one controversial use that will be made of the semantics here. Let's first note that prefixes and verbs are inserted freely into trees by the BR's above. Not every prefix and every verb stem is eligible for insertion into every tree, of course, since the verb and prefix nodes bear features specifying which lexical items are admissible. Since prefix and verb stem are both lexical items, they are both marked by the rule number, which indicates subcategorization class. This may best be seen by examining a tree, such as (3), which is admitted by a rule based on BR 11, and two applications of complement-adding metarules (the actual rule and derivation appear below):

(3)



Only lexical items from class 11 are eligible to be inserted here under either lexical node. I don't see any difficulty in allowing that PREF may also bear this feature, since it is also a lexical item to be inserted directly below an expanded node. Notice that the prefixes found among the verbs in class 11 include fort-, aus-, and zu- (and many others). These cannot be combined randomly with all of the stems in this class to create well-formed separable prefix verbs, however. Thus we have fortjagen, ausnuetzen, and zulassen but not *fortnuetzen, *zunuetzen, and *zujagen. Nothing in the tree in (3) disallows these, however. There are two ready solutions to this problem.

The solution implicit in the BR's in (1) is that in interpreting the combination of verb and prefix (while allowing the free generation of any verb with any prefix), we filter out nonexistent combinations. The starred examples above are still generated, but uninterpretable. their unacceptability is explained as a case of semantic anomaly. Thus we appeal (minimally) to a semantic filtering.

As a second possible solution, we might multiply categories. We might, for example, replace BR 11 with (4):

(4)

<11(zu), [PVP PREF, V], PREF+V'> : zu-lassen, zu-machen,..
-fin
-NPacc

<11(fort), [PVP PREF, V], PREF+V'> : fort-jagen, fort-setzen,
-fin
-NPacc

etc.

As a lexical item inserted in the expansion of BR 11(zu), both the prefix and the verb would bear the feature +11(zu), which could only be expanded (in the case of the prefix) as zu. This sort of system would work to prevent unwanted combinations of prefix and verb stem, but because this latter treatment involves the multiplication of categories, I take the former to be preferable; it has been adopted here. If there were reason to avoid appeal to semantic filtering entirely, the latter treatment would be available.

Before deriving VP rules, we have to say something about the LP rules which will be used to order separable prefixes at the end of VP's. Here, as above, there are two possibilities, depending on whether we wish to guarantee that separable prefix and verb stem always form a constituent in nonfinite and nonmain clauses.

The striking fact that the prefix and verb always appear together in these clauses, and that nothing may interrupt them suggests that we ought to guarantee that they appear in a single constituent in these sentences. To do this, we must first guarantee that we do not derive VP rules simply by using the complement adding MR's on the BR's in (1). The simplest way to do this is via feature: we add the feature [+pref] to the BR's with separable prefix, and we require that the complement-adding rules operate on [-pref] PVP's. Then we just need rules to change [+pref] to [-pref], while creating the desired constituent, e.g. the following:

(5)

$\langle n, [_{\substack{(P)VP \\ +pref}}\ V,PREF\ ], F\rangle \rightarrow \langle n, [_{\substack{(P)VP \\ -pref \\ -fin}}\ (P)VP_{+pref}\ ], F\rangle$

$\langle n, [_{\substack{(P)VP \\ +pref}}\ V,PREF\ ], F\rangle \rightarrow \langle n, [_{\substack{(P)VP \\ -pref \\ -mc}}\ (P)VP_{+pref}\ ], F\rangle$

The first rule requires that prefix and verb form a constituent in nonfinite clauses, the second in nonmain clauses. We note that although the prefix and verb stem form a constituent in the derived rules, they do not constitute a word. This has empirical consequences which we cannot pursue here.

Finally, we need a rule to wipe out the [+pref] feature in finite main clauses as well, in order to license the use of the complement-adding MR's in these cases as well. This is the task of (6):

(6) $\langle n, [_{\substack{(P)VP \\ +pref}}\ \ldots\ ], F\rangle \rightarrow \langle n, [_{\substack{(P)VP \\ +mc}}\ \ldots\ ], F\rangle$

This rule, in distinction to those in (5), does not prescribe that the prefix and verb form a constituent. Instead, they are sister constituents in the (P)VP to which further sister may be added via the flat adding of complements.

To provide for the ordering of separable prefixes vis-a-vis their sisters, let us assign the features +verb, -noun, +pref, and -fin to the separable prefixes. Then let us recall the LP statements (9.1) to (9.3) in 3.3.1, repeated here for convenience:

(7) 1. $V_{\substack{+fin \\ +mc}} < X$

2. $X_{-verb} < V_{-fin}$

3. $X < V_{\substack{+fin \\ -mc}}$

(7.2) predicts that prefixes will be found at the end of VP's (after nonverbal elements), which is exactly the pattern noted. We verify the pattern again in (8):

(8) Arno jagt alle fort
A chase all PREF
'Arno chases everyone away'

Given (7.3) we expect to find prefix and verb, in that order, at the end of subordinate clauses. This is also correct, as (9) documents.

(9) ...dass Arno alle fortjagt
COMP
'...that Arno chases everyone away'

If to the existing LP rules we add (10):

(10) PREF < V_{-mc}

then we expect to find the prefix and stem, in that order, at the end of verb phrases in subordinate clauses even when the verb is nonfinite. This is also true. Cf. (11):

(11) ...dass Arno alle fortgejagt hat
AUX
'that Arno chased everyone away'

The treatment just sketched is complicated since it would involve an extra feature, and several new MR's. It has the advantage, however, of having the fixed prefix + stem constituent, which cannot possibly be interrupted by the subsequent introduction of modal or auxiliary verbs, or anything else. These may present a problem in some extension of the fragment described here, so that we may wish eventually to return to the alternative just sketched.

On the other hand, it's enough for the purposes of the present fragment to add (10) to the existing rules. That is, (7.2) has the consequence that prefixes appear at the end of VP's, while (7.3) guarantees that finite verbs follow prefixes in subordinate clauses, quite irrespective of the constituent structure of the VP's involved. We still need (10) to obtain the order in (11), but again, there is no need to appeal to a verbal constituent.

We'll tentatively adopt this (latter) treatment of verbs with separable prefixes. The first was sketched in detail, first because I wanted to demonstrate that it is not beyond the capacity of this approach to provide for the constituent in question, and second because there may be German constructions in which it is required. For example, (12) has not been incorporated into the present fragment, but it is suggestive that the finite auxiliary appears before the prefix:

(12) ...dass Arno alle hat fortjagen koennen
COMP A all AUX away-chase can
'...that Arno could chase everyone away.'

The finite auxiliary has a good deal of freedom in subordinate clauses with two or more nonfinite verbs, but it never interrupts the prefix and verb stem.

To conclude this section, let us examine some VP rules derived from the BR's introduced here.

(13) <11, $[_{VP}$ PREF, V], PREF+V'> BR
-fin
-NPacc

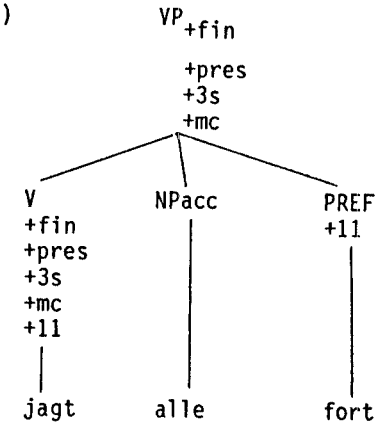
<11, $[_{VP}$ NPacc, PREF, V], PREF+V'(NPa')> FAC
-fin

Anticipating the rules introducing tense and applying the relevant LP rules (repeated below for convenience), we derive the VP rule in (14):

(7.1) V_{+fin} < X
+mc

(7.2) X_{-verb} < V_{-fin}

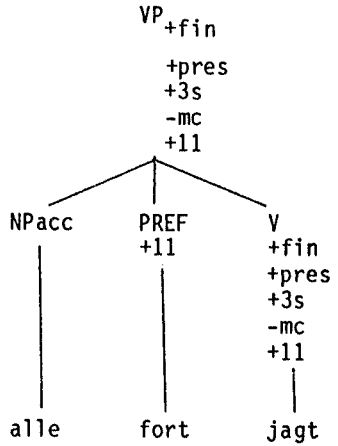
(14)



This is the structure of the VP in (8), though of course (8) actually contains a CVP/NPnom. In case the feature [-mc] is instantiated, another LP rule becomes relevant (repeated below for convenience), and we derive the VP rule in (15):

(7.3) X < V_{+fin}
-mc

(15)



This is the structure of the VP in (9).

3.4 Fronting Formalized

The treatment of fronting, which was discussed extensively in 3.2.2 and 3.2.3 above, can now be formalized. To provide for fronting from dependent clauses, noted in 3.3.2, we will employ the apparatus for unbounded dependencies introduced in Gazdar (1982), that of derived "slash" categories. For all of the rules in the grammar, defining membership in categories α, and for all of the major constituent (i.e. frontable) categories β in German, we define the derived categories α/β:

Derived Categories Metarule

<n, $[_{\alpha}$ ...π...], F> --> <n, $[_{\alpha/\beta}$ ...π/β...], $\lambda x^*_{T(\beta)}$F>

In addition to this, we must provide for basic expressions in each of the categories β/β. These will all be phonologically null, and interpreted by the distinguished variables $x^*_{T(\beta)}$:

Traces

$\langle 99, [_{\beta/\beta}\ t\ ],\ x^*_{T(\beta)} \rangle$

Finally, we provide a linking rule to add the topicalized elements to sentences:

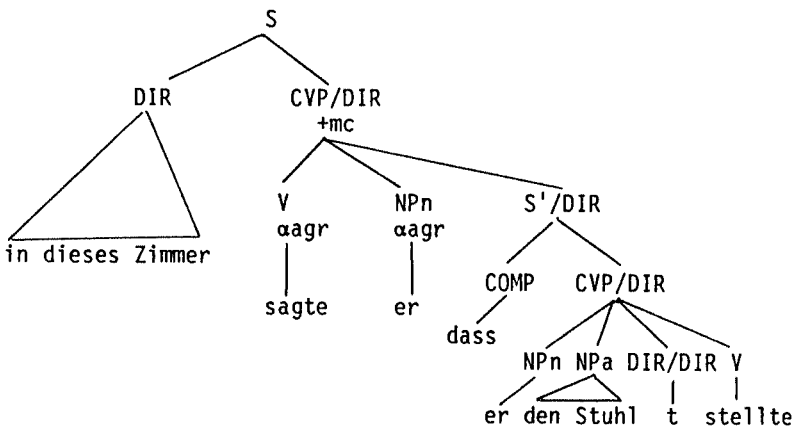
Linking

$\langle 100, [_{S}\ X_{-fin,}\ CVP/X_{+fin}\ ],\ CVP/X'(X') \rangle$

+mc; -clitic, -pref, αnom, αagr.; αagr

The general strategy employed here has been presented, but several of the details of the Fronting MR merit further discussion. First, fronting is at least normally limited to main clauses, as Fourquet (1971:159) pointed out. This is reflected in the feature [+mc] on the linking rule. Note at the same time that elements from subordinate clauses may be fronted to this matrix initial position because the system of derived categories automatically provides for configurations such as the one below:

(1)



The details of (1) are not included in the present fragment (nor is complementation of any sort), but the tree illustrates the principle

formalized in the Derived Categories Metarule that slash categories admit further slash categories, potentially extending the length between the topicalized element in first position and its expected untopicalized position beyond a single clause.

Second, there are nonfrontable elements, most notably finite verbs and clitics, e.g. the pronoun es and the "conversation" particles denn, doch, schon, and ja. Separable prefixes likewise do not undergo fronting. This is likewise reflected in features in the linking rule.

Third, the formulation of the semantics in the derived rule presupposes that the semantic place of the constituent to be fronted, β, has been filled by a variable of the appropriate type, $x^*_{T(\beta)}$. 'T(β)' denotes the semantic type of the syntactic term 'β.'

Fourth, this analysis accommodates the well-known fact that only single constituents may be fronted. Hoberg (1981), a large corpus study, confirmed this most recently.[13] This arises from the fact that there is no provision in the Derived Categories Metarule for more than a single missing element. Apparent sequences of constituents which may be fronted, such as Eine Geschichte erzaehlen in (2.1) in 3.3.1, are analyzed genuine constituents and therefore spurious counterexamples. Since the analysis allows that these unusual constituents may arise only when complements are added one at a time to the verb, it predicts that apparent sequences of fronted constituents will always contain a nonfinite verb, the exact generalization noted by Hoberg (1981:181) about these elements.

In addition to these clear empirical advantages of the present analysis, we may add that it is reasonably parsimonious about fronting. Nonfinite partial verb phrases are fronted by the same mechanism that fronts other constituents, namely the Linking rule above. Finally, we may note that the analysis makes a number of further predictions about partial verb phrases, notably about their conjoinability. For example, the analysis predicts that eine Geschichte erzaehlen may function as a constituent not only when it's fronted, but in nonfronted position, such as in (2), as well:

(2) Er hat ihr <u>eine Geschichte erzaehlt</u>
he AUX her a story tell(prt)
'He told her a story'

The analysis predicts then e.g. that this may be conjoined with like constituents, which it in fact may:

(3) Er hat ihr <u>ein Buch geschenkt</u> und <u>eine Geschichte erzaehlt</u>
he AUX her a book give(prt) and a story tell(prt)
'He gave her a book and told [her] a story'

Of course, this might be analyzed (even in this sysyem, but especially in others) as a sort of nonconstituent conjunction.

Before concluding this section, an example of the application of the rules involved in fronting:

(4) <11, [$_{PVP}$ PREF, V], PREF+V'> BR
-fin
-NPacc

<11, [$_{VP}$ NPacc, PREF, V], PREF+V'(NPa')> FAC
-fin

<11, [$_{CVP}$ NPn, NPa, PREF, V], PREF+V'(NPa')(NPn')> FAC
-fin +agr.
+agr

To this we apply the derived categories metar··le to obtain a main clause rule:

<11, [$_{CVP/NPa}$ NPn, NPa/NPa, PREF, V],
-fin +agr $\lambda x^*_{T(NP)}$(PREF+V')(x*)(NPn')>
+agr.
+mc

(Note that we have tacitly included the meaning of NPa/NPa in the

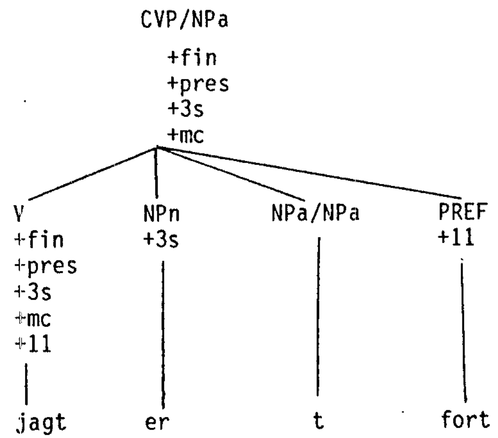
semantic rule above, rather than the NPa/NPa' that the rule actually calls for. The inclusion is justified, however, given BR 99, the Traces rule above, and it makes the formula easier to read.)

Anticipating the rules introducing tense and applying the relevant LP rules (repeated below for convenience), we derive the CVP rule in (5):

(7.1) V_{+fin} < X (from 3.3)
+mc

(7.2) X_{-verb} < V_{-fin}

(5)



The above subtree will be useful in connection with Linking Rule instantiations such as the following:

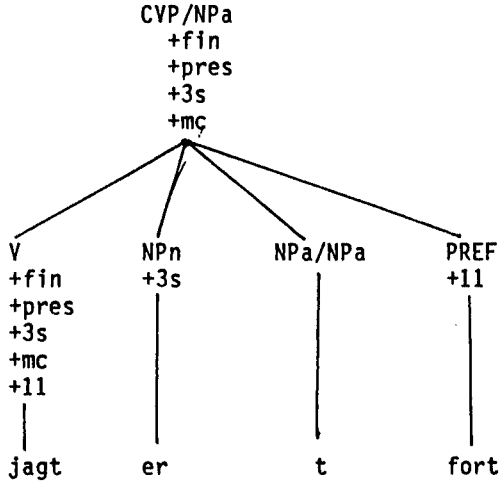
<100, [$_S$ NPa, CVP/NPa], CVP/NPa'(NPa')>
+mc

Anticipating the rules introducing tense and applying the relevant LP rules (repeated below for convenience), we derive the CVP rule in (5):

(7.1) $V_{\substack{+fin \\ +mc}} < X$ (from 3.3)

(7.2) $X_{-verb} < V_{-fin}$

(5)

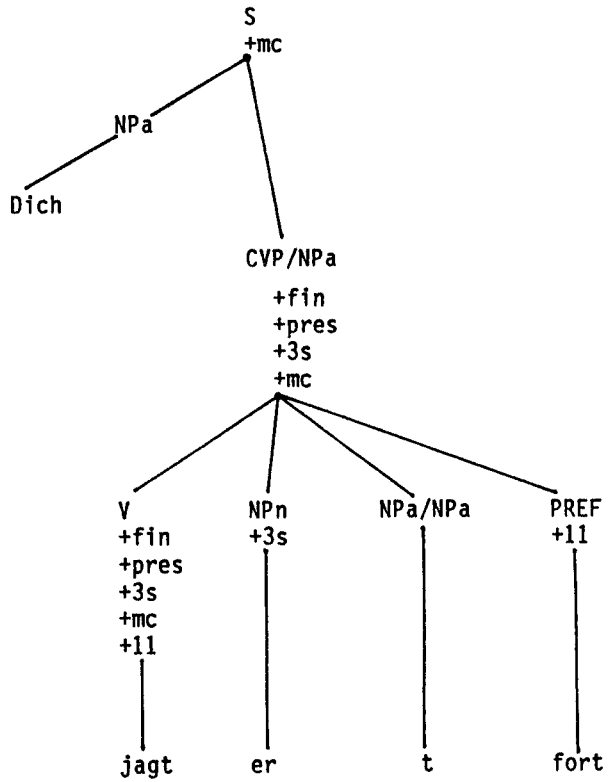


The above subtree will be useful in connection with Linking Rule instantiations such as the following:

<100, $[_{\substack{S \\ +mc}}$ NPa, CVP/NPa], CVP/NPa'(NPa')>

Together they admit the tree below:

(6)



Dich jagt er fort
you chase he away
'You, he'll chase away'

Ignoring the introduction of tense, we derive the following formula from the semantic rules associated with the Linking rule and the Derived Category rule above:

$\lambda x^*_{T(NP)}$(**fort+jag-'**)(x*)(**er'**) (**dich'**)

which, applying lambda conversion, we see is equivalent to:

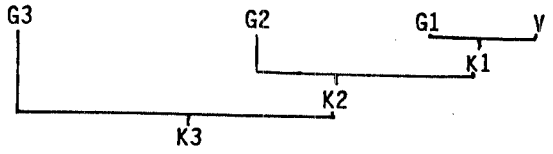
fort+jag-'(dich')(er')

This indicates that the fronting mechanisms are operating as desired.

3.5 The Analyses of Jean Fourquet

As pointed out in 3.4, the present analysis of fronting owes to Jean Fourquet (1971:159) the dependence of fronting on clause type. But Fourquet's general approach to analyzing the German clause as left-branching is also the nearest parallel to the postulation of the (phantom) PVP constituents advocated here. Fourquet (1971:159) postulates structures such as the following:

(1) der Koenig von Thule den Becher ins Meer werf-



The present proposal differs in allowing flat VPs as well as the contoured ones such as (1). But the conception here is indebted to Fourquet.

3.6 Two Strategies for the Treatment of Temporalia (in GPSG)

Although there might be any number of formalizations of the grammar of tense and temporalia in GPSG, they will all do one of two things. Either the treatment will allow the free generation of the various tenses (most likely in connection with maximally free feature

instantiation), or it will not, but will instead find some mechanism of introducing the various tenses in some special way. In the first case, we simply allow any of the features which mark tense to be used in any rule, and take care e.g. that the meanings we assign in the lexicon to those verbs marked [+pres] differ from those [+pret]. A rule interpreting the tense feature might be all that is required on this view, or, alternatively, one might describe the systematic relationship between the various tenses using a rule of tense marking, but in this case it would be a lexical rule. This approach has the advantage of treating tense at the level at which is marked--on the lexical unit verb.

In the second case, we introduce tense by syntactic rule, which seems more in keeping with its very regular and productive use.

Not GPSG alone, but in fact every framework, faces this decision. The choice will depend both on semantic scope relationships and on the shape of tense marking in a particular language. For example, if tense were marked with a sentence or VP adverb in some language, no one would feel compunction about introducing tense at that level. In a language such as German (or English), however, where tense is marked morphologically, one would be inclined much more toward a treatment of tense as a lexical category--a feature of, or an operation on, words. A lexical treatment of tense would amount to the free generation of tense syntactically.

The formulation of the BRs in 3.3.1 and 3.3.2 has removed the suspense from the present narrative: it should be clear that I have opted for the second alternative. All verbs are introduced here as nonfinite--but are deformed systematically by later rules to exhibit tense marking. There is a serious limitation to the first strategy which prompted this choice and which will be presented here. In fact, I argue for a somewhat more general conclusion: **in any semantically compositional framework tense must be introduced at the VP level** (or higher), barring the use of structures intermediate to syntactic constituent structure and semantic interpretation.

By some lights, this is a surprising result. Since tense in German is marked morphologically, one is inclined (as noted above) toward a lexical treatment. Indeed, according to the Generalized Lexicalist Hypothesis (LaPointe (1980:230)), a lexical treatment of German tense is required, not merely desirable:

Generalized Lexicalist Hypothesis: No syntactic rule can refer to an element of morpological structure.

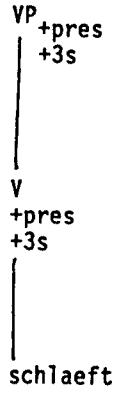
The GLH would allow lexical rules (LaPointe's "Lexically Restricted Frames") to refer to adjacent lexical items in syntactic trees, but would not allow them to refer to phrasal nodes such as the node dominating duratives. (Cf. 3.7.1 for BRs introducing duratives.) Any framework incorporating the GLH will therefore either eschew compositionality or will be committed to a level of structure between syntax and semantics. LaPointe's own theory adopts the first alternative--in its extensive references to properties of "logical form." Consult LaPointe (1979) for details of his proposed system. The import of the argument below is that such references are unavoidable once the GLH has been adopted.

The Generalized Lexicalist Hypothesis is therefore incompatible with semantic compositionality (without the postulation of structure intermediate to syntax and semantic composition). It also points to a larger issue. The GLH formalizes what might be called "Halle's morphology," which refuses to recognize a distinction between derivational and inflectional morphology. This section of the chapter shows the need--within semantically compositional frameworks--of reintroducing one important component of the inflectional/derivational distinction, viz. the need for syntactic rules to be able to refer to inflectional (but not derivational) morphology.

3.6.1 Tense as a Verb Operator

Suppose then that the BRs did not admit only untensed VP's, but that they allowed e.g. that Present or Preterite forms appear as well. Since we accept the degree of semantic compositionality which Bach (1976) terms the rule-to-rule hypothesis, we require that a model-theoretic interpretation be assigned to the constituent admitted by these rules. Let us examine one such rule, in order to illustrate the problem concretely.

(1) $\langle 2, [_{VP}{}_{+pres}\ V_{+pres}\ ],\ \pi \rangle$



We argued in Chapter 1 that the meaning of the Present tense can be appropriately rendered by the tense logical constant PRES. We should therefore represent the meaning of the constituents introduced by BR 2 in (1) in the following way:

(2) $\lambda x \mathrm{PRES}(V'(x))$

The difficulty arises in consideration of optional temporal modifiers, such as the durative stundenlang. As noted in 2.4, duratives must be assigned narrower scope than tense. Modifiers are introduced via MR's in GPSG, which suggests the following sort of MR for duratives:

(3) <n, [$_{VP}$ ...], F> --> <n, [$_{VP}$ ...DUR...], π>

The difficulty lies in replacing the 'π' with a coherent semantics. Any attempt to provide the semantics in (3) will have to be able to reach within the Present tense operator in (2) and will thus be noncompositional (if the verb is already tensed). Nor can the formulation of the noncompositional rule be straightforward. We could not e.g. simply write: find the tense operator in F and insert the durative operator immediately to its right. Nor could we simply look for the first such operator--there may be more than one, as in the case of a conjunction:

(4) ...dass sie lange sangen und tanzten.
COMP they long sang and danced
'...that they sang and danced for a long time'

The required formulation is clear enough: the durative operator must be inserted immediately to the right of the tense operators associated with the main verb(s) of the verb phrase. The rule is thus not only noncompositional, but it requires as well that (some) syntactic features be retained in the semantic interpretation (viz. an indication of which verb(s) are main verb(s)). This is an unlikely looking violation of the principle of autonomy of components.

One solution to this problem would be to postulate a level of structure between syntactic constituent structure and semantic composition. This might be the level of "functional structure" in Lexical Functional Grammar (LFG), for example. Halvorsen (ms) presents a semantics for LFG which composes model theoretic interpretations from functional structures (once these have been composed from syntactic phrase structures). Tense is factored out of verbs in functional structure (Halvorsen (ms: 2-3)), so that there should be no difficulty in accounting for the correct interpretations of tense even if one

treated tense as a verb operator, in LFG. The question to be pursued here is whether one can assign the correct interpretation without using an additional level of structure.

It is worth pausing to review the general lines of the above argument. Some temporal features, e.g. tense, are marked directly on verbs. If one allows all the VP rules to generate all the possible morphological forms of verbs, then tensed forms will be among them and will require interpretation. Optional elements, e.g. temporal adverbs, will not be present, however, and so will not be incorporated in this first step of interpretation. Instead, they will be added to interpretations in which tense is already represented, and, given the way in which semantic interpretations are normally constructed, they will automatically be assigned wider scope than tense. This yields a dilemma: either all morphological features are interpreted as having narrower scope than all optional elements (which is false in the case of tense vis-a-vis duratives and frequentatives) or mechanisms must be developed which can restructure the natural scope relations. But this is always noncompositional and often messy. One can, however, avoid the dilemma by relinquishing the free generation of all tensed forms in basic rules.

All of this indicates quite strongly that tenses should be introduced after the introduction of duratives, i.e. at the VP level or higher. Carlson (ms.) makes the same point based on the need to assign tense scope over some noun phrases, which assumption Enc (1981) has at least seriously challenged.

There is one remaining unexamined assumption in this argument, however, which ought to be considered: the argument assumes, namely, that duratives etc. must be analyzed as VP modifiers, and not as complements (semantics arguments) of verbs. Couldn't duratives be reanalyzed as required complements for which a place would automatically be held in semantic interpretation, so that the scope relations could be an automatic consequence of the the lexical meaning of the verb.

Excursus: On Duratives (and Frequentatives) as Complements to the Verb

At first blush one might very well think so. For the sake of precision, let's provide some formal flesh to this proposal. Briefly, it foresees that will be subcategorized to take, in addition to its customary nominal or adverbial complements, at least one temporal adverbial. The BR's must be modified appropriately. For example, (8) in 3.3.1 would read:

(5) <2, [$_{VP}$ V], V'> : schlafen, lachen,...
-TEMP

<3, [$_{PVP}$ V], V'> : lieben, treffen, bauen,...
-TEMP
-NPacc

Duratives and Frist-adverbials will be added via the usual MR's for adding complements, CAC-MR and FAC-MR. There must of course be a zero element in each category, so that we may regard the complements as present even while they remain inaudible. The semantics of the basic verbs (and VP's built up from them) would also have to be adjusted. In place of the n-place predicates which until now have been associated with basic (P)VP's, we should, for each such predicate, define an n+1-place predicate, with the new place reserved for a temporal adverbial. Suppose for example that for every n-place predicate v associated with a basic (P)VP, we define an n+1 place v_T with the following semantics:

(6) $A_{s,r,e} \models v_T(x_0)(x_1)\ldots(x_n)$ iff $A_{s,r,e} \models x_0(v(x_1)\ldots(x_n))$

Note that this effectively gives elements of the complement category (interpreted by x_0 above) narrower scope than all other temporal elements--since the others will be added as sentence operators to atomic sentences such as $v_T(x_0)(x_1)\ldots(x_n)$.

Tense would then be added as a MR on lexical verbs. (This relinquishes the free generation of tensed forms, but it retains a lexical treatment. I don't see how a "free generation" treatment could work.) It would have to have the effect of deriving (7) from (5).

(7) <2, [$_{VP}$ V], $\lambda x_{TEMP}\ \lambda y$ PRES(v_T'(x)(y))>
-TEMP
+pres

<3, [$_{PVP}$ V], $\lambda x_{TEMP}\lambda y\lambda z$PRET($v_T$'(x)(y)(z))>
-TEMP
-NPacc
+pret

Crucial is the feature [-TEMP] here, which ensures that some temporal adverbial--perhaps null in realization--must be added to (2) and (3), and (given the semantics) that it must be quantified in within the scope of tense.

The complement-adding MRs may then be applied to derive the rules in (8):

(8) <2, [$_{VP}$ TEMP, V], λyPRES(v_T'(TEMP')(y))>
+TEMP
+pres

= λyPRES(TEMP'(V'(y))), semantically

<3, [$_{PVP}$ TEMP, V], $\lambda x\lambda y$PRET(v_T'(TEMP)(x)(y))>
+TEMP
+pret
-NPacc

= $\lambda x\lambda y$PRET(TEMP'(V'(x)(y))), semantically

The required scope relations have been realized in (8).

This has been achieved, however, at the cost of the introduction of new semantical apparatus, the predicates 'v_T,' and new syntactic mise en scene, the null realization of indefinite temporal adverbials (to account for the optionality of these adverbials once they have been given the status of complements). In addition, since we analyze optional adverbials as complements, we can no longer regard optionality as proof of modifier status. Thus an interesting empirical claim has been relinquished as well.

If this were not enough to bias one against the analysis of tense as a verb operator, rather less tractable problems arise when one considers the iterability of these temporal adverbials. Duratives and frequentatives are not limited to a single occurrence per clause as BR's 2 and 3 above might suggest:

(9) Schon zwei Jahre besucht er uns jede Woche eine Stunde
already 2 years visit he us every week an hour
'He has visited us an hour every week for two years'

Er hat uns zweimal eine Woche lang jeden Tag vier mal angerufen
he AUX us two-time a week long every day four time call
'He's called us four times a day for a week twice'

This is particularly inappropriate under the view that duratives and frequentatives function as members of the same category (cf. 2.4-2.5). In that case the sentences in (9) represent three ard four iterations of the single category TEMP.

But even a single iteration is an irreparable embarrassment for the view that these are complements. Iteration is not only regarded as uncharacteristic for complements, it presents formidable technical problems as well. Since complements do not in general iterate, the admission of one iterable category would require a split in syntactic

treatments--one for standard complements, one for iterables. We work ourselves into a semantic cul de sac as well because the addition of a temporal adverb to a verb should, under the complement view, yield a unique predicate--just as every function should yield a unique value when applied to a particular argument. But applying the function represented by the verb besuch- to its putative durative argument seems to yield two functions--one which takes two NP arguments to form a proposition, and one which takes the NP arguments and a frequentative argument (and possibly another durative and then possibly still another frequentative argument). There isn't a recognizable sense in which this could be regarded as functional application.

There does not seem to be a plausible way to maintain an analysis of duratives (and frequentatives) as complements to the verb, and therefore to save the analysis of tense as a verb operator.

3.6.2 Tenses as Phrasal Operators

The analysis of tenses as verb operators looks even worse when one considers that there is a straightforward syntactic treatment of the scope relations between tense and duratives. We write the BR's so that no tensed elements can be introduced, i.e the BR's admit only constituents whose verbs are not semantically tensed. Duratives, and other elements with scope narrower than tense are admitted via MR's which operate exclusively on untensed rules (in this case, simply those marked [-fin]). Tense-introducing MR's change this feature to [+fin], ensuring that duratives etc. cannot subsequently be introduced. Finally, those elements whose temporal scope seems wider than tense, e.g. frame adverbials, are introduced via MR's which operate on tensed rules. In each case, the semantics associated with the rule simply attaches an appropriate operator, so that the meaning of the derived rule is obtained compositionally.

If we e.g. introduced tense as a VP operator, following Bach, the meaning would simply be λxOPERATOR'(VP'(x)), where VP' is the meaning of the constituent which would have been introduced by the input rule. Bach (1980) suggested the use of the lambda operator in the above fashion as a means of introducing tense and aspect in order to reconcile the apparent sentence scope of tense (and aspect) operators with the fact that they regularly appear on verb phrases. His remarks apply equally well to German with the minor adjustment (within the present framework) that we introduce tense not on VP's, but on CVP's, in order to be able to introduce tense even where we find no VP (=PVP_{-NPnom}), i.e. on impersonal constructions such as the impersonal passive (discussed in 3.2 above).

As semantically elegant as the VP (or CVP) analysis might be, it appears nonetheless to run into a syntactic problem. There are subconstituents within the VP which bear tense marking--which would seem to indicate that tense ought to be introduced at the level of these constituents (or lower). In order to demonstrate the difficulty, we shall state the tense-introducing MR on CVP's:

(1) Tense MR

$$\langle n, [_{CVP\ -fin} \ldots], F\rangle \dashrightarrow \langle n, [_{CVP\ +fin\ +pres} \ldots], PRES(F)\rangle$$

$$\langle n, [_{CVP\ +fin\ +pret} \ldots], PRET(F)\rangle$$

The operators PRES and PRET have the semantics described in 2.3 and 1.6, which will not be repeated here. The **Head Feature Convention** (HFC) ensures that the feature [+pres] will be passed from the CVP node to the lexical head of the CVP constituent, the verb. The lexicon then provides possible forms for the feature bundles:

(2)	verb	e.g.	verb
	+n (subcat. class)		+2
	+pres (tense)		+pres
	+x person		+3per
	±singular		+sing

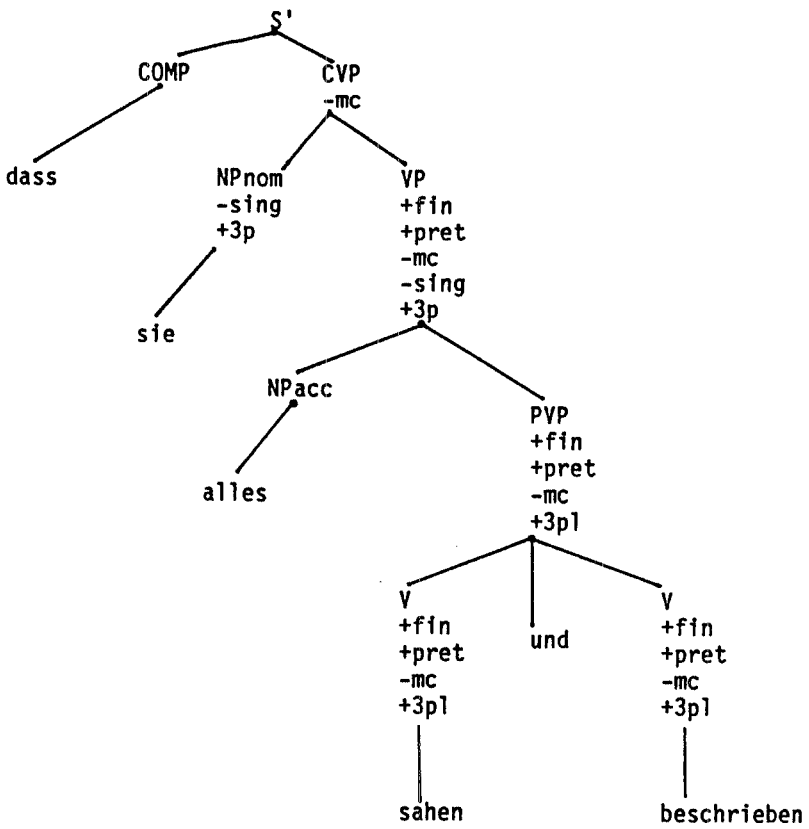
In this example, these would include schlaeft, lacht, and existiert. (Cf. BR 2.) The lexicon thus provides the correct morphological form in toto, leaving no work for late "spelling rules." This ensures that the proposal respects Brame's "spelling prohibition," and is consistent with the hypothesis of a limited interface between grammatical components.

The fact that there are subconstituents within the CVP which regularly exhibit tense marking (viz. verbs) may be felt to show that tense is therefore a verb category rather than a verb phrase category. It shows no such thing, however. The fact that tense marking is not on CVP's, but on verbs, just as person and number marking is on verbs, does not prevent tense from having important ramifications beyond the verb, just as person and number marking does. This is agreement in the case of person and number marking and semantic scope in the case of tense. The HFC ensures that a feature required on CVP's automatically make its way onto the word it is to mark. The HFC allows that tense may be introduced at the CVP level (by MR) but realized as specific verb features (and ultimately, particular shapes of verbal stems). There is thus no discrepancy between the proposal that tense be accounted for via a CVP MR and the existence of elements within the CVP where tense marking is consistently realized.

The case for analyzing tense as a verb operator does not improve with the observation that the subconstituents which bear tense marking are conjoinable, and therefore all the more robustly constituents. Finite verbs are eminently conjoinable:

(3) ...dass sie alles sahen und beschrieben
COMP they all saw(3p) and described(3p)
'...that they saw and described everything'

(3')



Nor is there any difficulty accounting for the conjunction node in (3'), though again there might appear to be at first blush. It is simply an instance of the conjunction schema--which allows the conjunction of any two identical category labels, including nonbasic ones, as in this case.

If the existence of subconstituents with tense marking doesn't prove that tense ought to be introduced below the CVP level, then neither does the existence of conjoined subconstituents with <u>different</u> tense. These examples are very easy to find for VP's:

(5) for any NP denoting a duration (in A), the following rule is available:

<202, $[_{DUR}$ NPacc (lang)], d(NP')>, where d(NP') is that function, which, for any model A, proposition p, and times s,e, and r

$A_{s,e,r} \models (d(NP'))(p)$ iff there is a e' such that
1. e is a final subinterval of e'
2. e' is at least $[NP']_A$ long
3. $\forall i \subseteq e'$ $A_{s,i,r} \models p$.

(5) may seem to illicitly appeal to a semantic well-formedness condition in specifying that BR 202 is applicable only to NP's denoting durations. It may just as well be formulated so that the syntax is blind to semantics: clause (2) of the definition of d(NP') then rules out the interpretation of NPs which do not denote durations.

It seems that there are no lexical items in the category of Frist adverbials, but (6) provides for phrases in this category.

(6) <203, $[_{FRIST}$ $PP_{+inFRIST}$], PP'>

<204, $[_{PP}$ $PREP_{+inFRIST}$ NP_{+dat}], PREP'(NP')>
+inFRIST

204: <u>in</u>

<u>in</u> is the only element in lexical category 204. It is furthermore semantically distinct from locative (and other) instances of <u>in</u>. The lexical semantics of <u>in</u> is responsible for the truth conditions of these adverbials (which were sketched, and defended, in 2.5 above). Its meaning is defined only for those cases in which it combines with NPs denoting durations. Its combinations with other NP's are anomalous (but subject to misinterpretation because of the homophonous prepositions).

(7) in_{+FRIST}' is that function f which takes as arguments durations and yields as values propositional operators, so that for any duration d, proposition p, in all models A at all times s,e, and r:

$A_{s,e,r} \models (in'(d))(p)$ iff e is at most d in length and $\exists i \subseteq e$ such that $A_{s,i,r} \models p$.

Cf. the discussion in 2.5.

Further sorts of narrow scope temporal adverbs might be introduced in the same manner. The strategy should be clear from these two examples, however, so that we might best turn to rules introducing other temporal elements in order to see how the entire system is coordinated. The nonperfect tenses were introduced in (1) in 3.6.2 and needn't be repeated here. (These were singled out for syntactic reasons--they involve no auxiliary verbs, unlike the Perfect tenses.)

3.7.2 Frame Adverbials (that Modify Reference Time)

The MR in (1) introduces frame adverbials (of the sort that modify reference times) into the current fragment:

(1) Frame MR

$\langle n, [_{CVP}\ \ldots\ ], F\rangle \dashrightarrow \langle n, [\ldots FRAME \ldots], FRAME'(F)\rangle$
$\quad\quad +fin$

These adverbials are thus introduced semantically as propositional operators (as 2.1 suggested might be needed), while they fall under the CVP node syntactically. The feature [+fin] disallows the addition of frame adverbials to structures which haven't incorporated tense. Its inclusion on the left side of (1) effectively guarantees that frame adverbials have wider scope than tense, which accords with the discussion in 2.1 of the semantics of frame adverbials vis-a-vis tense. The class of frame adverbials includes the primitives gestern, heute, and morgen. These must be included in the lexicon:

(2) $_{FRAME}$: gestern, heute, morgen,...

The semantic interpretation of these lexical primitives will of course also be provided in the lexicon. We will treat their semantics much as we do the semantics of more complicated expressions. In general, frame adverbials may be said to be associated with a time interval; e.g. morgen is associated with the day after speech time, etc. (In such simple cases we are even tempted to say that it simply denotes the time interval.) To describe the semantics of this sort of frame adverbial, a rule like the following suffices:

(2') the semantic interpretation of morgen, used as a frame adverbial, is that function FRAME(**morgen**'), such that for any model A, proposition p, and times s,e, and r:

$A_{s,e,r} \models FRAME(\textbf{morgen}')(p)$ iff $r \subseteq [\textbf{morgen}']A_{s,e,r}$ and $A_{s,e,r} \models p$.

Similarly for the interpretations of heute, gestern, etc. This is, of course, the way these frame adverbials were informally described in 2.1 above.

(2') is the rule we shall adopt, even though it would certanly run into difficulties with other sorts of frame adverbials. Since unfortunately not all frame adverbials are as specific as morgen, it is peculiar to regard them as associated with a time interval. Consider, for example, an jedem Samstag 'on every Saturday.' This would have to be associated in one way or another with times that fall within every Saturday; the times involved clearly would not constitute an interval, and worse, they could not even effectively be dealt with as a set of points of time (without some extensive apparatus), since this tack would not distinguish 'every Saturday' from 'one Saturday.' And in such a case, it won't be possible to assign an interval to $[\textbf{am-Samstag}]A_{s,e,r}$.

Dowty (1979:325f) provides a method for dealing with frame adverbials of this sort, but we won't attempt to generalize it for use in

this work since, as noted above, we don't attempt to include propositions about iterated events in this work. It is, moreover, clear that any such attempt to generalize Dowty's method for application here would require careful accommodation of the concept of reference time: it would be unreasonable to conceive of there being a set of reference times included in the model as temporal parameters only in order to then be used in connection with propositions about iterated events.

We shall therefore content ourselves with the approximation in (2'), and continue with the semantics of other elements in this category, including nonbasic elements. Nonprimitive expressions in this category include am Montag, um vier Uhr, in der Woche nach Weihnachten, im Dezember, and in 1983. These demonstrate the need for rules such as the following:

(3) $\langle 211, [_{\text{FRAME}}\ \text{PREP}_{+an}\ \text{NPdat}\ ],\ \mathbf{an}_T'(\text{NPd}')\rangle$

$\mathbf{an}_T'$ is the meaning of the temporal an, distinct from the locative. Its semantics are as follows:

(4) $\mathbf{an}_T'$ is that function which takes as arguments days and has as value, for every day d, in every model A, and with respect to every proposition p, and times s,e, and r, that function f such that

$$A_{s,e,r} \models f(p) \text{ iff } r \subseteq d \text{ and } A_{s,e,r} \models p.$$

The combination of the temporal an with an expression which does not denote a day is semantically undefined in (4). It may be regarded as ill formed (since it is therefore anomalous). It should be noted that (4) does not specify how certain NP's come to denote days; that they do may be taken as a reasonable starting point, however. ((4) very definitely does not presuppose that NP's denote days nonindexically. We may easily allow that NP's are interpreted with respect to any or all the parameters s,r, or e. The first two are clearly required.)

The syntax of (3) is remiss in not providing an account of the an/am allomorphy. This is a fairly complicated matter, however, as

the pattern in (5) might suggest:

(5) an dem Tag (emph.)	an dem Montag (emph.)
am Tag	am Montag
an dem Tag (unemph.)	* an dem Montag (unemph.)

Cf. Schaub (1979) and references there for a more complete discussion of these issues. We will not concern ourselves further with the matter here. an will simply be written as am before the names of the days of the week.

We proceed similarly for the other prepositional phrases which function as frame adverbials. For example, um:

(6) $\langle 212, [_{\text{FRAME}}\ \text{PREP}_{+um}\ \text{NPacc}\ ],\ \mathbf{um}_T'(\text{NPa}')\rangle$

$\mathbf{um}_T'$ is that function which takes as arguments times of the day and has as value, for every time T, with respect to every A, p, s, e, and r, that function f such that:

$$A_{s,e,r} \models f(p) \text{ iff } r \in \{i \mid \exists t' \in T\, t' \subseteq i\} \text{ and } A_{s,e,r} \models p.$$

The definition presupposes that T may denote a time of day--that is, the same time on every day. It is unlike other temporal constants used thus far in that it doesn't denote a specific time, such as 2 pm on Sept. 26, 1983, but rather 2 pm on every day.

Vor is somewhat more interesting in that it takes durations as arguments and yields frame adverbials as values. To define the semantic effects of vor, we first need to define the notion of interval bound by a and b, (a,b):

Definition. For a and b intervals such that a<b
$(a,b) = \{t \mid \forall t_1 \in a \forall t_2 \in b(t_1 < t < t_2)\}$ (read: the interval between a and b)

As the definition stands, (a,b) might be either an open or a closed (or half-open, or half-closed) interval, depending on a and b. This

will play no role in the use of the concept here.

Below is then the rule introducing vor, and its lexical meaning:

(7) $\langle 213, [_{FRAME}\ \ PREP_{+vor}\ \ NPdat\ ],\ \mathbf{vor}_T'(NPd')\rangle$

$\mathbf{vor}_T'$ is that function which takes durations as arguments and has as value, for every duration d, and every A, p, s, e, and r that function f such that

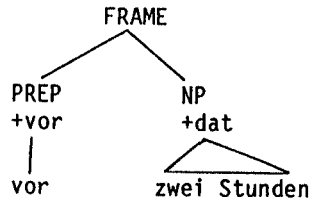
$A_{s,e,r} \models f(p)$ iff $r \in \{t \mid t<s \wedge (t,s)$ is length $d\} \ \&\ A_{s,e,r} \models p$

(vor is also interpreted to locate event time, in which case its semantic rule is somewhat different. Cf. 4.2 for an explication of this.) To see the import of BR 213, we examine the derivation below. We assume that zwei Stunden is a dative NP, and that it denotes the duration two hours.

(8) $\langle 213, [_{FRAME}\ \ PREP_{+vor}\ NPdat\ ],\ \mathbf{vor}_T'(NPd')\rangle$

The rule in (8) admits the subtree below:

(9)



This will be assigned the interpretation below (by the semantic part of the rule in (8)):

$\mathbf{vor}_T'(\mathbf{zwei\text{-}Stunden}')$

Since **zwei-Stunden'** is by assumption the duration two hours, the above is equivalent to that function f, such that, for all A, s,e,r, and p:

$A_{s,e,r} \models f(p)$ iff $r \in \{t \mid t<s \wedge (t,s)$ is two hours in duration$\}$ and $A_{s,e,r} \models p$.

The effect of adding frame adverbials to verb phrases in combination with tense and other sorts of temporal adverbials is illustrated in the following section, 3.8.

Before closing this section, we should note how combinations of frame adverbials will be treated. This is quite straightforward semantic, and involves only one minor additional rule syntactically. To begin, let us note that one way of introducing combinations of frame adverbials is quite straightforward. We simply apply the Frame Adverbial MR iteratively. The following is quite legitimate:

(10) $\langle 2, [_{VP}\ \ V\ ],\ V'\rangle$: schlaf-
-fin

$\langle 2, [_{CVP}\ NP_{+nom},\ V_{+agr}\ ],\ V'(NPn')\rangle$ FAC MR
-fin +agr

$\langle 2, [_{CVP}\ NPn,\ V_{+agr}\ ],\ PRES(V'(NPn'))\rangle$ Tense MR (3.6.2)
+fin +agr
+pres

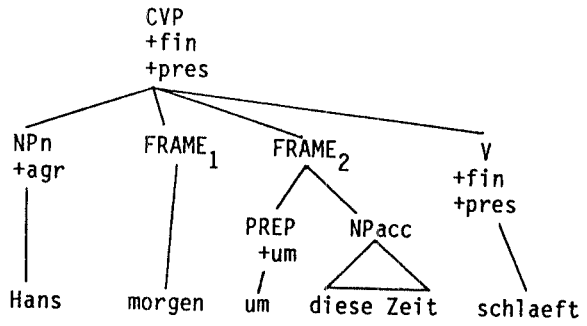
$\langle 2, [_{CVP}\ FRAME_1,\ NPn,\ V_{+agr}\ ],\ FRAME_1(PRES(V'(NPn')))\rangle$ Frame MR
+fin +agr
+pres

$\langle 2, [_{CVP}\ FRAME_1,\ FRAME_2,\ NPn,\ V_{+agr}\ ],$
+fin +agr
+pres
$FRAME_2(FRAME_1(PRES(V'(NPn'))))\rangle$

The notation above is nonstandard: the subscripts have been added to clarify the workings of the metarules. They are not required to preserve semantic scope relationships, and they are certainly not standard practice in GPSG.

The final rule in the above derivation justifies the subtree

below:



Using the semantic part of the final rule above, we can verify that iterative application is indeed properly provided for. We examine the sentence:

(11) ...dass Hans morgen um diese Zeit schlaeft
COMP tomorrow at this time sleep(pres)
'...that Hans will be sleeping tomorrow at this time'

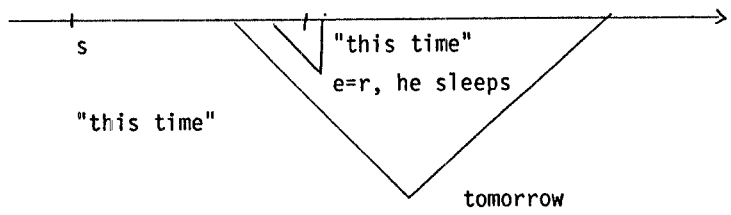
We assume that diese Zeit denotes the hour of the day as of speech time (more exactly, the set of times each of which includes a time whose hour of the day conincides with speech time). Then the semantic interpretation of (11) may be determined as follows:

(11') $A_{s,e,r} \models$ (11) iff

$A_{s,e,r} \models (\mathbf{um}_T\text{'}(\mathbf{diese\text{-}Zeit}'))(\mathbf{morgen}'(\mathrm{PRES}(\mathbf{schlaf}\text{-}'(H))))$
iff
$r \in \{i \mid \exists t' \in [\mathbf{diese\text{-}Zeit}']A_{s,e,r}$ and $t' \subseteq i\}$
and $A_{s,e,r} \models \mathbf{morgen}'(\mathrm{PRES}(\mathbf{schlaf}\text{-}'(H)))$
iff
t' $[\mathbf{diese\text{-}Zeit}']A_{s,e,r}$ and $t' \leq r$ and $r \subseteq$ day following s
and $A_{s,e,r} \models \mathrm{PRES}(\mathbf{schlaf}\text{-}'(\mathbf{er}'))$

iff
" " " " " " " " " " " "
and e=r-<s and $A_{s,e,r} = \mathbf{schlaf}\text{-}'(H)$

Thus (11) is true in situations such as the following:



The iterative application of the Frame Adverbial MR thus amounts to multiple modification of reference time, and presents no semantic difficulties (as asserted in 2.1 above). We note here again that the relative scope of the adverbials is irrelevant. This may be seen in the above derivation: had we evaluated $\mathbf{morgen}'(\mathbf{um}_T(\mathbf{diese\text{-}Zeit}'))(p)$ rather than $(\mathbf{um}_T(\mathbf{diese\text{-}Zeit}'))(\mathbf{morgen}'(p))$, we would have to switch the order of the first two conjuncts in the final line of the derivation above, but there would be no change in the set of conjuncts.

There is, however, a syntactic inadequacy of the treatment thus far, namely the failure to allow such multiple frame adverbials constituent status, which is required to generate sentences such as the following:

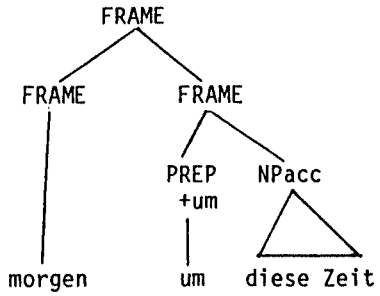
(12) Morgen um diese Zeit schlaeft er
tomorrow at this time sleep(pres) he
'He'll be sleeping tomorrow at this time'

We may introduce such compound frame adverbials with the following rule:

Compound Frame Adverbial MR

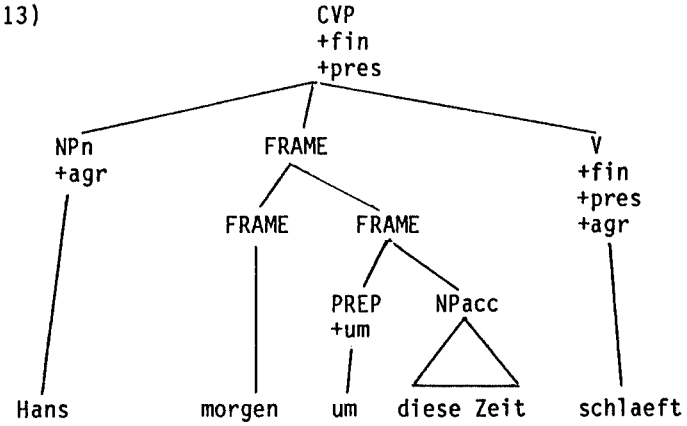
<214, [$_{FRAME}$ $FRAME_1$, FRAME2, ... $FRAME_n$],
λp($FRAME_1$($FRAME_2$(...($FRAME_n$(p))...)))>

BR 214 justifies the subtree below:



This might have been used e.g. in connection with the rule derived in the third step of the derivation in (10) above. This would legitimate the subtree below:

(13)



The interpretation of this structure, prescribed in the same rule, is straightforward, once BR 214 is incorporated.

FRAME(PRES(V'(NPn'))) 3rd rule in (10)

FRAME = λp(**morgen'**((**um$_T$**(**diese-Zeit'**))(p))) BR 214, 210, 212

λp(**morgen'**((**um$_T$**(**diese-Zeit'**))(p))) (PRES(**schlaf-'**(H)))

morgen'((**um$_T$**(**diese-Zeit'**))(PRES(**schlaf-'**(**er'**))))

The above formula is exactly that whose truth conditions were derived in (11') above, except that the relative scope of **morgen'** and **um$_T$**(**diese-Zeit'**) has been reversed. But since the relative scope of frame adverbials is immaterial to truth conditions (as noted above), this means therefore that the above formula is equivalent to the one evaluated in (11'), which seems correct.

This concludes the discussion of temporal adverbials. It will be resumed in 4.2 and 4.3, and the interaction of temporal particles and temporal adverbials will be taken up in 3.9.

3.8 Some Derivations

In order to best appreciate the effects of the rules introduced in 3.7, some derivations should be examined. Beginning with BR 15, we apply the Flat Adding of Complements MR (FAC-MR) and the Tense MR:

(1) <15, [$_{PVP}$ PREF, V], PREF+V'> --> (FAC-MR)
-fin
-PPauf

<15, [$_{VP}$ PP_{+auf}, PREF, V], PREF+V'(PP')> --> (FAC-MR)
-fin

<15, [$_{CVP}$ NPn, PP_{+auf}, PREF, V_{+agr}], PREF+V'(PP')(NPn')>
-fin +agr
--> (TEMP-MR)

<15, [CVP -fin TEMP, NPn +agr, PP+auf, PREF, V+agr],
TEMP'(PREF+V'(PP')(NPn'))>
--> (TENSE-MR)

(2) <15, [CVP +fin +pret TEMP, NPn +agr, PP+auf, PREF, V+agr],
PRET(TEMP'(PREF+V'(PP')(NPn')))>

To this we apply the Derived Categories Metarule, obtaining:

<15, [CVP/NPn +fin +pret TEMP, NPn/NPn +agr, PP+auf, PREF, V+agr],
λx*T(NP)(PRET(TEMP'(PREF+V'(PP')(x*))))>

Ignoring the relative position of the NPn/NPn trace, the LP rules allow only two PSR's to be associated with this last ID statement, one of which is provided with (4). The relevant LP rules are repeated in (3) for convenience. (Recall that prefixes are nonfinite verbs in feature specification.)

(3) V+fin +mc < X X-verb < V-fin

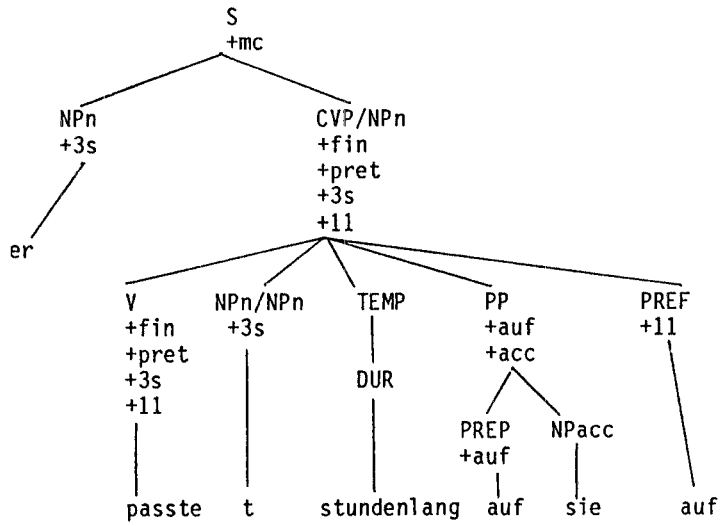
(4) <15, [CVP/NPn +fin +mc +pret V+agr NPn/NPn +agr TEMP PP+auf PREF],
λx*T(NP)(PRET(TEMP'(PREF+V'(PP')(x*))))>

(Given our LP statements thus far, the prepositional phrase might have preceded the temporal adverbial in (4); ignoring the NPn/NPn trace, there is no other possibility.) The Linking rule schema includes:

<100, [S +mc NPn +agr CVP/NPn +agr], CVP/NPn'(NPn)>

The following tree is thus allowed:

(5)



Er passte stundenlang auf sie auf
he watched for hours on them PREF
'He watched them for hours'

BR 100 and (2) above allow us to derive the semantics associated with (5), represented by (6):

(6) λz*T(NP)(PRET(TEMP'(**aufpass-**'(**sie**')(z))) (**er**')

From BR 200 we know that TEMP' = DUR' (= **stundenlang**'). We may also simplify the λ-expression in (6), to obtain (7), whose truth conditions are derived in (8):

(7) PRET(**stundenlang**'(**aufpass-**'(**sie**')(**er**')))

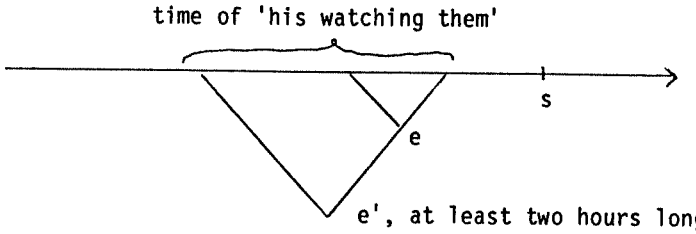
(8) $A_{s,e,r} \models$ (7) iff e=r<s and $A_{s,e,r} \models$**stunl**'(**aufpass-**'(**sie**')(**er**))
(def. of 'PRET,' 1.6)

iff e=r<s and there is an e' such that

1. e is a final subinterval of e'
2. e' is at least two hours long
3. $\forall i \subseteq e'\ A_{s,i,r} \models$ **aufpass-'(sie')(er')**

The sentence in (5) holds then in the following sort of situation:

(9)



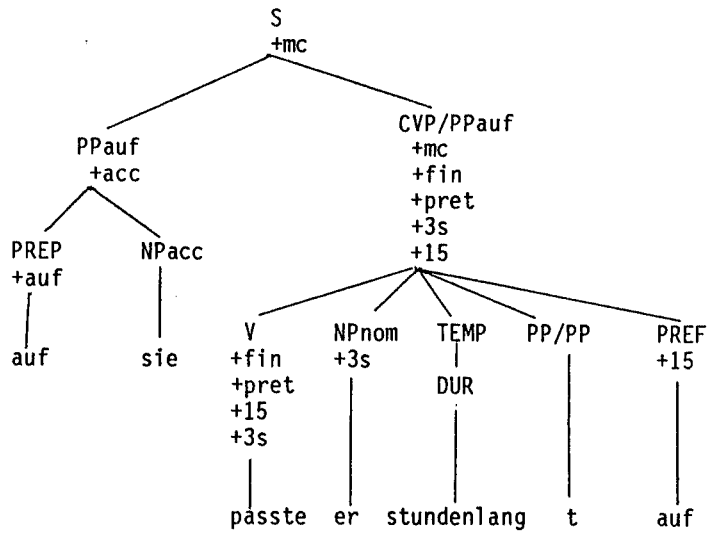
The tree in (5) employs the English-like subject-predicate word order, but we might just as easily have derived a sentence with a different "fronted" constituent. This would be accomplished by applying the Fronting MR, somewhat differently to (2) above; this may yield (10), which complements (11), another instance of the linking schema:

(10) $\langle 15, [_{\substack{\text{CVP/PPauf} \\ \text{+fin} \\ \text{+pret}}}$ TEMP, NPnom, PPauf/PPauf, PREF, V_{+agr}], $\lambda x^*_{T(PPauf)}$(PRET(TEMP'(PREF+V'(x)(NPn'))))$\rangle$

(11) $\langle 100, [_{\substack{\text{S} \\ \text{+mc}}}$ PPauf, CVP/PPauf], CVP/PP'(PP')$\rangle$

Together, these admit the tree in (12) with the interpretation in (13):

(12)



Auf sie passte er stundenlang auf
on them watched he for hours PREF
'He watched them for hours'

(13) $\lambda x_{T(PPauf)}$ (PRET(**stundenlang'**(**aufpass-'**(x)(**er'**)))) (**sie'**)
PRET(**stundenlang'**(**aufpass-'**(**sie'**)(**er'**)))

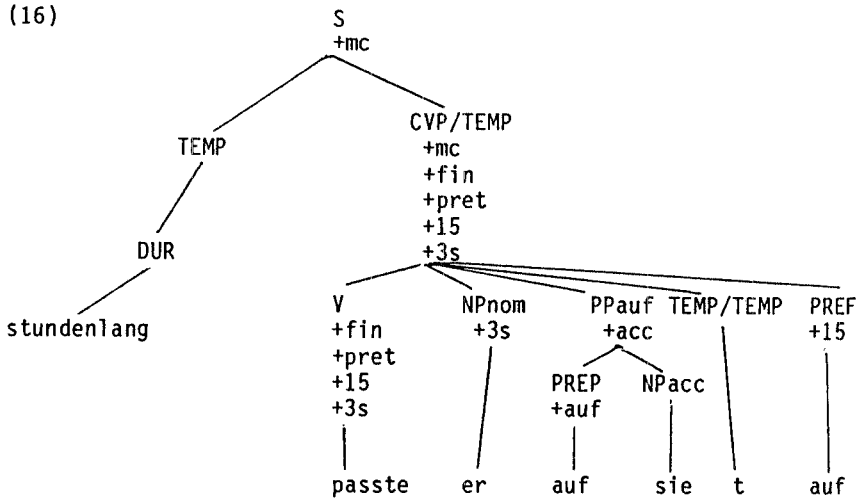
(13) is identical to (7), so that the sentences thus analyzed are provably equivalent.

We might equally well have applied the Fronting MR's to the CVP rule in (2) to create (14), and have instantiated the fronted schema as in (15), both of which may combine to admit the tree in (16), whose semantics are displayed in (17):

(14) $\langle 15, [_{\substack{\text{CVP/TEMP} \\ \text{+fin} \\ \text{+pret}}}$ PREF, TEMP/TEMP, PPauf, NPnom, V_{+agr}], $\lambda x_{T(TEMP)}$(PRET(x(PREF+V'(PP')(NP'))))$\rangle$

(15) <100, [$_{S}$ TEMP, CVP/TEMP], CVP/TEMP'(TEMP')>
+mc

(16)



Stundenlang passte er auf sie auf
for hours watched he on them PREF
'He watched them for hours'

(17) $\lambda x_{T(TEMP)}$(PRET(x(**aufpass-'(sie')(er')**))) **(stundenlang')**
PRET(**stundenlang'(aufpass-'(sie')(er')**))

Since (17) is identical to (7) and (13), it is obviously equivalent to the sentences analyzed in (5) and (12).

It is worth examining a sentence with peculiarly German temporal modification.

(18) Morgen sind wir zwei Jahre hier
tomorrow are we two years here
'We'll have been here two years as of tomorrow'

The derivation of the rules responsible for (18) begins with BR 9

(from 3.3.1), to which first the predicative and nominative are added via the FAC-MR, second the durative via the TEMP MR, third tense via its MR, and finally the frame adverbial also via MR:

(19) <9, [$_{PVP}$ V], V'> --> (FAC-MR)
-fin
-pred

<9, [$_{VP}$ PRED, V], V'(PRED')> --> (FAC-MR)
-fin

<9, [$_{CVP}$ NPn, PRED, V_{+agr}], V'(PRED')(NPn')> - - >
-fin +agr (TEMP-MR)

<9, [$_{CVP}$ NPn, TEMP, PRED, V_{+agr}], TEMP'(V'(PRED')(NPn'))>
-fin +agr
--> (TENSE-MR)

<9, [$_{CVP}$ NPn, TEMP, PRED, V_{+agr}],
+fin +agr
+pres PRES(TEMP'(V'(PRED')(NPn')))>
--> (FRAME-MR)

<9, [$_{CVP}$ NPn, FRAME, TEMP, PRED, V_{+agr}],
+fin +agr
+pres FRAME'(PRES(TEMP'(V'(PRED')(NPn'))))>

The Derived Categories MR may be applied to obtain:

<9, [$_{CVP/NPn}$ NPn/NPn, FRAME, TEMP, PRED, V_{+agr}],
+fin +agr
+pres $\lambda x^{*}_{T(NP)}$(FRAME'(PRES(TEMP'(V'(PRED')(x))))>

which may be used in conjunction with the Linking rule schema:

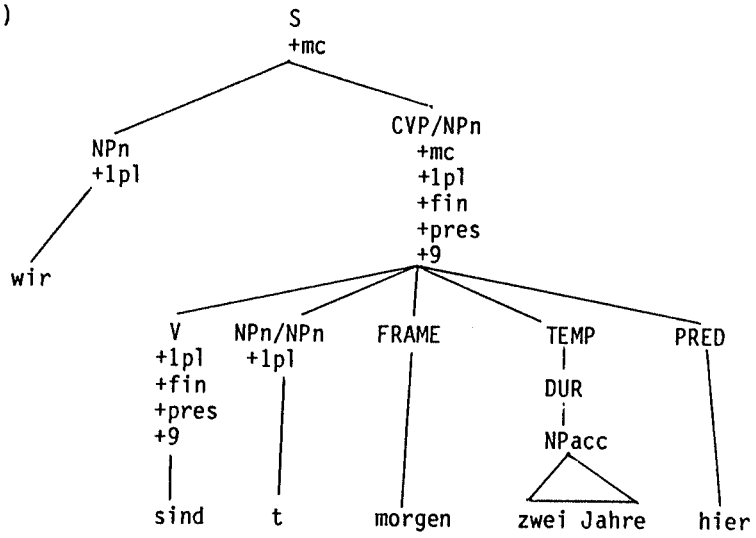
<100, [S +mc NPn +agr CVP/NPn +agr], CVP/NP'(NP')>

BR 202 (from (5) in 3.7.1) will also be put to use:

[DUR NPacc]

as will a lexical entry from (2) in 3.7.3, and a rule allowing hier to be used predicatively, to admit the following tree:

(20)



Wir sind morgen zwei Jahre hier
we are tomorrow two years here
'We'll have been here two years as of tomorrow'

Combining the semantics specified in (19) with those in BR 100, we predict the interpretation of the tree (20) as in (21), the truth conditions for which are derived in (22):

(21) $\lambda x^*_{T(NP)}$(**morgen'**(PRES(**2-J'**(**sei-'**(**hier'**)(x)))) (**wir'**)
morgen'(PRES(**2-J'**(**sei-'**(**hier'**)(**wir'**))))

(22) $A_{s,e,r} \models$ (21), by (2') in 3.7.2, iff
r is a subinterval of the day following s and
$A_{s,e,r} \models$ PRES(**2-J'**(**sei-'**(**hier'**)(**wir'**)))

By the definition of 'PRES' in 2.3.2, the latter conjunct holds iff

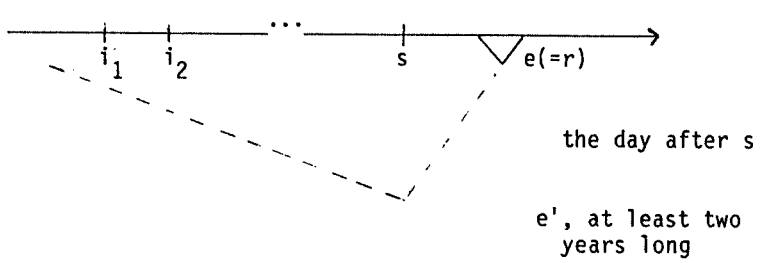
e=r⊀s and $A_{s,e,r} \models$ **2-J'**(**sei-'**(**hier'**)(**wir'**)),

i.e. by (5) in 3.7.1 iff

e=r⊀s and there is an e' such that
1. e is a final subinterval of e'
2. e' is at least [2 Jahre]$_A$ long
3. ∀i⊆e' $A_{s,i,r} \models$ **sei-'**(**hier'**)(**wir'**)

Thus the sentence in (20) is true in situations such as the one sketched in (23):

(23)



The fragment thus accommodates these distinctly German temporal constructions quite readily. Similar, even more complicated temporal modification is analyzed in 4.2. Alternative applications of the fronting MR's (cf. 3.4) would allow us to derive any of the following sentences (in a fashion analogous to the derivations in (10)-(12) and (14)-(16) above):

(24) a. Morgen sind wir zwei Jahre hier
tomorrow are we two years here
'We'll heve been here two years as of tomorrow'

b. Zwei Jahre sind wir morgen hier

c. Hier sind wir morgen zwei Jahre

All of these will be assigned the same truth conditions, as a glance at the semantics of the Derived Categories MR and the Linking Schema may verify.

A final example illustrates the treatment of Frist adverbials. We begin, as always, with a BR (in this case (13)), to which the MR adding complements, the TEMP-MR, and the Tensing MR all apply:

(25) <13, $[_{\substack{PVP \\ -fin \\ -NPgen}}$ PREF, V], PREF+V'> --> (2 x FAC-MR)

<13, $[_{\substack{CVP \\ -fin}}$ NPn, NPgen, PREF, V_{+agr}], PREF+V'(NP')(NPn')>
--> (TEMP-MR)

<13, $[_{\substack{CVP \\ -fin}}$ TEMP, NPn, NPg, PREF, V_{+agr}],
TEMP'(PREF+V'(NPg')(NPn'))>
--> (Tense MR)

<13, $[_{\substack{CVP \\ +fin \\ +pret}}$ TEMP, NPn, NPg, PREF, V_{+agr}],
PRET(TEMP'(PREF+V'(NPg')(NPn')))>

Let us also recall BR's 201, 203, and 204, repeated here for convenience:

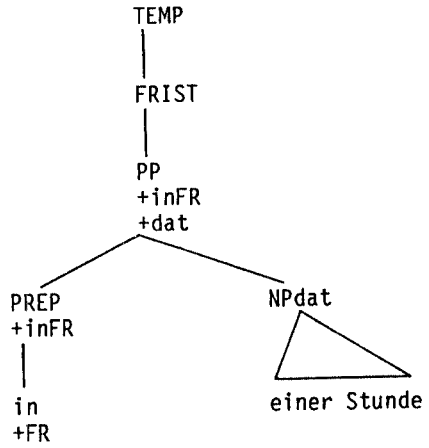
(26) <201, $[_{TEMP}$ FRIST], FR'>

<203, $[_{FRIST}$ PP_{+dat}], PP'>

<204, $[_{\substack{PP \\ +inFR \\ +dat}}$ $PREP_{+inFR}$ NPdat], PREP'(NP')> : in

The rules in (26) justify the subtree in (27) and, together with the lexical entry for in (in (7) in 3.7.1), assign the meaning in (28) to its terminal string, in einer Stunde:

(27)



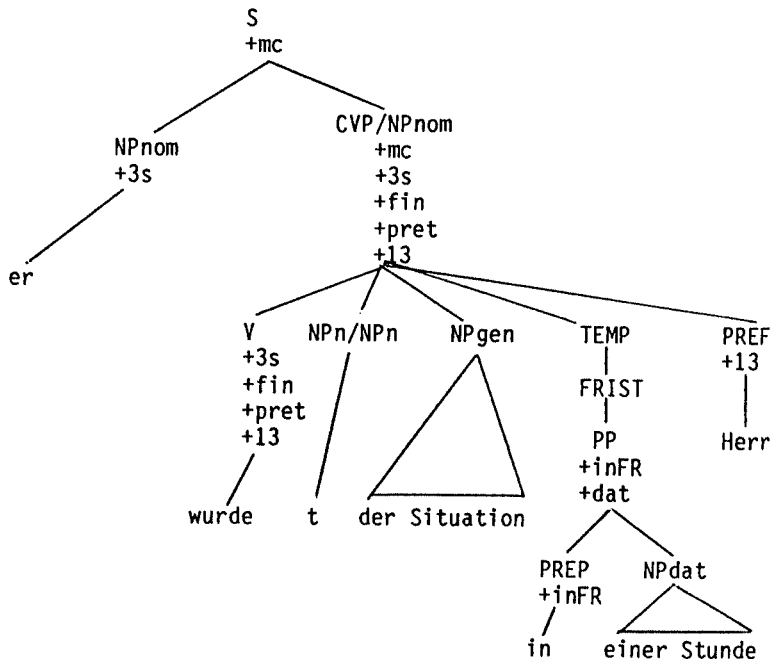
in einer Stunde
in one hour
'in an hour'

(28) (assuming that eine Stunde denotes the duration of one hour)
in'(eine Stunde') is that function, which, for all models A, propositions p, and times s, e, and r:
$A_{s,e,r} \models$ **(in'(eine Stunde'))**(p) iff e is at most one hour long and $\exists i \subseteq e$ $A_{s,i,r} \models p$.

Applying the Derived Categories MR to the rule in (25), and

choosing the correct instance of the Linking schema, we can show (29):

(29)



3.9 The Syntax of Temporal Schon

Temporal schon is one of a small class of adverbial particles, including noch and erst, which may appear either alone as VP adverbs or in construction with another temporal adverbial. The following may be taken as representative of schon's syntactic range:

(1) a. Er war schon da
he was already there
'He was already there'

b. Schon stundenlang war er da
for hours
'He'd been there for hours [already]'

c. (%) In schon zwei Stunden kommt er
in two hours come he
'He'll come in just two hours'

d. Schon morgen kommt er
tomorrow
'He's coming tomorrow'

To provide for examples such as (1a), the syntax clearly must allow the independent introduction of schon into VP rules. The following rule accomplishes this:

Particle MR

$\langle n, [_{CVP}\ X\ ], F\rangle \rightarrow \langle n, [_{CVP}\ PART\ X\ ], PART'(F)\rangle$

PART : schon, noch, erst

The second line is essentially a lexical insertion rule: it stipulates that the lexical primitives on the right are members of the category PART. The meaning of schon (and erst) was presented in 2.6; the meaning of noch will be the subject of 4.3. The Particle MR then provides for introduction of particles into CVP rules (and thus CVP subtrees) as immediate daughters of CVP. The sort of rule derivation which this foresees is exactly parallel to that employed in the introduction e.g. of duratives, which was illustrated in derivation (1) in 3.8. We therefore forego further illustration here, and we merely assert that this pair of rules will allow the generation of setences such as (1a). Schon and the other particles tend to appear earlier in VP's, but since they do not seem to be constrained to appear at only certain points, no further LP rules would seem to be required in connection with the particle MR. (As noted in 2.6, many

speakers resist fronting schon independently, so that it may not appear in isolated preverbal position for these speakers. But this is a matter of constraining the Fronting MR appropriately, and it doesn't call for additional LP rules.)

We note that the Particle MR does not stipulate that the CVP rule to which the provision for particles is to be added be finite, or that it be nonfinite. This reflects the fact that there is no essential scope relationship between **schon'** and the tense which will eventually interpret the finite VP. (N.b. There is no essential scope relationship in the present semantic theory; there almost certainly is in many others.)

The fact that schon appears with other words before the finite verb in (1b)-(1d) indicates that it is part of a constituent with those words. Further syntactic rules are required to provide for the existence of such constituents. We handle the simplest case, (1d), first.

Particle + Frame Adverbial MR

$\langle n, [_{FRAME}\ F\ ], F' \rangle$ --> $\langle n, [_{FRAME}\ F,\ PART\ ], \lambda p(F'(PART'(p))) \rangle$

The order of elements in constituents admitted by the rule above is free; in addition to (1d), we find:

(2) Morgen schon kommt er

Er kommt morgen schon

Er kommt schon morgen

Thus no further LP rules will be required.

Using the Particle + Frame Adverbial MR, we provide a derivation of (1d), beginning with the lexical insertion rule for basic frame adverbials, which we number BR 210 here:

$\langle 210, [_{FRAME}\ X\ ], X' \rangle$: morgen,... ((2) in 3.7.2)

$\langle 210, [_{FRAME}\ X,PART\ ], \lambda p(X(PART'(p))) \rangle$ Part α Frame Adv. MR

The above rule justifies the existence of the preverbal constituent. We also need a rule admitting the VP:

$\langle 2, [_{\substack{VP \\ -fin}}\ V\ ], V' \rangle$ from 3.3.1

$\langle 2, [_{\substack{CVP \\ -fin}}\ NPn,\ V_{+agr}\ ], V'(NPn') \rangle$ FAC-MR

$\langle 2, [_{\substack{CVP \\ +fin \\ +pres}}\ NPn,\ V_{+agr}\ ], PRES(V'(NPn')) \rangle$ Tense MR

Given this, the Frame MR ((1) in 3.7.2) allows that:

$\langle 2, [_{\substack{CVP \\ +fin \\ +pres}}\ FRAME,\ NPn,\ V_{+agr}\ ], FRAME(PRES(V'(NPn'))) \rangle$

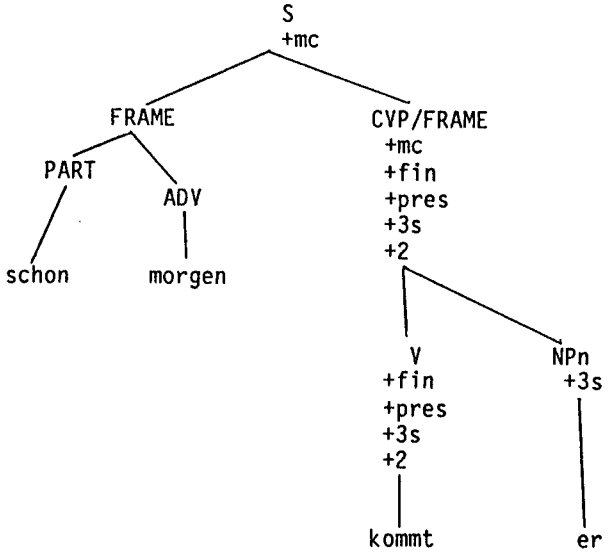
And the Derived Categories MR that:

$\langle 2, [_{\substack{CVP/FRAME \\ +fin \\ +pres}}\ FRAME/FRAME,\ NPn,\ V_{+agr}\ ], \lambda f(f(PRES(V'(NPn')))) \rangle$

Finally, BR 100, repeated here for convenience, admits the required S node.

$\langle 100, [_{\substack{S \\ +mc}}\ FRAME\ CVP/FRAME\ ], CVP/FRAME'(FRAME') \rangle$ ((2) in 3.4)

The above rules combine to admit the following tree:



The meaning assigned to this tree may be calculated using the semantics sections of the same rules:

CVP/FRAME'(FRAME')

λf(f(PRES(**komm-'(er)**))(λp(**morg'(schon**(p))))

λp(**morg'(schon**(p)))(PRES(**komm-'(er)**))

morg'(schon(PRES(**komm-'(er)**)))

This may be evaluated using the semantic rules of earlier sections.

$A_{s,e,r} \models$ **morg'(schon'**(PRES(**komm-'(er')**))) iff
$r \subseteq$ the day following s and
$A_{s,e,r} \models$ **schon'**(PRES(**komm-'(er')**))
(cf. (2') in 3.7.2)

and the latter iff

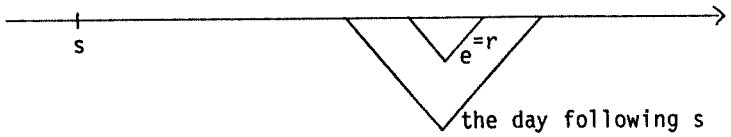
$e \leq r$ and $A_{s,e,r} \models$ PRES(**komm-'(er')**) (by 2.6's analysis of **schon'**)

and the last iff

$r = e - < s$ and $A_{s,e,r} \models$ **komm-'(er')** (by (1') in 2.3)

Thus (1d) has the follwing set of truth conditions:

$A_{s,e,r} \models$ (1d) iff r the day following s and $e \leq r$ and $r = e - < s$
and $A_{s,e,r} \models$ **komm-'(er')**



The analysis of the combination of schon + frame adverbial seems successful enough that we might apply its principles to the combination of schon + durative and schon + Frist adverbial, exemplified in (1b) and (1c), respectively. This is the task of the following rule:

Particle + Temporal Adverbial MR
$\langle n, [_{TEMP}\ X\ ], F\rangle$ --> $\langle n, [_{TEMP}\ X, \text{PART}\ ], \lambda p(F(\text{PART}'(p)))\rangle$

This MR assigns particles scope within temporal adverbials, and places the particle as a sister to the other constituents within the composite constituent. The scope of particles is thus specified to be

narrow in the case of both rule combining particles with other temporal adverbials. The scope of schon vis-a-vis duratives or Frist adverbials is not crucial--either order might have been used in the interpretation schema in the rule on the right. Specifying that the particle is to be a sister constituent of the other elements of the temporal adverbial is crucial, however, if we are to be able to generate the order exemplified in (1c), in schon zwei Stunden. If the MR had stipulated a constituent of $[_X$ TEMP PART], this order could not be generated.

Not every order of elements within this constituent is grammatical. We find instead the following pattern:

schon in zwei Stunden
% in schon zwei Stunden
* in zwei schon Stunden
in zwei Stunden schon

The fact that the third order is excluded may be seen from the formulation of BR 204, the syntax part of which is repeated here for convenience:

$$[_{\substack{PP \\ +inFRIST}} \quad PREP_{+inFRIST} \quad NP_{+dat} \ ]$$

There is simply no provision for material to be added within the NP. If the order in schon zwei Stunden, (1c), is to be excluded as well, the simplest way would be to adopt the constituent structure $[_X$ TEMP PART]. In fact, however, it is excluded in the present formulation of the rules as well, because BR 203 introduces the prepositional phrase beneath the node FRIST, which BR 201 introduces beneath the node TEMP. To admit phrases with this structure, we would actually have to revise the present system of rules in favor of MR introduction. This revision would retain BR 204 (repeated above), and introduce it under TEMP in virtue of a MR such as this:

$$\langle n, [_{\substack{PP \\ +inFRIST}} \quad \ldots \ ], F\rangle \ \text{-->} \ \langle n, [_{TEMP} \ \ldots \ ], F\rangle$$

(There might be an intermediate step as well, if the category FRIST is to be retained.) Since the status of examples such as (1c) is in doubt, this revision will not be adopted here. We merely note here that none of the patterns of grammaticality judgements present insuperable descriptive problems.

The derivation of actual examples using the Particle + Temporal Adverbial MR proceeds exactly parallel to the derivation of examples using the Particle + Frame Adverbial MR, illustrated above.

Notes--Chapter Three

1. Cf. however, Uszkoreit (1982).

2. As matters stand, at any rate. Of course, other theories may be more restrictive in matters of admissible categories and features, uses of categories and features, admissible semantic rules and primitives, or morphological or lexical structure, etc. They might then reject some of the rules below.

3. Nor is it true if we attend not only to the rules, but also to their specification in metagrammar. This will become clear below.

4. The sentences in (3) below are acceptable to most, but not all (of the nine) native speakers asked. Here, just as at many other points, it seemed best to work with the more liberal judgements. This is justified by the subtlety of the fronting construction, which is subject to a good deal of poorly understood pragmatic conditioning (and which is taken up briefly below in the text). This would explain the unacceptability of many grammatical sentences. The native speakers perhaps couldn't readily imagine pragmatically appropriate situations. The emphasis on the more liberal judgements may also be especially justified because many of the native speakers asked were university-level teachers of German; they tended to adopt a decidedly pedagogical tack in responding.

5. But cf. Keenan (1975) and Kawashima (1980) on the unboundedness of German Wh-movement, which likewise is often regarded as clause-bounded.

6. One runs the risk of leaving the relevant (acceptable) examples around the next Fragebogen, of course, and the risk is especially acute using this sort of data, on which cf. note 4. Should such data

be forthcoming, the rules of conjunction might be made more general, as the text will point out.

7. Johnson (ms.) develops the proposal in Nerbonne (1982c) to use complement features in describing the syntax of the German VP, extending the system proposed there to include auxiliary verbs.

8. It turns out that all native speakers consulted accept (2.3) (and (2.1) and (2.2)) and therefore differ from the judgements in Heidolph et al. (1981). In general, this work is so carefully done that I would hesitate before assuming that the judgements there are simply wrong. The system required to deal with the variety which accepts all of the sentences in (2) is, however, also simpler (by the assumption of a hierarchy of complement features) than one which disallows (2.3) and accepts (2.1) and (2.2). No hierarchy is needed to account for all the judgements I can verify. The data ought to be checked, therefore.

9. For the judgements reported in Heidolph (1981:720) at least one such hierarchy is required, even if it turns out that it isn't valid for all verbs (in which case several would be required). I speculate that the hierarchy in (5) (which at least reflects how readily the different complements combine with verbs to form PVP's) is just Lenerz's (1977) unmarked order of constituents--in reverse. On this point, cf. Lenerz (1977:39f).

10. Uszkoreit (1982) uses a similar set of LP statements, which, moreover, inspired the present one, but he does not include a parallel to (9.2), and instead lets the feature [+mc] mark only finite verbs in main clauses. Then (9.2) is just an instance of

$$X < V_{-mc}$$

i.e. Uszkoreit can replace (9.2) and (9.3) with a single LP statement. This is possible because his syntax does not foresee instances where auxiliary or modal verbs occur as coconstituents with participles or infinitives. They are rather analyzed as verbs in VP + V structures, i.e. coconstituents with VPs. But (i) auxiliaries and (ii) modals may be coconstituents with main verbs:

(i) Geschlafen haben duerfte er wohl nicht±
sleep(prt) AUX(inf) might he well not
'He certainly couldn't have slept±'

(ii) Schlafen muessen hat er
sleep(inf) must(prt) AUX he
'He had to sleep'

If this possibility were restricted to infinitive auxiliaries and modals, then again, one needn't reject Uszkoreit's LP rules. (Moreover, some addition would be required to either set of LP statements.) But finite verbs behave similarly:

(iii) ...,dass sie das Buch gelesen hatten und besprechen
COMP they the book read(prt) AUX and discuss(inf)
wollten
want
'...that they had read the book and wanted to discuss it'

The order of elements within the conjunct gelesen hatten is accounted for by (9.3), similarly for besprechen wollten.

11. Uszkoreit (1982) included a MR introduction of separable prefixes in a paper on various word orders.

12. Shortly before this was finished, I received draft materials, not clearly intended for publication or quotation, which propose a treatment of separable prefixes within GPSG where the relationship between prefix and stem is syntactic when the two are separate, and lexical when together. The paper first introduces the prefix via a word formation rule, which is consistent with limited predictability in subcategorization, but which nonetheless--in this case--is said to have a purely compositional semantics. This is the source of the prefix-verb combination found everywhere except in main assertion clauses (in all those places where prefix-verb is indeed always written as a single word). But the prefix and verb may also be introduced

syntactically, in which case the same compositional semantics is employed (and required!), and (some of) the subcategorization facts are explained semantically. This would have the consequence that the example used in the text, bei-wohnen (requiring a dative), would be ill-formed if it appeared with the locative required by its stem, wohnen, because its meaning, **bei'(wohn-')** has nonsensical value when applied to any locative argument (or it has no meaning at all). This means that the ill-formedness is syntactic whenever bei-wohnen appears in nonfinite form or outside of main clauses, and semantic when bei-wohnen appears (separated) in main clauses. This seems awkward, but tenable.

Untenable, on the other hand, is the account of bei-wohnen's well-formedness with dative NP's. Recall that rules derived by metarule inherit the subcategorization class of the rule they are derived from. This means that no rule derived from wohnen will be subcategorized to take anything but locative PP's. There will be no provision for the dative NP's required by beiwohnen.

Similarly untenable is the supposition that the meaning of the separable prefix verb is derived compositionally from the prefix and the verb, as the text argues, and as the comparison of wohnen and residieren, both 'to live, reside,' with beiwohnen 'to be inherent in' and * beiresidieren. The difficulty in the metarule introduction of the separable prefix is that it relies on the semantics to filter out unwarranted combinations, so that if it blocks **bei'(residier-')**, then it will also block **bei'(wohn-')**, since **wohn-'** = **residier-'**.

13. Hoberg (1981:181) notes apparent counterexamples to this striking generalization. These are interesting, but clearly involve other factors. Her two examples are the following:

Mit den Huehnern ins Bett gehen sie dort
with the chickens to bed go they there
'They go to bed with the birds'

Mit dem Pfeil, dem Bogen, durch Gebirg und Tal kommt der Schuetzer
with the arrow the bow through hill and dale comes the archer
gezogen
drawn
'The archer comes, marching, with bow and arrow, over hill and dale'

I suggest that the first is a (semifrozen) lexicalization and that the second, which is stylistically quite marked, involves some sort of grouping into a manner adverbial. Thus neither would be relevant to the discussion in 3.2.3.

14. It is possible to save the analysis technically by adding one or more indices to the model especially for reference by duratives (and frequentatives). For example, the sentence below

Er studiert schon zwei Jahre
he study already 2 years
'He's studied for 2 years'

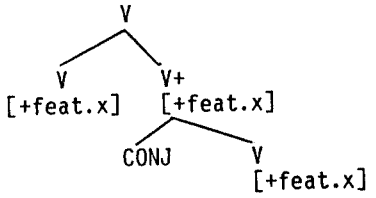
might be analyzed as true at indices s,r,e,d (read 'd'as 'durative reference') iff

(i) the event time e is the length required by the durative and
(ii) the durative-less sentence is satisfied at s,r,e,sub-d

where the d has been changed to sub-d to indicate that the tenseless sentence radical will be expected to exhibit the subinterval property--i.e. that the proposition will be expected to be true not only of its event time, but also of every subinterval thereof. This is obviously a technical trick to save the verb operator analysis. It annihilates the notion that indices ought to be contextually prominent (so that speakers and hearers might reasonably have access to them). I can't say that it wouldn't work, however.

15. Brame (1978) is the source of the spelling prohibition. Cf. Gazdar et al. (1981:6) on its status within GPSG.

16. In fact, the syntax of the conjunction schema specifies a slightly different structure:



But we aren't concerned with this here. Cf. Gazdar (1981) for details on the structure of coordination.

Chapter 4: Extending the Fragment

4.1 The Perfect Tenses

4.1.1 The Forms of the Perfect

As part of the inflectional paradigm of each German verb, we find the following analytic Perfect forms:

(1)	Aux(Pres)-Perfect Participle	er hat geschlafen
	Aux(Past)-Perfect Participle	er hatte geschlafen
	Aux(Inf) -Perfect Participle	er muss geschlafen haben

If we cared to analyze werden as a future auxiliary, then a further element in the paradigm is predictable:

(2)	Aux(Fut) -Perfect Participle	er wird geschlafen haben

But Vater (1975) argues correctly that werden functions just as the other modals semantically and should not be regarded as a future tense. We may therefore concentrate on the forms in (1). Not all verbs use haben as the Perfect auxiliary; the alternative is sein, but the choice between the two has no temporal import. Moreover, there is no general way to predict the choice of auxiliary, either temporally or otherwise.[1] For this reason, we will allow that the choice of auxiliary verb is lexically marked.

A sample paradigm for each of the auxiliary verbs:

(3)	Present	hat geschlafen	hat
	Past	hatte geschlafen	hatte
	Infinitive	geschlafen haben	haben
(4)	Present	ist gestorben	ist
	Past	war gestorben	war
	Infinitive	gestorben sein	sein

We often refer to the Past Perfect as the Pluperfect, and the Present Perfect simply as the Perfect.

4.1.2 The Meaning of the Perfect Tenses

Truth conditions for sentences involving each of these tenses may be readily formulated in the present framework.

(5) $A_{s,e,r} \models \mathrm{PERF}(p)$ iff (i) if $s \leq r$, then $\exists e' \leq r\ A_{s,e',r} \models p$
or (ii) if $-(s \leq r)$, then $e=r<s$ and $A_{s,e,r} \models p$.

i.e.

(i) $\underset{s \quad r}{\longrightarrow}$ and $\underset{e \quad r}{\longrightarrow}$ as in:

(6) Naechsten Freitag hat er den Brief geschrieben
next Friday AUX he the letter write(prt)
'He'll have the letter written by next Friday'

or:

(ii) $\underset{e=r \quad s}{\longrightarrow}$

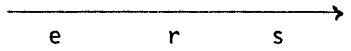
as in:

(7) Er hat den Brief geschrieben
he AUX the letter write(prt)
'He wrote the letter'

Before commenting on this interpretation of the Present Perfect, we list the meanings assigned to the Past Perfect and the Perfect Infinitive.

(8) $A_{s,e,r} \models$ PLUP(p) iff e<r<s and $A_{s,e,r} \models$ p.

i.e.



as in:

Susi hat Rolf gesprochen. Er hatte den Brief geschrieben.
S AUX R speak(prt) he AUX the letter write(prt)
'Susi spoke to Rolf. He had written the letter.'

(9) $A_{s,e,r} \models$ PERFINF(p) iff e<r and $A_{s,e,r} \models$ p.

i.e.

as in:

Er gab zu, den Brief geschrieben zu haben.
he admit(past) the letter write(prt) to AUX
'He admitted having written the letter.'

The analyses of the Perfect Infinitive and the Pluperfect are not particularly controversial, so that very little will be said here about them.[2] The Pluperfect is exactly Reichenbach's (1947:297) version, which was further defended in 1.7.1, and the Perfect Infinitive has been examined for the sake of displaying the entire paradigm. It will not be incorporated into the fragment, just as no other multi-clausal constructions have been. The analysis of the Perfect, on the other hand, is subject to dispute.

Let us first note that in (5ii) the meaning of the Perfect does not differ from that of the Past, describing past time. Thus the following inference is expected to hold:

(10) PRET(p)
$\therefore$ PERF(p)

We predict then that the Perfect can replace the Preterite (or Past tense--these terms are used interchangeably here) without affecting truth value. The replacement might of course affect any of a number of other things, such as e.g. style, and in particular the well-known preference for the Preterite in narrative. But the inference seems valid in every case.

Case (5i) anlayzes the use of the Perfect to describe future time. Three aspects of (i) should be noted carefully. First, it only licenses the future use of the Perfect in contexts where reference time is in the future, e.g. those in which future frame adverbials are present. To appreciate this condition, we examine an example of the Perfect with a future frame adverbial.

The rule interpreting frame adverbials is repeated here for convenience:

(11) for f a frame adverbial, p a proposition
$A_{s,e,r} \models$ f(p) iff $r \subseteq [f]_{As}$ and $A_{s,e,r} \models$ p

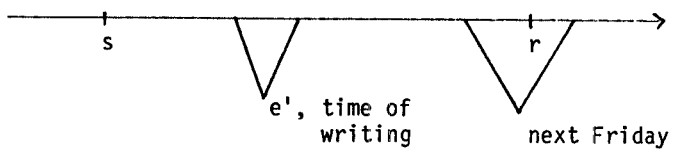
We would thus assign (6) the analysis (12):

(12) **naechsten-Freitag'**(PERF(**er-den-Brief-schreib-'**))

By (11), this holds in A at s,e,r iff r falls within the time denoted by naechsten Freitag and PERF(**er-den-Brief-schreib-'**) holds in A at s,e,r. Since next Friday clearly lies in the future with respect to s, we must apply clause (i) of the Perfect interpretation rule (5), which yields that (12) iff (13).

(13) $r \subseteq [f]_{As}$ and $\exists e' \leq r$ and er den Brief schreib- holds at e'

(14)



The requirement n (5i) that the future use of the Perfect be limited to situations with future reference time explains the distinction between (15) and (16).

(15) T hat es bis jetzt nicht geschrieben, aber naechsten Freitag
AUX it till now not write(prt) but next Friday

hat er es sicher geschrieben.
AUX he it surely write(prt)

'T hasn't written it yet, but he'll have it written by Fri.'

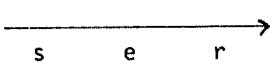
(16) T hat es bis jetzt nicht geschrieben, aber er hat es sicher geschrieben.

The second conjunct in (15) has a future reference time, as evidenced by the future adverbial, naechsten Freitag. The event time, i.e. the time of his writing, must precede this reference time, but it may still be in the future, as sketched in (14). This is compatible with

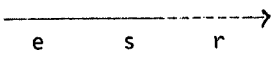
the first conjunct, i.e. his not having written it to date. No such future reference time is specified in the second conjunct of (16), which, moreover, must be expected to share the reference time of the first conjunct. This is the time denoted by jetzt, speech time. (7) specifies that this second conjunct be true iff the atomic proposition holds at some past event time, but this contradicts the first conjunct of (16), and the sentence is nonsensical.

The second important aspect of (5i) to note is that it is not exactly Reichenbach's Future Perfect, reproduced here as (17). It is instead compatible with both (17) and (18).

(17)



(18)



That the present analysis is correct is evidenced by the possibility of sentences such as (19):

(19) Ich weiss nicht, ob er es geschrieben habe.
'I don't know whether he has written it [already].

Naechsten Freitag hat er es aber sicher geschrieben.
next Friday AUX he it but surely write(prt)
But by next Friday he'll surely have it written.'

The analysis (7i), in claiming that the Perfect may represent (unambiguously) situations (17) and (18), contradicts Hornstein's (1977:522) claim that natural language tenses always represent at most one structure such as (17) or (18). Comrie (1981) makes this point quite generally against all interpretations of Reichenbach which, like Hornstein's, insist on an exhaustive specification of s, e, and r for each temporal expression.

A third noteworthy aspect of (5i) is that it provides the correct

semantics for the Perfect when used in temporal conditional sentences such as (20):

(20) Sie gibt es dir, wenn sie es geschrieben hat
she give it you when she it write(prt) AUX
'She'll give it to you when she's written it.

In this case it is reasonable to assume that the future reference time is given by the matrix clause. Note that the event time of the conditional, i.e. the time of writing, must precede the reference time, i.e. the time of giving. This accords nicely with (5i).

The division of (5) into clauses (i) and (ii) reflects (intentionally) Admoni (1970:185) and his judgement that the Perfect is both a relative and an absolute tense. His relative tense is represented here by (5i), which depends on reference time, while his absolute tense is reflected in clause (ii), satisfied whenever event time preceeds speech time. At the same time, we should emphasize that the present trreatment does not have to be regarded as holding that the Perfect is ambiguous, neither in the sense of representing various lexical items, nor in the weaker sense of representing a single lexical item with disjunctive clauses in the semantic rules (the disjunction used in (5) is inessential and may be replaced by conjunction, if this is preferable). We may regard the two clauses of the semantic rule as simply context dependent variants. Thus the present treatment contrasts with that of Baeuerle (1979:79), who regards the Perfect form as representing ambiguously either Preterite or Present Perfect meaning.

Baeuerle adopts this position in order to maintain an otherwise compositional analysis of the Perfect paradigm. His analysis exploits a seductive aspect of this paradigm, given in (3) and (4) above, which has escaped comment thus far. Both <u>haben</u> and <u>sein</u>, the Perfect auxiliary verbs, exist independently in the language, and their Present, Past and Infinitival forms are identical whether they are used as Perfect auxiliaries or otherwise. This is the significance of the second columns in (3) and (4). Baeuerle's hypothesis involves

analyzing all of the Perfect tenses as compound tenses, composed of a single Perfect marker, the participle plus auxiliary stem, to which the various tense or infinitival markings may be added. If his hypothesis could be verified, then the three elements of the Perfect paradigms in (3) and (4) need not be analyzed as three novel tenses, but rather may be seen as the combination of one Perfect aspect with three independently required tenses. We could then reduce a six element paradigm to a three element one with the Perfect/Imperfect distinction seen as orthogonal to the three-way tense distinction.

(5)-(9) above clarify what it is required of the semantics of Baeuerle's proposal.[3] Note that (5i), (8) and (9) all require that event time precede reference time. We take this to be the contribution of the Perfect aspect in all the Perfect tenses. This might be formalized as it is in (21):

(21) $A_{s,e,r} \models$ Perfect Aspect (p) iff $\exists e' < r$ and $A_{s,e',r} \models p$

Note the use of the existential quantifier on the right side of (21). This formulation is required to treat the future use of the Present Perfect, but it predicts that all of the Perfect tenses are to be interpreted indefinitely rather than deictically (and definitely). This is not clearly correct in either the case of the Perfect Infinitive or the case of the Past Perfect (both of which I have argued allow definite reference to time--cf. 1.7.1), but it is very clearly incorrect about some use of the Present Perfect with past time reference. The Present Perfect is normally used deictically. Thus (22) may be used to speak about a contextually salient past time, and its negation (22') may be interpreted as denying that (22) held at <u>that</u> time.

(22) Er hat gelacht
he AUX laugh(prt)
'He laughed'

(22') Er hat nicht gelacht
he Aux not laugh(prt)
'He didn't laugh'

This could not be described using (21). Any attempt to treat the Perfect tenses compositionally must, therefore, grant some special status to the Present Perfect. Its use in both definite and indefinte reference to time demands special treatment. Baeuerle effects a distinct treatment by allowing the Present Perfect form to function as an analytic realization of the normally synthetic Past tense.

The need to posit a second, special and noncompositional meaning for the Present Perfect should count rather heavily against the overall attempt to analyze the Perfect tenses compositionally. We are talking, finally, about a three-element paradigm: the admission that one of the three doesn't combine as predicted is serious.

Ignoring this gap (and the fact that the tenses are not uniform vis-a-vis definiteness of interpretation), the compositional paradigm is fairly straightforward. We simply have to guarantee that the Past requires that reference time be past, and that the Present requires that reference time be nonpast. If we suppose that tense has wider scope than Perfect aspect, then the rest of the semantics in (5) through (9) follows.

But this is just to say that the semantics may be coherent on the compositional view. It is another matter to show that any positive virtue adheres to this treatment. There is, after all,no great gain in simplicity in reducing a six-element paradigm to a three-element one with an additional aspect distinction and one exceptional element.

What evidence might be brought to bear on this decisionπ The most convincing semantic argument in favor of the compositional view would be to show that there are elements with scope intermediate between tense and Perfect aspect. We should like to find an element which would adopt the position of X in (23):

(23) PRES(X(PERFECT-ASPECT(p)))

this would confirm the compositional hypothesis quite to anyone's satisfaction. Hendricks (1981:34) suggests that duratives have exactly this scope, citing (24) (his (4)) as proof:

(24) E hat diese Schlange schon lange getoetet
AUX this snake already long kill(prt)
'This snake has been dead for a long time now, and E killed it'

Schon lange in combination with Present tense always specifies that the sentence modified has held 'for a long time now' (as 1.10 demonstrated). If the Perfect denotes the state resulting from Erika's killing the snake, then the temporal semantics of (24) follows from the compositional view where schon lange has the scope of X in (23).

The example is flawed, however, in that schon lange doesn't function here as a durative. No clear example of duratives can replace lange here, as (25) indicates:

(25) * E hat diese Schlange schon tagelang getoetet
zwei Stunden
for days
two hours

If (25) is at all interpretable, then only in the sense that the act of killing, not its results, lasted the specified length of time. Thus lange in (24) doesn't mean 'for a long time,' but rather 'a long time ago.'

Baeuerle (1979:79) cautiously suggests that the compositional treatment provides an approach to the semantics of the Perfect in sentences such as (26):

(26) Seit zwei Stunden hat er seine Jacke ausgezogen
since two hours AUX he his jacket off-take(prt)
'He took his jacket off and he's had it off for two hours'

In (26), as in (24), the adverbial is understood to specify the duration of the state resulting from his removing his jacket. This might naturally be captured by assigning seit zwei Stunden the scope of X in (23). We might then explain how it is that the adverbial functions here exactly as it would in a Present tense sentence and not at all as it would in a Past tense sentence (which the treatment formulated in (5ii) would seem forced to predict).

The real explanation for this, and the source of error in the above argument, lies in the fact that (26) is simply a Present tense sentence, and not a Perfect at all. Ausgezogen haben is a lexically compound, but Nonperfect infinitive. The best proof of this is the fact that it has the paradigm of a Present tense form; in particular, it forms a regular Pluperfect, ausgezogen gehabt hatte. This may be used in sentences such as (27).

(27) Als ich ihn beim Abendessen traf, hatte er seine Jacke
when I him at supper met AUX he his jacket

schon eine Stunde ausgezogen gehabt.
already a hour off-take(prt) have(prt)

'When I met him at supper, he'd had his jacket off for an hour'

This form is anomalous under the view that ausgezogen haben is (exclusively) a Perfect form (though it may, in sentences other than (26) and (27), represent a genuine Perfect). For this reason, (26) is deceptive.

The construction in (26) is the product of a lexical rule of limited productivity. Its lack of productivity can be demonstrated directly by attempting to substitute other verbs, e.g. genaeht haben 'to have sewn,' or verb-object combinations, e.g. mir das Geld gegeben haben 'to have given me the money' for ausgezogen haben bzw. seine Jacke ausgezogen haben in (26). Note that these examples come from the same (telic) aspectual class as the original ausziehen, but that

most of them are nonetheless (i) ungrammatical or (ii) understood differently, viz. so that the action is understood to have lasted hours. This is the sort of irregularity one expects of a lexical construction but not of a tense form, since tenses are normally regular in formation and meaning.

The construction is not limited to participle + haben, but rather is possible with other adjectives and predicatives, as (28) illustrates:

(28) Er hat es an on
ausgezogen off
noetig necessary (i.e. he needs it)
gern dear (i.e. he likes it)
etc.

Moreover, since past participles may be used as adjectives in construction with sein 'to be,' there is likewise a Present tense construction which has exactly the same form as those Perfects which take sein as auxiliary. An example of one of these is provided:

(29) Er ist seit zwei Stunden abgefahren
he AUX since two hours away-drive(prt)
'He drove away and he's been away for two hours'

The existence of these genuine Present tense forms which are homophonous with Perfects may be a source for the lingering intuition among speakers of German that there is something "immediate" or "present" about the Perfect, at least in contrast to the Past. For example, Gelhaus (1969:14) defines the Perfect as "a continued command over a completed action" ("ein nicht abgeschlossenes Verfuegen ueber ein abgeschlossenes Tun"), much like Wackernagel's (1904) definition of the Greek Perfect as a form describing past actions "deren Wirkung im oder am Object in der Gegenwart fortdauert." There is no reflection of this intuition in the rule of Perfect interpretation (5ii) above, but it may be the sense of the homophonous Present tense

constructions (and the meaning in (5i)) which Gelhaus and others have articulated.

There are apparently then no temporal items with scope intermediate between tense and Perfect aspect, and there seems to be no semantic evidence for a compositional treatment of these forms.

There is, moreover, some weak evidence for a noncompositional view arising from the "special uses" of some tense forms. Latzel (1974) has noted that a small class of German verbs, including sein and the passive werden may be used in the Preterite to speak of future time. This is illustrated in (30):

(30) Warte, bis er hier war = Warte, bis er hier gewesen ist
wait until he here was wait until he here be(prt) AUX
'Wait until he's been here'

≠ Warte, bis er hier ist
wait until he here is
'Wait until he's here'

The important point for the present purposes is that the Preterite form in (30) clearly has the expected Perfect meaning, i.e. it replaces neither what would be tense, nor what would be aspect on the compositional view, but, apparently, the single Perfect element. This indicates that the Perfect is treated as a single element for the purposes of this substitution.

4.1.3 The Syntax of the Perfect

The Perfect tenses, like the nonperfect tenses, will be admitted via MR on nonfinite (complete) verb phrases. This treatment is not forced on us, but there are several reasons in favor of it, the most important of which is preserving the parallelism between the Perfect and the nonperfect tenses. Since the Present and the Past tenses are admitted via MR on nonfinite CVP's, the Perfect and the Pluperfect ought to be as well, at least until some reason to the contrary is

forthcoming.

A second reason is that the CVP is the smallest phrasal constituent on which Perfect marking is regularly found. If the Perfect were introduced on constituents smaller than VP's, we would expect to find these conjoined in ways such as the following:

...dass er der Organization alles versprochen hat und nichts gibt

But it seems that these are not well formed, even if they are easily interpretable.[4)]

A third and final reason is that this treatment allows us to recognize the participial verb together with its complements as a constituent to the exclusion of the finite auxiliary. This would not be expected if the Perfect were introduced below the CVP level. There is ample evidence that the participial VP's exist. They may appear before the finite verb, as in (1), and they may be conjoined, as in (2):

(1) Seiner Tochter ein Maerchen erzaehlt hat er
his daughter a story tell(prt) AUX he
'He told his daughter a story'

(2) Er hat ein Buch gekauft und ein Kapitel davon gelesen
he AUX a book buy(prt) and a chapter it-of read(prt)
'He bought a book and read a chapter of it'

The following MR introduces the Perfect at the VP level. It assumes that verbs are lexically marked +sei- if they require sein, rather than haben as Perfect auxiliary, since, as was pointed out at the beginning of 4.1, the choice of auxiliary verb is not completely predictable. It assumes that the participial form of verbs and verb phrases is available as input to the Perfect-introducing MR, and that this form has not been assigned any temporal interpretation. In a larger fragment, this assumption might well be relinquished, so that we might try to extract a common area of meaning among adnominal

participial phrases, Perfects with finite auxiliaries, and even other constructions (perhaps the passive$_{\pi}$) which share the use of the participial form. But this would require investigation which I haven't undertaken.

Perfect MR

$$\langle n, [_{\substack{CVP \\ +prt \\ \alpha sei-}} \ldots V \ldots], F\rangle \dashrightarrow$$

$$\langle n, [_{\substack{+perf \\ +fin \\ \alpha sei-}} \ldots AUX \ldots V_{\substack{+prt \\ +n \\ \alpha sei-}} \ldots], PERF(F)\rangle$$

$$\langle n, [_{\substack{+plup \\ +fin \\ \alpha sei-}} \ldots AUX \ldots V_{\substack{+prt \\ +n \\ \alpha sei-}} \ldots], PLUP(F)\rangle$$

To appreciate the mechanics of this rule, we must keep in mind both the Head Feature Convention and the fact that the auxiliary will be the head of the output rule. The feature [αsei-], mentioned on the left side of the MR, will be passed to the auxiliary verb on the right side courtesy of the HFC. (Strictly speaking, the feature [αsei-] needn't be mentioned on the CVP node of the right side of the above rule since it merely repeats a feature from the left side. It has been repeated above to make the mechanics of the rule more transparent. The feature needn't be made explicit on the left side of the rule, either, if the convention were adopted that all VP nodes must be marked either plus or minus [αsei-] . But I take it that its inclusion on the left side above does make the rule easier to read.) Since the auxiliary verb is the head of the construction admitted by the right side of the MR, the features [+perf] and [+plup] will find their way onto the verbs from the phrasal nodes. This will ensure that the correct auxiliary, i.e. haben or sein in the case of +perf and hatte or war in the case of [+plup]. The feature [+fin] has been added on the right side to provide for the correct verb form and to license the operation of the Frame Adverbial MR (which is restricted to operating

on [+fin] VP rules in order to keep straight the scope of frame adverbials and tense.

Note that the above rule adds the auxiliary verb as a sister to the other constituents in the VP. This is required if we are to be able to apply the Fronting MR to extract elements from the Perfect VP, which must be guaranteed if we are to account for sentences where constituents within the VP are fronted, e.g.

Hans habe ich nicht gesehen
H AUX I not see(prt)
'I didn't see Hans'

Of course, if we are to allow that the participial VPs themselves are constituents (to account for (1) and (2) above), we must provide for an alternate constituent structure as well, in which the auxiliary verb is a sister to the entire complex of participial verb and complements. The following rule accomplishes this:

Perfect MR (Contoured)[5]

$$\langle n, [_{\substack{CVP \\ +prt \\ \alpha sei-}} \ldots], F\rangle \dashrightarrow \langle n, [_{\substack{+perf \\ +fin \\ \alpha sei-}} AUX\ CVP_{\substack{+prt \\ \alpha sei-}}], PERF(F)\rangle$$

$$\langle n, [_{\substack{+plup \\ +fin \\ \alpha sei-}} AUX\ CVP_{\substack{+prt \\ \alpha sei-}}], PLUP(F)\rangle$$

No rule has been provided for Perfect infinitives. There are at least two reasons for this. First, the fragment doesn't include modals or basic verbs (such as schein- 'seem') which introduce infinitival VPs, and second, the syntax of the Perfect infintives may be distinct since both fronting and conjunction shows that participles do form constituents with Perfect auxiliaries. We needn't concern ourselves with this complication. (There is a suspicious similarity between the rules for flat and contoured VP's, which leads Johnson

(ms.) to attempt to collapse them.)

Perhaps the best method of further clarifying the rule would be a demonstration of its application.

4.1.4 A Sample Derivation

<10, [$_{VP}$ PREF, V], PREF+V'> : weg-geh-([+sei-])
-fin
+prt
+sei-

The above is one instantiation of BR 10; others allow the feature [-sei-], but none of these will be compatible with weg-geh-. Yet another possibility would use the feature [-prt], but this would preclude the subsequent application of the Perfect MR. Note that there is no semantic reflection of the fact that the above rule admits participles rather than e.g. untensed stems. The semantic interpretation of the Perfect form is effected when the auxiliary is provided for (using the Perfect MR). To the above we apply FAC, to form a CVP, then the Pluperfect MR:

<10, [$_{CVP}$ AUX, NPn, PREF, V$_{+prt}$], PLUP(PREF+V'(NPn'))>
+fin +agr +10
+plup +sei-
+sei-
+agr

Since the feature [+fin], which was added by the Pluperfect MR, is incompatible with the input feature [+prt], the latter is not among the features of the output CVP. Note that it has been retained on the V, however, since the Perfect MR specifies so.

The above is manipulated further by the Frame Adverbial MR:

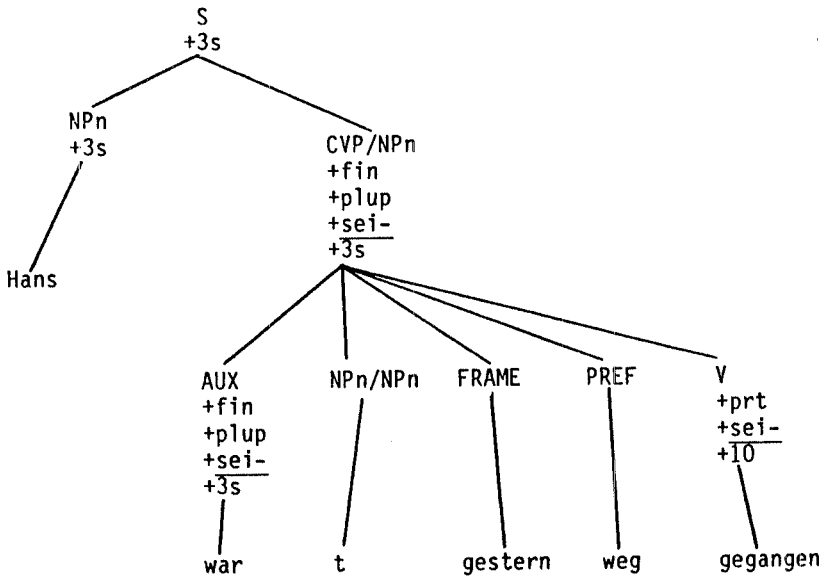
<10, [$_{CVP}$ AUX, NPn, FRAME, PREF, V$_{+prt}$],
+fin +agr +10
+plup +sei-
+sei-
+agr
FRAME(PLUP(PREF+V'(NPn')))>

which may be employed in the actual generation of a tree. Let us note that the LP rules in (9) in 3.3.1 prescribe that (i) the finite auxiliary must be first in the VP constituent, (ii) the [+verb] items PREF and V[+prt] must follow the [-verb] FRAME, and that (3) in 3.3.2 prescribes that (iii) PREF < V[-fin]. These combine to yield the rigid order of elements as listed in the above ID rule.

After the application of the Derived Categories Metarule, we obtain:

<10, [$_{CVP/NPn}$ AUX, NPn/NPn, FRAME, PREF, V$_{+prt}$],
+fin +agr +10
+plup +sei-
+sei-
+agr
$\lambda x_{T(NP)}$FRAME(PLUP(PREF+V'(x)))>

which we employ in the tree below:



(1) Hans war gestern weggegangen
H AUX yesterday away-go(prt)
'Hans had left yesterday'

We derive (1)'s truth conditions straightforwardly:

$A_{s,e,r} \models \lambda x_{T(NP)}$(**gestern'**(PLUP(**weg-geh-'**(x))))(**Hans'**) iff

$r \subseteq$ [**gestern'**]$_A$ + $A_{s,e,r} \models$ PLUP(**weg-geh-'**(**Hans'**))

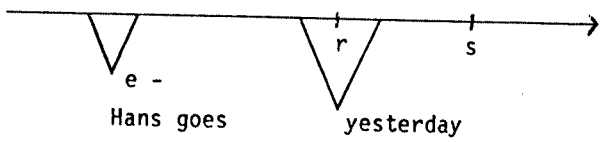
the latter conjunct of which holds iff

$e<r<s$ and $A_{s,e,r} \models$ **weg-geh-'**(**Hans'**)

We can then sum up:

$A_{s,e,r} \models$ (1) iff $r \subseteq$ [**gestern'**]$_A$ + $e<r<s$ + $A_{s,e,r} \models$ **weg-geh-**(**Hans'**)

which conditions hold in situations such as the following:



The above set of truth conditions certainly represents one reading of (1), but it just as certainly does not represent another--the reading in which Hans left yesterday. The derivation of this reading is the subject of section 4.2.

4.2 Adverbials which Modify Event Time

In order to accommodate the reading of (1) in 4.1.2 in which Hans left yesterday (rather than the one in which he had left as of yesterday), we must recognize a further class of temporal adverbials. Since the class is apparently co-extensive with the class of frame adverbials which modify reference time, the simplest way to introduce these is via MR:

(1) e-Frame MR

$\langle n, [_{FRAME} \ \ldots\ ], f\rangle \dashrightarrow \langle n, [_{e\text{-}FRAME} \ \ldots\ ], E(f)\rangle$

where for all models A, speech, event and reference times s,e, and r, and all propositions p, E is that function which takes as arguments functions f such that

$A_{s,e,r} \models f(p)$ iff $r \in X$ and $A_{s,e,r} \models p$

and yields functions E(f) as value such that

$A_{s,e,r} \models (E(f))(p)$ iff $e \in X$ and $A_{s,e,r} \models p$.

The above semantic definition is easiest to understand if one keeps in mind that every frame adverbial is associated with a set of times X. The function E merely switches the parameter within the model to which the associated set is compared. In the basic rules defining the semantic effects of frame adverbials, such as (2') or (4) in 3.7.2, the associated set X is always compared to the reference time parameter in the model of evaluation. E switches that so that X is to be compared to the event time parameter.

(1) assumes that all frame adverbials specify a set of times among which reference time must fall. In fact, of course, some of the rules (such as BR 210) specify intervals i within which reference time is specified to fall (as a subinterval). But it would be equivalent to view those rules as specifying the set

$\{t \mid t \subseteq i\}$

among which reference time would be expected to fall. We will proceed as if these rules were so written.

It is not an accidental feature of the present treatment that it recognizes two perfectly overlapping categories of adverbials, though it may be regarded with some suspicion. Since the tense logic we are employing distinguishes event and reference times, and frame adverbials must be analyzed as modifying one or the other, the double class is forced on us once it is recognized that the adverbials are understood as modifying either time. In a treatment where reference time

and event time were not formally distinguished, so that only two indices were employed, one would surely try to exploit some sort of scope relationship to avoid the postulation of the two classes (losing the possibility of explicating deictic uses of the Perfect, however). In defense of the overlap, we might note that this is not an unusual circumstance. Past participles in both German and English mark the perfect tenses, the passive voice, deverbal adjectives and the adnominal modification of verb phrases. Present participles similarly play a variety of roles. Thus both of these elements belong to a variety of completely (or nearly completely) overlapping classes.

In addition to the above rule, which defines the membership and semantic effects of event time adverbials, we need an additional rule which provides for the introduction of these adverbials in larger constituents. This is the task of the following MR:

(2) <u>e-FRAME Introduction MR</u>

```
<n, [CVP  X ], F>
     +prt

          -->  <n, [CVP  X, e-FRAME ], e-FRAME'(F)>
```

Note that the MR applies only to participial CVP's, ensuring in particular that there will never be an introduction of event time modifying adverbials into nonperfect CVP's. This is not strictly necessary, since we could just as well allow the rule to apply very generally, but there is no use for the event time modifiers in nonperfect VPs: in nonperfect tenses, e=r, so that modifiers of reference time indirectly specify event time as well. Separate modifiers that contradicted each other would also be admissible, since we could easily explain why they are contradictory, but since they would contribute nothing beyond confusion and since the gain in simplicity would be minimal, we might just as well not admit them.

The rule is otherwise straightforward, so that we can turn to an illustration. We begin with the same BR used as illustration in 4.1.4.


```
<10, [VP  PREF, V ], PREF+V'>  : weg-geh-([+sei-])
      -fin
      +prt
      +sei-
```

from which we derive a CVP in the usual fashion:

```
<10, [CVP  NPn, PREF, V ], PREF+V'(NPn')>
             +agr
      -fin
      +prt
      +sei-
      +agr
```

to which we now apply the above MR introducing event time modifying adverbials:

```
<10, [CVP  e-FRAME, NPn, PREF, V+prt ], e-FRAME(PREF+V'(NPn'))>
                     +agr
      -fin
      +prt
      +sei-
      +agr
```

and the Pluperfect MR:

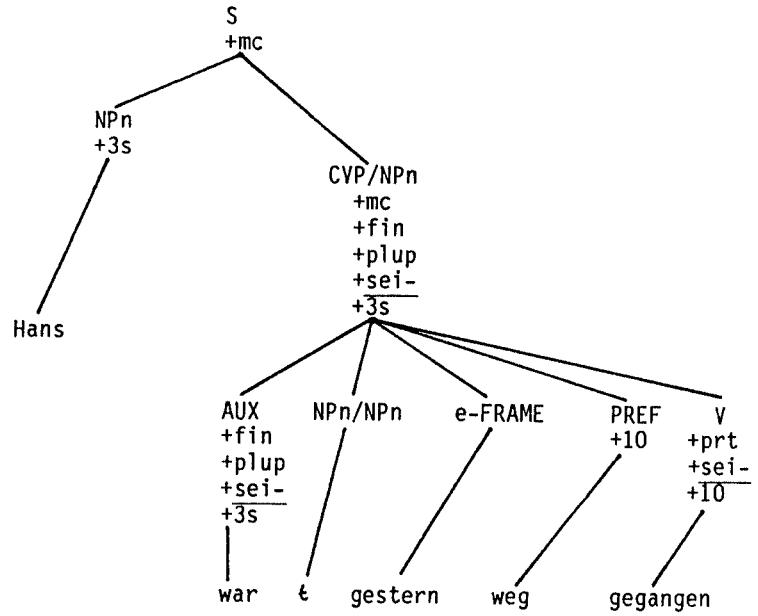
```
<10, [CVP  AUX, e-FRAME, NPn, PREF, V+prt ],
      +fin                +agr       +10
      +plup                          +sei-
      +sei-
      +agr                           PLUP(e-FRAME(PREF+V'(NPn')))>
```

In addition the rule introducing the e-FRAME adverbial must be derived. The BR introducing basic frame adverbials is the input to the e-FRAME MR:

```
<210, [FRAME  Adv ], Adv'>        : gestern        (2) in 3.7.2

<210, [e-FRAME  Adv ], E(Adv')>                    (1) above
```

These, together with the familiar rules responsible for fronting, justify the following tree:



(1) Hans war gestern weggegangen
H AUX yesterday away-go(prt)
'Hans had left yesterday'

This structure is assigned the following semantic interpretation:

$\lambda x^*_{T(NP)}$((E(**gestern'**))(PLUP(**weg-geh-'**(x)))) (**Hans'**)

(E(**gestern'**))(PLUP(**weg-geh-'**(**Hans'**)))

whose truth conditions may be derived straightforwardly:

$A_{s,e,r} \models$ (E(**gestern'**))(PLUP(**weg-geh-'**(**Hans'**))) iff

$e \subseteq$ [**gestern'**]$_A$ and $A_{s,e,r} \models$ PLUP(**weg-geh-'**(**Hans'**))
-by the definition of E in (1) above

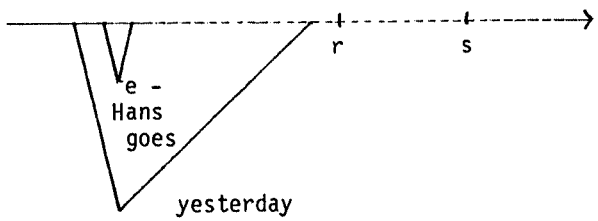
the latter conjunct of which holds iff

$e<r<s$ and $A_{s,e,r} \models$ **weg-geh-'**(**Hans'**)

We can then sum up:

$A_{s,e,r}$ = (1) iff $e \subseteq$ [**gestern'**]$_A$ and $e<r<s$ and
$A_{s,e,r} \models$ **weg-geh-**(**Hans'**)

which conditions hold in situations such as the following:



This may be compared to the derivation of the same sentence, (1) in 4.1.3.

We shall examine one further derivation because it exemplifies well how differently German temporal modification may proceed (in contrast to English). As we saw in BR 213 in 3.7, prepositional phrases using vor are potential frame adverbials, so that they therefore may be interpreted to modify reference time. The metarule in (2) above shows how they may also be interpreted as modifying event time. Those two rules thus account for two of the readings of the sentence below:

(3) Er war vor einer Stunde gegangen
he AUX one hour go(prt)
'He had gone as of an hour ago' - reference time modifier
'He had gone an hour ago' - event time modifier

But there is a third reading, too, in which his leaving took place an hour before reference time:

(3') Ich suchte ihn gestern. Er war aber vor einer Stunde
I sought him yesterday he AUX but one hour

gegangen
(go)prt

'I looked for him yesterday. But he had gone an hour earlier.'

To capture this reading, we need to introduce a second lexical item $\underline{\text{vor}}_{T\text{-}r}$, whose grammar closely resembles the already present $\underline{\text{vor}}_{T}$ (which will henceforth be referred to as $\underline{\text{vor}}_{T\text{-}s}$, to avoid confusion).

(4) <218, [$_{\text{e-FRAME}}$ $\text{PREP}_{+\text{vor}}$ NPdat], $\textbf{vor}_{T\text{-}r}$'(NPd')>

$\textbf{vor}_{T\text{-}r}$' is that function which takes durations as arguments and has as value, for every duration d, and every A, p, s, e, and r that function f such that

$A_{s,e,r} \models f(p)$ iff $e \in \{t \mid t<r$ and (t,r) is length $d\}$ and $A_{s,e,r} \models p$

The substantial distinction between the semantic rule above and the one associated with $\underline{\text{vor}}_{T\text{-}s}$ is that the latter measures time from speech time while $\underline{\text{vor}}_{T\text{-}r}$ above measures time from reference time. We will forego demonstrating a simple application of BR 218 at this point, and proceed with an example calculated to show how different German temporal reference may be (in comparison to English).

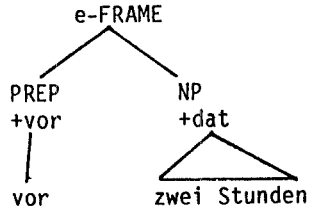
We begin with the derivation below. We assume that zwei Stunden

is a dative NP, and that it denotes the duration two hours.

(5) <218, [$_{\text{e-FRAME}}$ $\text{PREP}_{+\text{vor}}$ NPdat], $\textbf{vor}_{T\text{-}r}$'(NPd')>

The rule in (5) admits the subtree below:

(6)



This will be assigned the interpretation below (by the semantic part of the rule in (4)):

$\textbf{vor}_{T\text{-}r}$'(**zwei-Stunden**')

Since **zwei-Stunden**' is by assumption the duration two hours, the above is equivalent to that function f, such that, for all A, s, e, r, and p:

(7) $A_{s,e,r} \models f(p)$ iff $e \in \{t \mid t<r$ and (t,r) is 2 hrs in duration$\}$ and $A_{s,e,r} \models p$.

This will be employed in connection with the following VP rule:

(8) <3, [$_{\text{VP}}$ V], V'> : $\underline{\text{verlass-}}$
-fin
+prt
-sei-
-$\overline{\text{NP}}$acc

<3, [$_{\text{VP}}$ NPa V], V'(NP')> Flat Adding Complements MR
-fin
+prt
-$\underline{\text{sei}}$-

<3, [$_{\text{CVP}}$ NPn, NPa, V], V'(NPa')(NPn')> FAC
+agr
−fin
+prt
−sei−
+agr

<3, [$_{\text{CVP}}$ NPn, NPa, e-FRAME, V], e-FRAME'(V'(NPa')(NPn'))>
+agr
e-FRAME Introduction MR
−fin
+prt
−sei−
+agr

<3, [$_{\text{CVP}}$ NPn, NPa, PART, e-FRAME, V], Particle MR (3.9)
+agr
−fin
−sei−
+agr
PART'(e-FRAME'(V'(NPa')(NPn')))>

<3, [$_{\text{CVP}}$ AUX, NPn, NPa, PART, e-FRAME, V$_{+prt\ -sei-\ +3}$], Perfect MR (4.1)
+agr
+fin
+perf
−sei−
+agr
PERF(PART'(e-FRAME'(V'(NPa')(NPn'))))>

<3, [$_{\text{CVP}}$ AUX, NPn, FRAME, NPa, PART, e-FRAME, V$_{+prt\ -sei-\ +3}$], Frame MR
+agr
+fin
+perf
−sei−
+agr
FRAME'(PERF(PART'(e-FRAME'(V'(NPa')(NPn')))))>

<3, [$_{\text{CVP/FRAME}}$ AUX, NPn, NPa, PART, e-FRAME, V$_{+prt\ -sei-\ +3}$], Der.Cat. MR
+agr
+fin
+perf
−sei−
+agr
$\lambda x^{*}_{T(\text{FRAME})}$(x(PERF(PART'(e-FRAME'(V'(NPa')(NPn'))))))>

In additon to this, we'll appeal to the following instance of BR 100:

<100, [$_{S}$ FRAME CVP/FRAME], CVP/FRAME'(FRAME')>
+mc

and to BR 214, introduced in 3.7, which was shown there to admit the constituent morgen um diese Zeit as a frame adverbial, with the meaning:

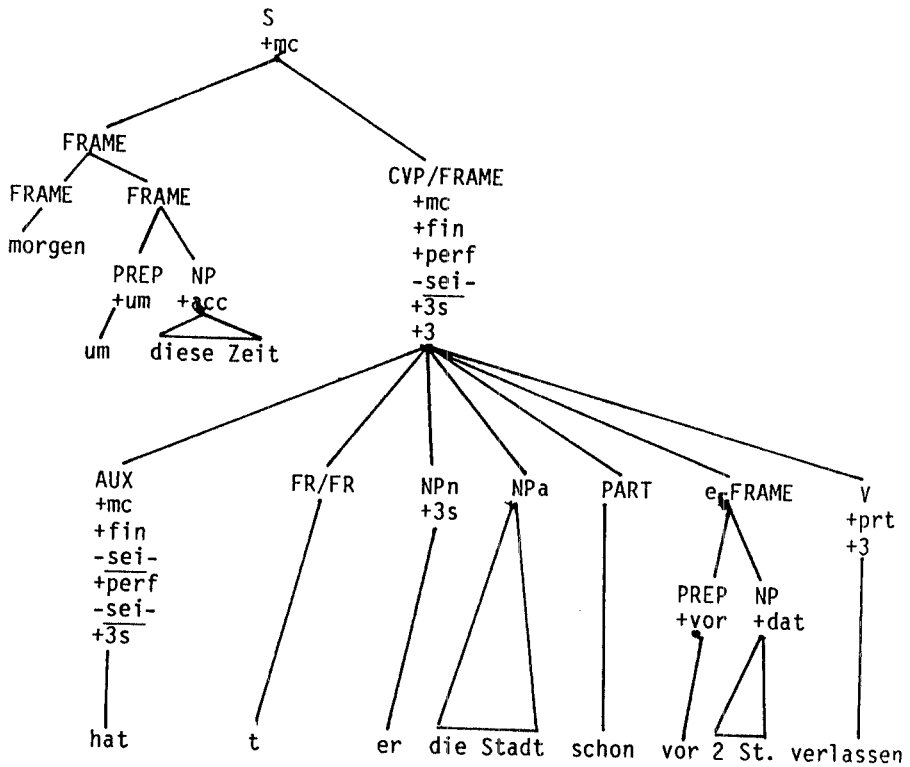
(9) $\lambda p((\mathbf{um}_{T}\text{'}(\mathbf{diese\text{-}Zeit}'))(\mathbf{morgen}'(p)))$

which, for a given p, holds iff:

$r \in \{i \mid \exists t' \in [\mathbf{diese\text{-}Zeit}']A_{S}$ and $t' \in i\}$ and $A_{s,e,r} \models \mathbf{morgen}'(p)$ iff

$\exists t' \in [\mathbf{diese\text{-}Zeit}']A_{S}$ and $t' \subseteq r$ and $r \subseteq$ day following s and $A_{s,e,r} \models p$.

Together, these rules and assigned interpretations admit the following tree:



(10) Morgen um diese Zeit hat er die Stadt schon vor zwei Stunden
tomorrow at this time AUX he the city already 2 hours
verlassen
leave(prt)

'As of tomorrow at this time he'll have left the city, and he'll have been gone for two hours'

To calculate the meaning of this, we simply apply the meaning of the CVP phrase to the meaning of the compound Frame adverbial:

(11) $\lambda x^*_{T(\text{FRAME})}(x(\text{PERF}(\text{PART}'(\text{e-FRAME}'(\text{V}'(\text{NPa}')(\text{NPn}'))))))(\text{FRAME}')$
$\text{FRAME}'(\text{PERF}(\text{PART}'(\text{e-FRAME}'(\text{V}'(\text{NPa}')(\text{NPn}'))))))$

$= (\lambda p((\mathbf{um}_T'(\mathbf{diese\text{-}Zeit}'))(\mathbf{morgen}'(p)))(\text{PERF}(\mathbf{schon}'$
$(\mathbf{vor}_{T\text{-}r}(\mathbf{zwei\text{-}Stunden})(\mathbf{verlass\text{-}}'(\mathbf{die\text{-}Stadt}')(\mathbf{er}'))))))$

$= (\mathbf{um}_T'(\mathbf{diese\text{-}Zeit}'))(\mathbf{morgen}'(\text{PERF}(\mathbf{schon}'$
$(\mathbf{vor}_{T\text{-}r}(\mathbf{zwei\text{-}Stunden})(\mathbf{verlass\text{-}}'(\mathbf{die\text{-}Stadt}')(\mathbf{er}'))))))$

(9) derived the truth conditions arising from the first part of this:

$A_{s,e,r} \models$ (11) iff
$\exists t' \in [\mathbf{diese\text{-}Zeit}']A_{s,e,r}$ and $t' \subseteq r$ and $r \subseteq$ day following s and
$A_{s,e,r} \models \text{PERF}(\mathbf{schon}'$
$(\mathbf{vor}_{T\text{-}r}(\mathbf{zwei\text{-}Stunden})(\mathbf{verlass\text{-}}'(\mathbf{die\text{-}Stadt}')(\mathbf{er}'))))$

We now apply the semantic rules interpreting PERF and **schon'** to the latter part of the above; since we are to interpret PERF where there is a future reference time, this part of the truth conditions will be met iff

$\exists e' < r$ and $e' \leq r$ and
$A_{s,e',r} \models (\mathbf{vor}_{T\text{-}r}(\mathbf{zwei\text{-}Stunden})(\mathbf{verlass\text{-}}'(\mathbf{die\text{-}Stadt}')(\mathbf{er}')))$

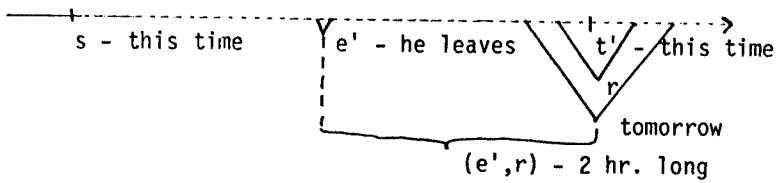
(7) above stipulates the effect of $\mathbf{vor}_{T\text{-}r}(\mathbf{zwei\text{-}Stunden})$ so that we may immediately derive further that the latter part of the above holds iff

$e' \in \{t \mid t < r$ and (t,r) is two hours in duration$\}$ and
$A_{s,e',r} \models \mathbf{verlass\text{-}}'(\mathbf{die\text{-}Stadt}')(\mathbf{er}')$

We may now derive the full set of (temporally interesting) truth conditions of (10):

$\exists t' \in [\mathbf{diese\text{-}Zeit}']A_{s,e,r}$ and $t' \subseteq r$ and $r \subseteq$ day following s and $\exists e' < r$ and $e' \leq r$ and $e' \in \{t \mid t < r$ and (t,r) is 2 hrs long$\}$ and
$A_{s,e',r} \models \mathbf{verlass\text{-}}'(\mathbf{die\text{-}Stadt}')(\mathbf{er}')$

Thus (10) is true in situations such as the following:



4.3 Noch

Noch is in some sense a complement to schon. It seems to be an exact complement to schon in presupposition. If (1) invites the inference that Hans is here somewhat earlier than expected, (2) suggests that he is a bit later than expected.

(1) Hans ist schon hier
is already here
'Hans is already here'

(2) Hans ist noch hier
still
'Hans is still here'

Cf. Koenig (1977) and (1981) and Hendricks (1981) for a more exact formulation of the presuppositional content of noch.

Like schon, it clearly has a broad range of meaning, not all of which may be subsumed under a single semantic rule. Most importantly, we shall wish to distinguish temporal from nontemporal uses of noch. My treatment of the temporally interesting noch follows Hoepelman and Rohrer (1981) closely.

4.3.1 Nontemporal noch

The most important nontemporal use of noch is one in which it

means 'additionally.' Cf. (1):

(1) Ungeschickt ist sie auch noch
clumsy is she also additionally
'On top of everything else, she's clumsy'

This, and presumably other nontemporal uses of noch, as well, may be distinguished from temporal uses of noch in much the same way that temporal and nontemporal uses of schon are distinguished.

First, nontemporal uses lack the invited inference that the proposition to which noch applies holds earlier than expected. (1) makes e.g. no such suggestion. Second, nontemporal uses may not be the focus of questions:

(2) Ist sie auch noch ungeschickt --Nein
'Is she [noch] clumsy ' no

≠ No, it is not additionally that she is clumsy.
= No, it is not still the case that she is clumsy.
(or: = No, she isn't clumsy any more.)

Third, some speakers accept the fronting of temporal (immer) noch while no one allows the fronting of nontemporal noch.

(3) Immer noch kann man den echten bayerischen Stil finden
still can one the real Bavarian style find
'One can still find the real Bavarian style'

There is a problem with applying these tests to noch, however. Consider the use of noch in (4):

(4) Hans kommt noch
come
'Hans will come yet'

(4) does not suggest that Hans is coming somewhat later than expected and is absolutely impossible in fronted position:

(4') * Noch kommt Hans

Thus (4) is a nontemporal use of noch according to the first and third tests. The second test is inconclusive:

(5) Kommt Hans noch --Nein.
'Will Hans come yet ' --No.

= No, he won't come.

Whether we can regard noch as the focus of the question depends on the meaning we attribute to it, and in fact, it adds little more than a sense of indefiniteness in (4).

Whether the use of noch in (4) ought to be regarded as "temporal" or not may be purely terminological, since it in any case cannot have the same semantics as the noch in (1) in 4.3. We formulate the semantic rule for this use of noch in (6):

(6) $A_{s,e,r} \models \textbf{noch}'(p)$ iff $\exists e'(r<e$ and $\exists r'(A_{s,e',r'} \models p))$

This is Hoepelman and Rohrer's (1981) (doch) noch, so-named because it is always replaceable with doch noch. I do not maintain that this is nontemporal, only that it is distinct from the use of noch in (1) in 4.3, whose semantics are formulated in 4.3.2.

Note that in requiring that there be a unique event time at which p is to hold, we limit the applicability of this expression to telic Aktionsarten, following Hoepelman and Rohrer (1981). In allowing that noch'(p) be true if p is true at any e and r, we allow that this noch might combine with any tense.

4.3.2 Immer Noch

Hoepelman and Rohrer also note that uses of noch in sentences such as (1) in 4.3 allow that noch be replaced with immer noch. They maintain that this noch combines only with atelics (Hoepelman and Rohrer, 1981:112), but (1) would seem to counterindicate this:

(1) Das Orchester spielt noch den zweiten Satz
the orchestra plays still the second movement
'The orchestra is still playing the second movement'

I suggest therefore that a slightly better way to view the affinity of noch for atelics is to view noch as inducing an imperfective reading--just as schon does.

Similarly, just as schon specifies that event time doesn't extend beyond reference time (into the future), noch specifies that event time doesn't extend beyond reference time into the past. Thus we first define:

$$i_1 \geq i_2 \text{ iff } \forall t_1 \in i_1 (\exists t_2 \in i_2 (t_2 \leq t_1)$$

and we require that:

Immer Noch's Semantics

$A_{s,e,r} \models \textbf{noch}(p)$ iff $e \geq r$ and if $e=r$, then $A_{s,e,r} \models \text{PROG}(p)$
and if $e \neq r$, then $A_{s,e,r} \models p$.

We note that this semantic rule licenses an imperfective reading of telics in combination with noch in the nonperfect tenses (where e=r), exactly as the semantic rule for schon does (in 2.6.3). This seems to be justified, as (1) indicates.

We note that since for all intervals i_1, i_2, if $i_1 = i_2$, then $i_1 \geq i_2$. Since the nonperfect tenses, i.e. the Present and the Preterite, require that e=r, we expect the addition of noch, requiring that $e \geq r$, not to affect truth value in these tenses. Similarly, the use of the conditional tense/mood in anticipatory narration, requiring

that r<e (cf. the discussion in 2.6.3), ought to be always compatible with noch. These predictions seem to be true:

(2) Er ist da — He's there
∴ Er ist noch da. — ∴ He's still there.

Er war da. — He was there.
∴ Er war noch da. — ∴ He was still there.

Er ging nachdenklich weg. Er wuerde sich das ueberlegen.
he went pensively away he AUX self it over-think
'He went away thinking. He would mull it over.'

... ∴ Er wuerde sich das noch ueberlegen.
'He would mull it over yet'

Note that if $i_1 < i_2$, then $i_1 \rightarrow i_2$. This means that the Prefect tenses, which require that e<r, should be incompatible with immer noch. The semantic rule for immer noch thus predicts that the following will be unacceptable:

(3) Er hatte den Film [immer] noch gesehen
he AUX the film * still see(prt)
'He had seen the film, too'

* Bis naeschsten Freitag hat er die Arbeit immer noch
by next Friday AUX he the paper still
geschreiben.
write(prt)

The first sentence in (3) is fine under the interpretation of noch as 'additionally'; the addition of immer, forcing the temporal interpretation of noch, makes the sentence ill formed. The second sentence is peculiar (though it's fine without (immer) noch). I suspect that

it might be acceptable in a context where the sense of 'additionally' were clearer.

4.3.3 The Syntax of Noch

Since noch is an element of the category of particles, along with schon and erst, its syntax has already been specified in the Particle MR (3.9) and the combination of Particle + Frame MR and Frame + TEMP MR (both in 3.9). Further derivations here would only repeat those in 3.9 (and 4.2).

One facet of noch's grammar is interesting, however. Let us recall the MR which introduced Particle + Temp.Adv. constituents:

Particle + Temporal Adverbial MR

$\langle n, [_{TEMP}\ X\ ], F\rangle \dashrightarrow \langle n, [_{TEMP}\ X, PART\ ], \lambda p(F(PART'(p)))\rangle$

This MR assigns particles scope within temporal adverbials, and places the particle as a sister to the other constituents within the composite constituent. The scope of particles is thus specified to be narrow in the case of both rule combining particles with other temporal adverbials. The scope of schon vis-a-vis duratives or Frist adverbials is not crucial--either order might have been used in the interpretation schema in the rule on the right. With noch, however, it turns out that the scope is important.

To see this, consider the combination of noch with duratives. Given the rule above, **zwei Jahre**'(**noch**'(p)) would be the expected meaning of sentences containing the constituent noch zwei Jahre. Given the semantic rule for duratives (2.4), this holds when:

$A_{s,e,r} \models$ **zwei Jahre**'(**noch**'(p)) iff there is an e' such that
1. e is a final subinterval of e'
2. e' is [**zwei Jahre**']$_A$ in length and
3. $\forall i \subseteq e'\ A_{s,i,r} \models$ **noch**'(p)

But (3) in turn holds iff for every relevant i, $i \geq r$ and p holds. Thus we derive:

$A_{s,e,r} \models$ **zwei Jahre'(noch'(p))** iff there is an e' such that

1. e is a final subinterval of e'
2. e' is $[$**zwei Jahre'**$]_A$ in length and
3. $\forall i \subseteq e'(i \geq r$ and $A_{s,i,r} \models p)$.

(We ignore the imperfectivity issue here.)

For the most part, this extra constraint resulting from noch is inconsequential, since the exact delineation of r is often left up to Pragmatics. But note that if r is specified elsewhere in the sentence, then there may be no s,e,r satisfying the above conditions. consider in this connection (1):

(1) * Morgen ist er noch zwei Jahre da
tomorrow is he yet 2 years there

Other rules guarantee that this is assigned the meaning:

(2) **morgen'**(PRES(**zwei Jahre'**(**noch'**(p))))

and (2)'s truth conditions are straightforwardly derived:

(3) $A_{s,e,r} \models$ (2) iff r $[$**morgen'**$]_A$ and e=r-<s and
$A_{s,e,r} \models$ **zwei Jahre'**(**noch'**(p))

and the last holds iff

there is an e' such that

1. e is a final subinterval of e'
2. e' is $[$**zwei Jahre'**$]_A$ in length and
3. $\forall i \subseteq e'(i \geq r$ and $A_{s,i,r} \models p)$.

But there can be of course no such e'. Any interval stretching two years prior to r must contain subintervals which are wholly prior to r and therefore in violation of clause (3).

This explains the distinction between (4) and (1), and between the two sentences in (5):

(4) Morgen ist er schon zwei Jahre da
tomorrow is he already two years there
'He'll have already been here two years as of tomorrow'

(5) Gestern war er schon zwei Jahre da
yesterday was
'He had already been here two years as of yesterday'

* Gestern war er noch zwei Jahre da

Unfortunately, the above explanation works only when noch and the durative phrase are given the indicated scope relation. If noch had wider scope than the durative, the explanation would collapse. This is unfortunate because it would be quite easy in the present system to derive a sentence with this scope relationship--by simply introducing the durative and the particle independently, in that order. I do not see how to block this except by revising the present system so that particles and temporal adverbs could only be introduced together, but this revision would take us rather far afield, and one would want to have a good deal of confidence in other aspects of the system proposed here before undertaking it.

4.4 Passives

This section examines the Passive, & formulates rules for its generation.

The German Passive has both personal and impersonal variants, as (1) and (2) respectively exemplify:

(1) Ein Haus wird gebaut
a house AUX build(prt)
'A house is being built'

(2) Ihm wird gratuliert
him(dat) AUX congratulate(prt)
'He is being congratulated'

It is easy to predict which variant will occur with a given phrase: if, in nonpassive sentences, the main verb must appear with an accusative NP complement, the personal form is used. If it must appear without an accusative NP complement, the impersonal variant is used. Of course, some verbs may appear either with or without an accusative NP complement, and in these cases, both the impersonal and the personal form are possible:

(3) Kein Fleisch wurde gegessen (cf. Er ass Fleisch)
no meat AUX eat(prt) he ate meat
'No meat was eaten'

Es wurde nicht gegessen (cf. Er ass)
it AUX not eat(prt) he ate
'No one ate'

Clearly, any treatment ought to reflect this conditioning.

4.4.1 The Subjectlessness of Impersonal Passives

The terms 'personal' and 'impersonal' were probably chosen to describe these two variants because the former have subjects, while the latter do not. The treatment of basic rules above assumed that the impersonal passive is subjectless (along with the construction Ihm ist zu gratulieren). This assumption may now be defended.

Personal constructions have a nominative subject which controls verb agreement and can function as the controller for understood subjects in EQUI-sorts of constructions; the impersonal don't. The evidence for this is well known, but the es which may appear in matrix initial position in impersonal constructions is deceptive. For

example, the impersonal passive appears with a dummy es in matrix initial position, however, as the second sentence in (3) does. This seductively resembles a subject, particularly to English ears (and eyes), used to finding subjects in sentence-initial position, but also to native German speakers, since initial position is a favorite spot for German subjects as well. Note further that the es in the second sentence in (3) is identical in form to the nominative/accusative singular neuter pronoun; moreover, verb marking in impersonal passives would agree with third person singular subjects. The difficulty with taking this as evidence of es's subjecthood is that any sentence in German may appear with matrix initial es, including the first sentence in (3):

Es wurde kein Fleisch gegessen
it AUX no meat eaten
'No meat was eaten'

Moreover, this es and the impersonal passive es share a number of peculiar properties. Both are limited to matrix initial position. Thus neither may appear post-verbally in declarative sentences (4a), in any embedded sentence (b), in questions (c), or even in exclamations (d):

(4) Es wurde geredet	Es ist der Tom gekommen
it AUX talk(prt)	it AUX T come(prt)
'People talked'	'Tom came'
a. * Dann wurde es geredet	* Dann ist es der Tom gekommen
then	
Dann wurde geredet	Dann ist der Tom gekommen
b. * ...ob es geredet wurde.	* ...ob es der Tom gekommen ist.
whether	
...ob geredet wurde.	...ob der Tom gekommen ist.
c. * Wurde es geredet	* Ist es der Tom gekommen
Wurde geredet	Ist der Tom gekommen
d. * Geredet wurde es	* Gekommen ist es der Tom
	come(prt) AUX it
Geredet wurde	Gekommen ist er

The nominative/accusative neuter singular pronoun es shares none of these peculiar properties, as is well known. There is therefore no reason to take the superficial similarity of the two words as evidence for the es in impersonal passives being a subject. Let us furthermore conclude that a unified treatment of the es in the two sorts of constructions exemplified in (4) would be desirable--that is, we should prefer to account for these common peculiarities.

This leaves only the 3rd person singular form of the impersonal passive as putative indication that we ought to find a third person singular subject for it. But let us first note that if we are indeed to favor a unified analysis for the two es's in (4), then we must *a fortiori* favor analyses which treat the impersonal passive es as a

noncontroller of number agreement, just as the other, "presentational" es in (4) is. For this es demonstrably does not control number agreement:

Es kamen zwei Menschen aus Bern
it came(pl) two people(pl) from Bern
'There came two people from Bern'

That is, sentences using the presentational es may have either singular or plural verbs. Second, how much weight are we to give the fact that such sentences do not appear in first or second person Surely we need not attribute this to an actual third person subject, since we can equally well regard the third person as the unmarked person. Any verb for which first and second person marking would be inappropriate ought then to appear in third person.

Given this evidence that es is not a subject, and the fact that no other likely candidate is in sight, we postulate that impersonal passives are subjectless.

This hypothesis leads to several testable predictions about impersonal constructions. First, recall that VP's have been defined as $CVP_{[-NPnom]}$. There is no such constituent in impersonal constructions, which means that we should find no analogue of impersonal constructions where VP's are required. One such construction involves the complementizer ohne:

Er ging, ohne sich zu verabschieden
he went without self to say-good-bye
'He went without saying good-bye'

Nerbonne (1982d) argues that this construction requires VP's (and that pragmatic control of the subject position is allowed). If this is so, we should expect to find some impersonal constructions here if these have subjects. If they are subjectless, on the other hand, we should expect to find none. In fact, none are possible:

* Es wurde tagelang gefeiert, ohne geschlafen zu werden
AUX days-long celebrate(prt) w.o. sleep(prt) to AUX

Es wurde tagelang gefeiert, ohne zu schlafen
sleep(inf)
'They celebrated for days without sleeping'

The present treatment predicts that VP complement constructions will systematically exclude impersonals, and this seems to hold. The treatment which view es as a subject cannot explain this (even if the treatment could add something to this effect, i.e. so that it could be made compatible with the facts).

Second, the present treatment predicts that es appears in impersonals only as a sort of zero-alternative to fronting. Thus we predict the failure of the impersonal es to appear within the VP. If es is a subject, this is unexpected behavior. Furthermore, we might expect that where the fronting construction is inapplicable, the alternative would be as well. In that case we would predict the impossibility of the es in subordinate clauses as well, where fronting does not apply.

4.4.2 The Lexical Nature of the Passive

Nerbonne (1982b) presents evidence that the impersonal passive is a lexical rule. Some of the arguments involved extends immediately to the personal passive, and, if both passives are to be described by a single rule, then all of the evidence that impersonal passives are created by lexical rule extends indirectly to personal passives.

To begin, there is a preference (within many theories) that rules with lexical exceptions ought to be lexical rules. The preference is plausible enough, given the concept of the lexicon as the finite repository of exceptionality. The preference is strengthened by two further considerations brought forward in Baker (1979). First, a most restrictive syntax would only allow phrasal rules to apply to phrases without reference to their makeup, in this particular case, without

reference to the particular lexical items in the phrase. Since we favor more restrictive systems, we ought to favor allowing no exceptional rules in the syntax. Second, it is argued, a lexical rule might plausibly be learned lexical item by lexical item, in which case we would expect children to learn such rules by hearing the outputs of the rules--in particular, without overgeneralizing. This scenario is implausible for phrasal rules, since they most naturally are learned to be applicable to phrase types (without regard for the makeup of the phrases). If children did try to learn phrasal rules with lexical exceptions, we would expect overgeneralization. Since children do not overgeneralize rules with lexical exceptions (according to Baker), they probably learn such rules lexical item by lexical item.

I am not aware of any extensive work in GPSG on the relationship between the lexicon and syntax, so that the force of the above considerations for the present case is unclear. But at least the concept of the lexicon as the finite repository of exception has a great deal to recommend it in any theory. The last two arguments in favor of excluding rules with lexical exceptions from the syntax are appealing, but they obviously rest on premises that one could take issue with: the first, on the premise that disallowing syntactic rules with lexical exceptions results in a significantly more restrictive theory (and of course that, if it's significantly more restrictive, then it's linguistically sound); the second, on the premise that children really do not overgeneralize lexical rules.

If phrasal rules allowed reference to the internal makeup of the phrase, then they might well be learned to be applicable to certain lexical items as these are encountered.

For whatever it's worth, however, there do seem to be lexical exceptions to the passive rule:

Es wird heute zu Hause geblieben±
it AUX today at home stay(prt)
'People will [have to] stay at home today±'

* Es wird heute zu Hause gewesen±
be(prt)

Both of these verbs are subcategorized to take predicative phrases, but only bleiben may be passivized.

There are also some more concrete indications of the lexical nature of this rule, as well. The following is summarized from Nerbonne (1982b). First, the combination of passive participle plus nonfinite passive auxiliary werden may form a constituent. This is shown by its ability to appear before the finite verb:

Gebaut werden muessen noch zwei Haeuser
build(prt) AUX must yet two houses
'Another two houses have to be built'

Geholfen werden muss ihm
help(prt) AUX must him
'He must be helped'

(Note that the first of these is a personal passive, and the second an impersonal.) The existence of a constituent of this sort is a natural consequence of a lexical formulation of the rule, but would require structure-building power of a phrasal formulation.

Second, there are apparent exceptions to the generalization noted above that impersonal passives are found exactly with those verbs which do not take accusative objects. It is not always the case that personal passives are found in sentences with verbs which would normally take accusative NP's, and impersonals in those with verbs which do not. A sizeable group of speakers accept impersonal passives with accusative reflexive pronouns, such as the following:

Da wurde sich geschlagen
there AUX self strike(prt)
'People fought there'

The sich in sich schlagen would be clearly accusative in other persons. Thus ich schlug mich mit ihm 'I fought with him.' This is a puzzling exception to an otherwise very solid generalization if one ignores the lexical status of the operands of the passive rule. Attending to this, however, and noting that sich schlagen is a well-known lexical reflexive, we readily obtain the proper modification of the rule: impersonal passives are formed of those inputs--possibly lexically complex--which do not take accusative NP complements. Thus sich schlagen may contain an accusative NP, but since it doesn't take one, it forms an impersonal passive.

The connection to the lexical vs. syntactic status of the passive is this: we divide up the reflexives (in what is in fact a standard way--cf. Curme, 1922:338; Stoetzel, 1970:23-28; or Cranmer, 1976:56-7) into the lexical and the syntactic. There are toss ups, but there are clear cases, too. Now the lexical formulation of the passive rule predicts that passives may be formed only from the lexical reflexives, such as the above, and never from the syntactic ones, such as the one below:

Er redete von einer Geschichte ueber sich
he spoke of a story about self

This is clearly a syntactic reflexive because it is buried in a modifier of the verb; because its meaning is predictable, given the meaning of its components; and because its meaning is reflexive, not reciprocal, medio-passive, or detransitivized (all of which are found only in lexical reflexives). The prediction that lexical reflexives only may appear in passives seems to be borne out:

Es wurde von einer Geschichte (* ueber sich) geredet
it AUX of a story about self speak(prt)

A third and final detail about German syntax (concerning again those speakers who allow the use of reflexives in passive sentences) confirms the lexical formualtion of the rule as well. Let us first recall that only major constituents ("Satzglieder," or "sentence elements," in the sense of Bach, 1962) may be fronted to the position before the finite verb. This is explicit in the fronting MR above. Thus a locative prepositional phrase is frontable, but not the object of the prepositional alone.

Er lief in dem Haus herum
he ran in the house around
'He ran around in the house'

In dem Haus lief er herum

* dem Haus lief er in herum

An emphatic reflexive pronoun sich selbst exists as well in German, and it may be fronted:

Sich selbst hat er damit helfen wollen
self self AUX he thus help want
'He wanted to help himself that way'

Like the nonemphatic reflexive, this reflexive may appear in passive sentences, too, but then, interestingly, it may not be fronted:

Es wurde sich meistens nur selbst geholfen, und keinen anderen
it AUX self mostly only self help and no others
'People mostly helped themselves, and no one else'

* Sich selbst wurde meistens geholfen, und keinen anderen

This indicates that sich selbst does not function as a sentence

element in the passive sentences, which is predicted once it is assumed that the passive is only possible where the sich selbst is part of a lexical verb. (The active sentence where it is fronted indicates that it may be added syntactically, too, so that the emphatic reflexive, like the unemphatic one, has both a syntactic and a lexical variant.)

Based on the general considerations at the beginning of this section, and these three details of the syntax of passive sentences, we should favor a lexical formualtion of the passive rule, i.e. one that operates on individual lexical items.

4.4.3 A Formulation of the Rule

Passives without agent phrases are presented here.

Passive Metarule

$$\langle n, [_{(P)VP} \; X \; V \;], \quad (P)VP' \; (=\lambda x_1 \ldots \lambda x_n (P)VP'(x_1)\ldots(x_n))\rangle \; \longrightarrow$$

$$[_{(P)VP} \; -pass \; -fin \; -comp_1 \; \vdots \; -comp_{n-1} \; -NPnom \; (=comp_n)$$

There are two cases. Either the set of feature complements for this lexical class includes as one $comp_i$ [-NPacc], or it does not. If it does,

$$\longrightarrow \langle n, [_{(P)VP} \; +pass \; -comp_1 \; \vdots \; -comp_{i-1} \; -comp_{i+1} \; \vdots \; -NPnom \; (=comp_n) \; (P)VP_{-comp1} \; \vdots \; -NPacc \; \vdots \; -comp_n],$$

w.meaning: $\lambda x_1 \ldots \lambda x_{i-1} \lambda x_{i+1} \ldots \lambda x_i \; \exists x_n (P)VP'(x_1)\ldots(x_{i-1})(x_i)\ldots(x_n)\rangle$

If, on the other hand, there is no $comp_i$ = [-NPacc] then

$$\text{--> } \langle n, [_{(P)VP}\ (P)VP_{-comp1}\ ],\ \lambda x_1..\lambda x_{n-1}\,\exists x_n (P)VP'(x_1)..(x_{n-1})(x_n)\rangle$$

+pass, +prt, $-comp_1$ ... $-comp_{n-1}$, $-comp_n$

& Convent. implication: (P)VP'(x_1)..(x_n) might be intentionaly brought about

Notice that the output of the passive rule is a participial phrase, and that no mention has yet been made of the passive auxiliary werden, which is introduced by metarule below. Let us examine applications of each of the clauses of this rule before considering how well it accomplishes its task. We first examine an application of the rule to a verb which does take an accusative NP complement, bitten. This is introduced in BR 8, repeated below for convenience:

$$\langle 8, [_{PVP}\ V\ ],\ V'\rangle$$

-fin, -PPum, -NPacc, -NPnom : bitten, betruegen,

$$\langle 8, [_{PVP}\ PVP_{-PPum}\ ],\ \lambda x_1\lambda x_2\,\exists x_3(V'(x_1)(x_2)(x_3))\rangle$$

-fin, +pass, +prt, -PPum, -NPnom; PVP_{-PPum}: -NPacc, -NPnom

The Head Feature Convention will ensure that the (P)VP (and subsequently, the V) in subtrees admitted by this rule has the features [+pass,+prt], i.e. that it is in passive participial form. To better appreciate how this rule functions in the grammar, let us apply to it the complement-adding MR, FAC, repeated here for convenience:

Flat Adding of Complements (FAC)

$$\langle n, [_{PVP}\ Y\ ],\ F\rangle \text{ --> } \langle n, [_{(P)VP}\ Y\ X_j\ \alpha nom\ ],\ F(X_j')\rangle$$

$[_{(P)VP}$ αagr αagr]

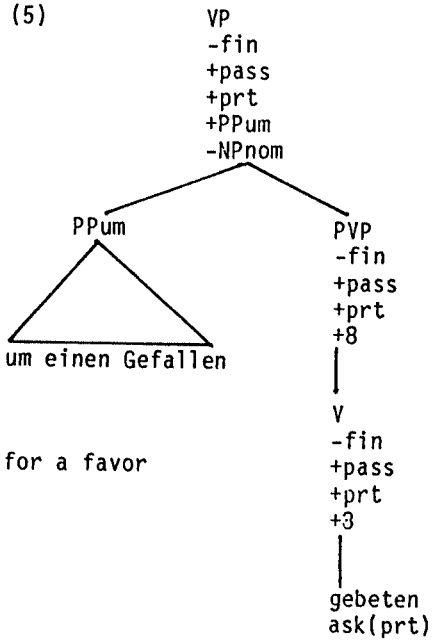
$+X_a$ ... $+X_i$, $-X_j$ ... $-X_m$ $\rightarrow$ $+X_a$ ... $+X_i$, $+X_j$ ... $-X_m$

$$\langle 8, [_{VP}\ PPum\ PVP_{-PPum}\ ],\ \lambda x_2\,\exists x_3(PVP'(PPum')(x_2)(x_3))\rangle$$

-fin, +PASS, +PRT, +PPum, -NPnom; PVP_{-PPum}: -NPacc, -NPnom

(Of course, the Contoured Adding of Complements Metarule would have been applicable, too, but the above suffices for demonstration.) The features on the internal (P)VP node aren't particularly informative--they've been listed to-date to emphasize that this node is identical to the node on the input rule but for the addition of the [+pass,+prt] features, so that lexical insertion should operate essentially the same way here as in the nodes in active rules. But all the complement features are predictable from the rule number, and they are all passed from the major node by the HFC (except of course for [-NPacc]). Since the features aren't important, and are a nuisance to write, they'll be dropped in the future. The rule above may be used to admit subtrees of the following sort:

(5)



'asked for a favor'

The order of the subconstituents PPum-V is determined by LP rule (2) in 3.3.1 above, repeated here for convenience:

$$X_{-verb} < V_{-fin}$$

The rules responsible for the expansion of PPum do not concern us here. Several other aspects of the tree above will receive comment after we have examined an application of the passive rule to a verb which is not subcategorized [-NPacc], i.e. an impersonal passive. For the sake of variety, we examine a separable prefix verb from class 15 in this application. BR 15 is first repeated.

<15, [$_{PVP}$ PREF, V], PREF+V'> : ein-gehen, hin-weisen,
-fin auf-passen,...
-PPauf
-NPnom

Since this rule doesn't introduce a category subcategorized with the feature [-NPacc], only the second variant of the passive is applicable. Applying this here, we obtain:

<15, [$_{VP}$ PVP_{-NPnom}], $\lambda x_1 \exists x_2(PVP'(x_1)(x_2))$>
-fin and conventional implication: PREF+V'$(x_1)(x_2)$
+pass might be intentionally brought about.
+prt
-PPauf

As it stands, the FAC MR is applicable here, but we choose to apply the Contoured Adding of Complements MR (CAC) instead. This has the advantage of creating a constituent PREF + V, which, as 3.3.2 noted, may be required anyway (guaranteeing the existence of the constituent is trivial, should it definitely be required--(5) would do this). CAC MR is repeated here for convenience:

Contoured Adding of Complements (CAC)

<n, [$_{PVP}$ Y], F> --> <n, [$_{(P)VP}$ Y, X_j $_{\alpha nom}$, PVP_{-clit}], $F(X_j')$>

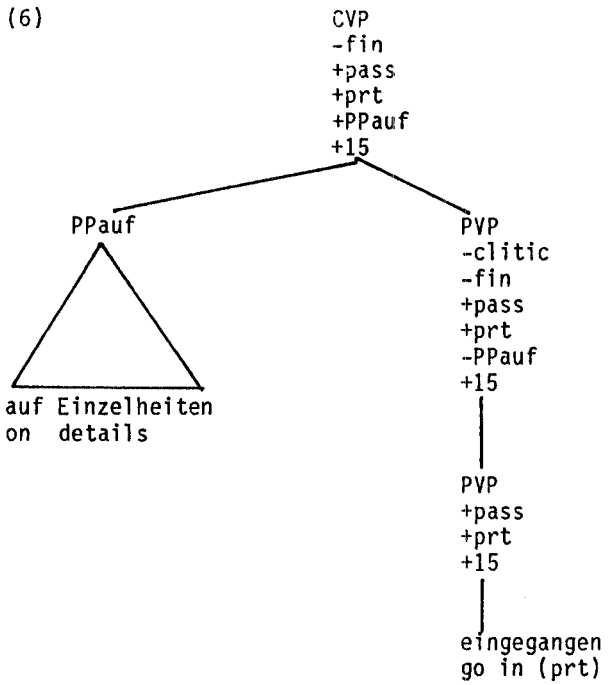
	$_{\alpha agr}$	$_{\alpha agr}$	
$+X_a$	$+X_a$		$+X_a$
:	:		:
$+X_i$	$+X_i$		$+X_i$
$-X_j$	$+X_j$		$-X_j$
:	:		:
$-X_m$	$-X_m$		$-X_m$

Applying this to the rule immediately above, we obtain:

<15, [$_{CVP}$ PPauf, PVP_{-clit}], $\exists x_2(PVP'(PPauf')(x_2))$>
-fin -fin and intentionality implicature
+pass +pass
+prt -prt

This admits the following subtree:

(6)



'gone into details'

(Redundant features have been suppressed in the lower PVP node in (6).

We shall turn directly to the introduction of the passive auxiliary werd-, but these examples may have sufficiently clarified the workings of the rules, in particular the passive rule, so that a discussion of their details and motivation may be fruitful. Let us first note that in making the type of passive dependent on the need for an accusative complement, this proposal reflects the conditioning of the passive rule by this factor and thus satisfies the desideratum established in the introduction to this section. With reference to 4.4.1, we may note that impersonal passives have no subjects, and no provision for the later introduction of subjects according to this passive rule. Cf. the tree immediately above.

The generation of passive sentences has been broken down into two stages, the introduction of the passive auxiliary, to be presented below, and the above passive rule, which creates participial phrases. This was done for two reasons. First, there are passive participial phrases which appear adnominally without the passive auxiliary, werd-. For example:

das vor kurzem gebaute Haus
the recently built house

Although more must be said about tense in their generation, it seems most economical to conceive of these phrases as created by the same passive rule responsible for (1) and (2). But in this case the passive rule must be separated from the rule introducing the passive auxiliary werd-. Second, there are conjunction facts which indicate that the participial phrases created by this passive rule are constituents to the exclusion of the passive auxiliary. Thus the (standard) VP without werd- is subject to conjunction (7a), as is the CVP without werd- (7b), and the PVP without werd- (7c):

(7a) Die Kinder wurden ins Haus geschickt und dem Gast vorgestellt
the children AUX into house send(prt) α the guest introduce (prt)
'The children were sent into the house and introduced to the guest'

(b) Es wurde getanzt und gefeiert
it AUX dance(prt) and celebrate(prt)
'People danced and celebrated'

(c) Ihm wurde geschmeichelt und zugelaechelt
him AUX flatter(prt) and at-smile(prt)
'He got flattered and smiled at'

Several of the points made in 4.4.2 about the lexical nature of

the German passive are reflected in the present rule. First, note that this metarule applies to rules to which no syntactic complements have been added. This is the significance of the rule's requiring that all such features be marked [-comp$_i$]--essentially requiring that verbs be marked [+pass] before syntactic rules apply to them. The rule thus applies only to (rules for) individual lexical items, and not to (rules for) phrases which the syntax has constructed.

Second, the system allows for lexical exceptions. We noted earlier that the verbs introduced by BR 9, repeated for convenience below, are apparently split vis-a-vis passivizability.

<9, [$_{pvp}$ V], V'> : sein, bleiben, werden,...
-fin
-pred

In the present system, this simply means that the feature bundle:

+verb
-noun
-fin
+pass
+prt
+9

is instantiated only by bleiben, and not by gewesen (nor by geworden). This is not a principled explanation of the failure of certain verbs to passivize--merely the postulation of a system consistent with this failure. If the exceptions are indeed lexical, nothing more is reasonable.

Third, the possibility of sich appearing in an impersonal passive is allowed if sich is allowed to appear within lexical verbs. In that case, sich schlagen would simply be an element of the class introduced by BR 2 --the class of intransitive verbs:

<2, [$_{vp}$ V], V'> : schlafen, lachen, existieren,
-fin ...,sich schlagen

The derivation of impersonal passive sentences using these verbs is quite straightforward. Syntactic reflexives could not have been specifically provided for before the passive rule applies, since the passive rule requires that all syntactic complements be yet missing. We may plausibly assume that the attempt to add reflexives after the passive metarule has deformed the original will be successful just in case a suitable nominative antecedent is available. Since nominative antecedents are never available in impersonal passives, no syntactic reflexives may be found there. This explains the ungrammaticality of the example used in 4.4.2 above, repeated here:

Es wurde von einer Geschichte (* ueber sich) geredet
it AUX of a story about self speak(prt)

A final point regarding the lexical status of rule may be made before we turn to the introduction of the passive auxiliary. We noted in 4.4.2 that one normally frontable item, the emphatic reflexive sich selbst, is not frontable in impersonal passive sentences, even though it may appear there. Again, given the assumption that sich selbst may appear in impersonal passives by virtue of its ability to function within the verb as part of a lexical unit, the fronting behavior is predicted. To see this, suppose that sich selbst helfen, like sich schlagen, is part of the class of verbs introduced by BR 2 (above). Then the passive MR applies to it to derive:

<2, [$_{CVP}$ VP], $\exists x_1$(VP'(x_1) + intentionality implicature>

The fronting MR ((1) in 3.4 allows that any possible daughter of the matrix CVP may be withheld from the CVP itself, and expressed in fronted position. Sich selbst isn't frontable in this passive construction because it isn't a daughter of the matrix CVP.

Let us turn then to the introduction of the passive auxiliary, effected by the following metarule:

Passive Auxiliary Metarule

$\langle n, [_{\substack{(X)VP \\ +pass \\ +prt}} \ldots\ ], (X)VP' \rangle$ -->

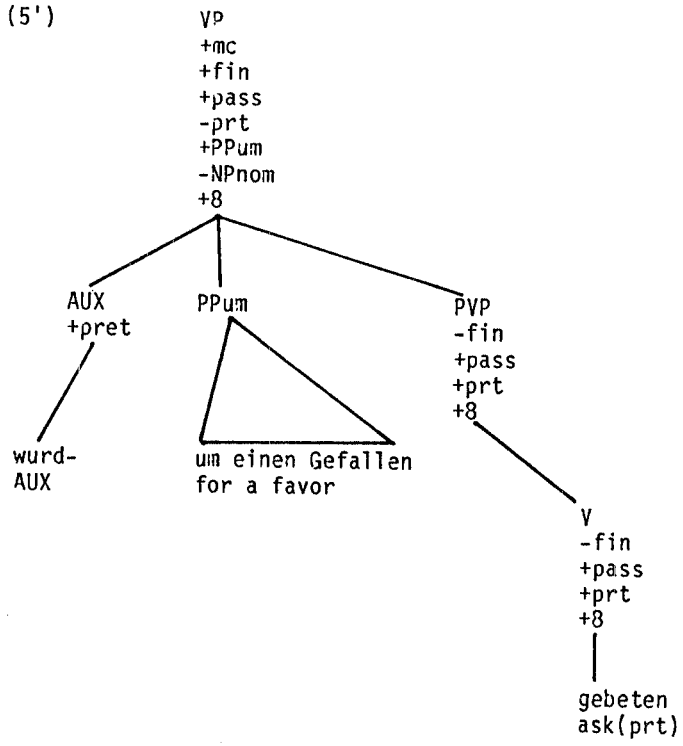
$\langle n, [_{\substack{(X)VP \\ +pass \\ -prt}} \ldots\ AUX_{+pass}\ ], \lambda x_1 \ldots \lambda x_n (AUX'((X)VP(x_1)\ldots(x_2))) \rangle$

Passive auxiliaries include werd-, and less frequently, gehoer-. Notice that passive vps with auxiliaries are marked [-prt], and so are distinguished from the participial phrases introduced directly by the passive rule. The notation (X)VP is meant to function as a cover term for PVP, VP, and CVP. As we saw in (7a)-(7c), all of these may be combined with the passive auxiliary. Using this metarule, we may immediately extend the subtrees (5) and (6) to VP or CVP phrases. We first apply the auxiliary-introducing metarule to the rule responsible for (5), obtaining:

$\langle 8, [_{\substack{VP \\ +pass \\ -prt \\ +PPum \\ -NPnom}} PPum\ V\ AUX_{+pass}\ ], \lambda x_1 \exists x_2 (V'(PPum')(x_1)(x_2)) \rangle$

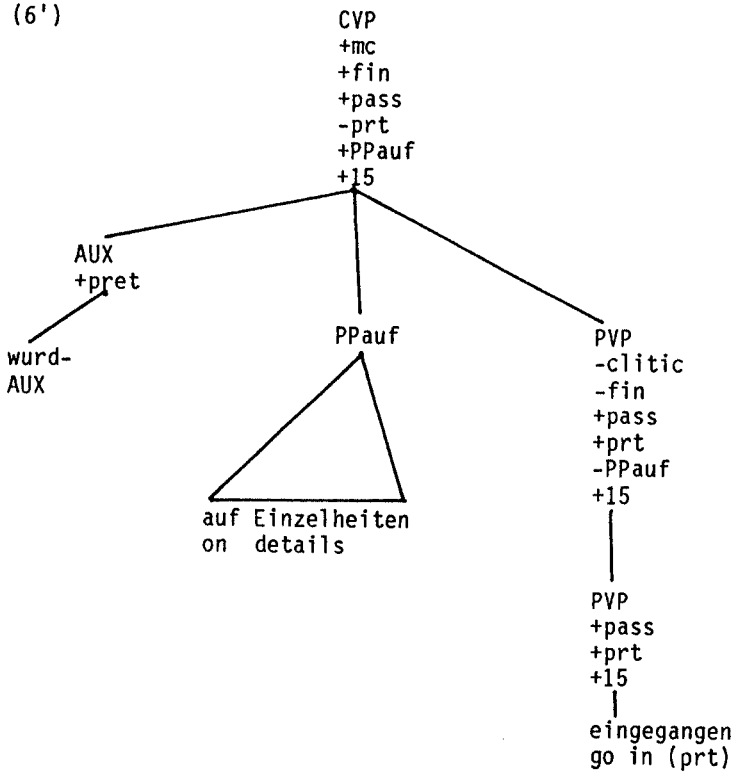
In extending the tree (5), we tacitly apply the tensing MR, as well.

(5')



'be asked for a favor'

(6')



'gone into details'

Since the Passive Auxiliary Metarule allows the passive auxiliary to combine with PVP phrases as well as "standard" VP's, it allows in particular that the passive auxiliary might combine with the participle to the exclusion of the participle's complements. Let us suppose that it does so with a verb of the class admitted by BR 4, repeated here:

$$\langle 4, [_{\substack{\text{PVP}\\ -\text{fin}\\ -\text{NPdat}\\ -\text{NPnom}}} \text{ V }], \text{V}' \rangle \quad : \underline{\text{schmeicheln}}, \underline{\text{helfen}}, \underline{\text{gratulieren}},.$$

which, given an application of the passive, admits:

$$\langle 4, [_{\substack{\text{PVP}\\ +\text{pass}\\ +\text{prt}\\ -\text{NPdat}}} \text{ PVP }], \lambda x_1 \exists x_2 \text{PVP}'(x_1)(x_2) \rangle$$

This is then a proper input for the auxiliary MR, which yields:

$$\langle 4, [_{\substack{\text{PVP}\\ +\text{pass}\\ -\text{prt}\\ -\text{NPdat}}} \text{ PVP AUX}_{+\text{pass}}], \lambda x_1 \exists x_2 \text{AUX}'(\text{PVP}'(x_1)(x_2)) \rangle$$

This is the rule which would admit the Geholfen werden constituent which we took as evidence that the passive ought to be formulated lexically in 4.4.2. Without rules introducing modals such sentences cannot be derived here, but the strategy is clear enough. If the dative NP complement were added here via the CAC MR, the constituent PRT + AUX would be preserved. If this were a subconstituent of a CVP with a finite modal, it would be subject to the fronting metarule, so that the sentence geholfen werden muss ihm would be derivable. But the details of this derivation cannot be presented here.

To demonstrate the analysis of entire sentences, and the treatment of es, let us first recall BR 100, repeated here:

$$\langle 100, [_{\substack{\text{S}\\ +\text{mc}}} \text{ X, CVP/X }], \text{CVP/X}'(\text{X}') \rangle$$

The alternative, the use of es, may best be described via an additional basic rule:

Es-introduction

$$\langle 301, [_{\substack{\text{S}\\ +\text{mc}}} \underline{\text{es}} \text{ CVP}], \text{CVP}' \rangle$$

We could, if we chose, subsume this under F-MR and BR 100, given the appropriate conventions about extracting Ø. In this case, we might be tempted to attribute some complement status to the Ø--perhaps calling

it a "dummy NP." The nomenclature is of no great significance.

What is significant here is that this treatment analyzes the es of impersonal passives and the "presentational" es in a unified way. Both are introduced by the same rule. This is, of course, impossible in any treatment which regards es in impersonal passive sentences as a subject. But given their identical and very peculiar properties, demonstrated above, a unified treatment is clearly most desirable.

To conclude this section, a derivation of one personal and one impersonal passive. Given the rule responsible for (5'), repeated here:

$$\langle 8, [_{\substack{VP \\ +pass \\ -prt \\ +PPum \\ -NPnom}} \text{ PPum V AUX}_{+pass}], \lambda x_1 \exists x_2 (V'(PPum')(x_1)(x_2)) \rangle$$

we need only add the NPnom to obtain the CVP rule required in F-MR and in Es-introduction. We add this using the FAC-MR:

$$\langle 8, [_{\substack{CVP \\ +pass \\ -prt \\ +PPum \\ +NPnom}} \text{ NPnom PPum V AUX}_{+pass}], \exists x_2 (V'(PPum')(NPn')(x_2)) \rangle$$

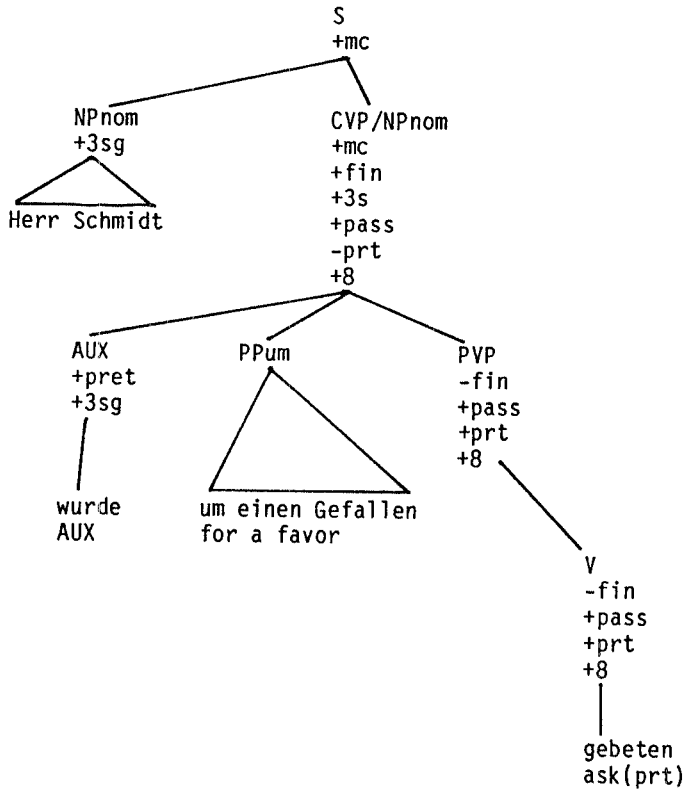
This might be used, as is, in conjunction with BR 301, to derive such sentences as es wurde Herr Schmidt um einen Gefallen gebeten. Or the fronting metarule may apply, yielding:

$$\langle 8, [_{\substack{CVP/NPnom \\ +pass \\ -prt \\ +PPum \\ +NPnom}} \text{ PPum V AUX}_{+pass}], \lambda x_1 \exists x_2 (V'(PPum')(x_1)(x_2)) \rangle$$

This may be combined with one instance of schema 100, viz.

$$\langle 100, [_{\substack{S \\ +mc \\ +3sg}} \text{ NPnom, CVP/NPnom}_{+fin}], \text{CVP/X'(X')} \rangle$$

to obtain the following tree:



Herr Schmidt wurde um einen Gefallenen gebeten
Mr. S AUX for a favor ask(prt)
'Mr. Schmidt was asked for a favor'

Finally, an example of the treatment of impersonal passives might not be out of place. Applying the passive rule, then the CAC MR to BR 15, we obtained the following (first derived above (6)):

$\langle 15, [_{CVP}$ PPauf,PVP_{-clit} $], \exists x_2(PVP'(PPauf')(x_2))\rangle$

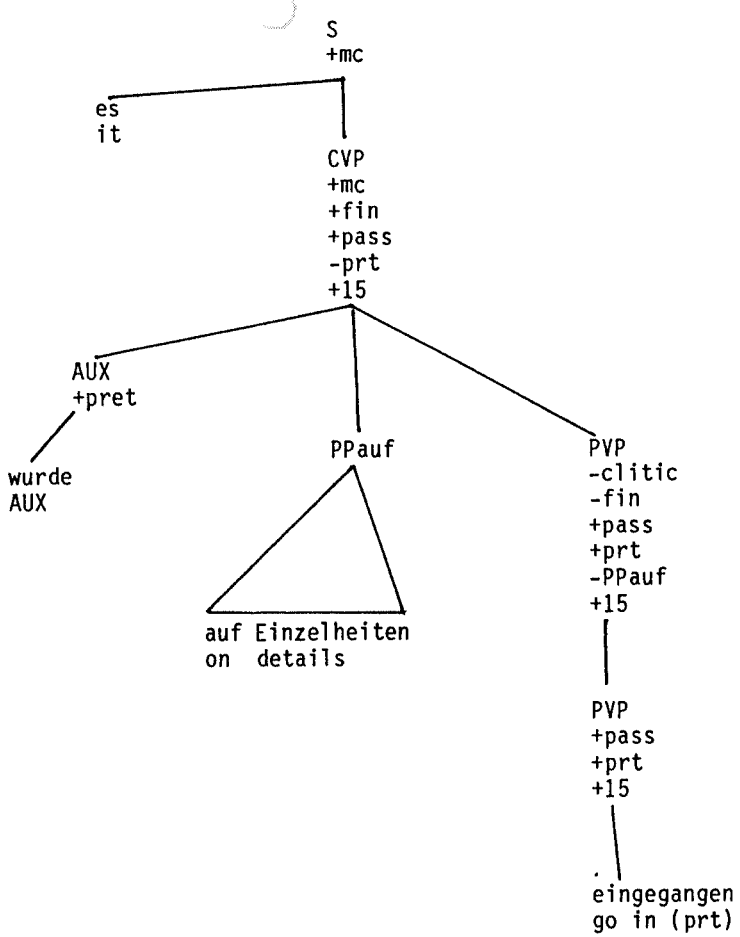
-fin	-fin	+ intentionality implicature
+pass	+pass	
+prt	+prt	
+PPauf	-PPauf	

To this we apply the passive auxiliary metarule (and the Tensing MR) to obtain:

$\langle 15, [_{CVP}$ PPauf, PVP_{-clit}, $AUX_{+pass}], \exists x_2 AUX'(PVP'(PPauf')(x_2))\rangle$

+fin	-fin	+ intentionality implicature
+pass	+pass	
-prt	+prt	
+PPauf	-PPauf	

with which the es-introduction rule combines nicely:



'[They] went into details'

Notes--Chapter Four

1. To a certain extent the choice between haben and sein is temporally determined, of course. All unprefixed intransitives which denote telic Aktionsarten use the auxiliary sein, and, with the exception of bleiben and sein, all other intransitives and all transitives use haben. Thus telic intransitive sterben, gestorben sein; atelic intransitive schlafen, geschlafen haben; and transitive essen, with gegessen haben. Verbs which are ambiguously telic or atelic may have Perfects with both auxiliaries: (in den Fluss) schwimmen, geschwommen sein, but (im Fluss) schwimmen, geschwommen haben. Prefixed verbs use the auxiliary of their unprefixed stem, even if this contradicts the semantic indicatio; thus herumgehen 'to walk around, walk about' clearly has an atelic sense (and consequently may be used with duratives). But the expected * herumgegangen haben is wrong due to the telic stem gehen 'to go,' which has the expected gegangen sein. Thus: herumgegangen sein. The determination of transitivity (for this purpose) is also complicated. Cf. er hat mir geholfen 'he helped me' vs. er ist mir entgegengekommen 'he accommodated me.' Again, the complicating factor may be the unprefixed stem (but it may also be whether the transitive form is basic or derived from a basic intransitive). The entire picture is slightly more complicated in the South, where the atelic intransitives liegen, stehen, and sitzen unexpectedly form Perfects using sein.

2. It is worth noting that the Perfect Infinitive (as it is used above), like tenses in subordinate clauses (cf. 1.7.2), may indexically refer to an event time not among the speech, event and reference times of its matrix clause.

3. What follows in the text is not simply a presentation of Baeuerle's semantics for the Perfect, but rather my sketch of what any semantics with similar ambitions must be like. Baeuerle's rules are

flawed in not showing how the Perfect index is affected by the tenses. The rules amount to requiring that e<s and that r<s.

4. A qualification: people hesitate about the above example, which suggests to me that it may be grammatical, but uncommon and perhaps stylistically marked. Should it turn out that these ought to be generated, then a further rule would be required (or a generalization of the present one), just as in the case of the Perfect Infinitive (cf. below). But the well-formedness of such examples would not demonstrate that the Perfect MR presently in the text is unnecessary, only that it's insufficient (or too little general). If it turns out that such examples should be generated, the obvious path to pursue would be to allow the Perfect (and other tenses) to be introduced on PVP's.

5. The parallel between this rule and the complement-adding metarules, (6) and (7) in 3.3.1, is suggestive: if we regarded the auxiliary as a sort of final complement (to participial verbs) then the Perfect MR and the Perfect MR (Contoured) could be instances of the Flat Adding of Complements MR and the Contoured Adding of Complements MR, respectively. If we did this, however, we would still need some way of deriving the participial rule, with its added required complement, from the BR. Alternatively, we might make the presence of the feature [-perf. aux] depend on the the presence of the feature [+prt].

REFERENCES

Admoni, Wladimir 1970 Der deutsche Sprachbau. C.H.Beck, Munich.

Altmann, H. 1976 Die Gradpartikeln im Deutschen. Narr, Tuebingen.

Andersson, Sven-Gunnar 1972 Aktionalitaet im Deutschen: Eine Untersuchung unter Vergleich mit dem russischen Aspektsystem. Vol. 1,2. (Studia Germanistica Upsaliensis 10) Uppsala.

Bach, Emmon 1962 The Order of Elements in a Transformational Grammar of German. In Language 38, 263-69.

_____ 1976 An Extension of Classical Transformational Grammar. Mimeo. The University of Massachusetts at Amherst.

_____ 1980 Tenses and Aspects as Functions on Verb Phrases. In Christian Rohrer, ed., Time, Tense, and Quantiifers. Niemeyer, Tuebingen. 19-39.

_____ 1982 Purpose Clauses and Control. In Pauline Jacobson and Geoffrey Pullum, eds., The Nature of Syntactic Representation. Reidel, Boston. 79-130.

Baeuerle, Rainer 1979 Temporale Deixis, temporale Frage: zum propositionalen Gehalt deklarativer Saetze. Narr, Tuebingen.

_____ and Arnim von Stechow 1980 Finite and Non-Finite Temporal Constructions in German. In Christian Rohrer, ed., Time, Tense, and Quantifiers. Niemeyer, Tuebingen. 375-421.

Bartsch, Renate 1969 Die Unterscheidung zwischen Wahrheitsbedingungen und anderen Gebrauchsbedingungen in einer Bedeutungstheorie fuer Partikeln. In H.Weydt, ed., Die Partikeln der deutschen Sprache. de Gruyter, Berlin.

Baker, Carl Leroy 1979 Syntactic Theory and the Projection Problem. In Linguistic Inquiry 10, 533-581.

Barwise, Jon and John Perry 1983 Situations and Attitudes. MIT Press, Cambridge. (pages from prepublication mimeograph)

Bennett, Michael and Barbara Partee 1972 A Guide to the Logic of Tense and Aspect in English. Indiana University Linguistics Club.

van Benthem, Johann F.A.K. 1983 The Logic of Time. Reidel, Boston.

Brame, Michael 1978 The Base Hypothesis and the Spelling Prohibition. In Linguistic Analysis 4, 1-30.

Brugmann, Karl 1904 Kurze vergleichende Grammatik der indogermanischen Sprachen. Strasburg.

Carlson, Greg ms. Marking Constituents.

Comrie, Bernard 1981 On Reichenbach's Approach to Tense. In CLS 17.

Cranmer, D. 1976 Derived Intransitivity: A Contrastive Analysis of Certain Reflexive Verbs in German, Russian, and English. Niemeyer, Tuebingen.

Cresswell, Max 1977 Interval Semantics and Logical Words. In Christian Rohrer, ed., On the Logical Analysis of Tense and Aspect Tuebingen. 7-30.

Curme, George 1922 ([1]1904) A Grammar of the German Language. Macmillan, New York.

Dowty, David 1978a Lexically Governed Transformations as Lexical Rules in a Montague Grammar. In Linguistic Inquiry 9.3, 393-426.

_____ 1978b Applying Montague's Views on Lingistic Metatheory to the Structure of the Lexicon. In Papers from the Parasession on the Lexicon. Chicago Linguistic Society, Chicago.

_____ 1979 Word Meaning and Montague Grammar: The Semantics of Verbs and Times in Generative Semantics and Montague's PTQ. Reidel, Boston.

_____ 1982 Tenses, Time Adverbs, and Compositional Semantic Theory In Linguistics and Philosophy 5.1, 23-59.

Enc, Murvet 1981 Tense without Scope: An Analysis of Nouns as Indexicals. Diss., University of Wisconsin-Madison.

Engel, Ulrich and H.Schumacher 1978 Kleines Valenzlexikon deutscher Verben. Forschungsberichte des Instituts fuer deutsche Sprache 31. Tuebingen.

Fourquet, Jean 1971 Satzgliedfolge und Satzverneinung als Problem der Struktur. In Fragen der strukturellen und der kontrastiven Grammatik (= Sprache der Gegenwart 17). Schwann, Duesseldorf. 151-159.

Franck, Dorothee 1980 Grammatik und Konversation. Scriptor, Koenigstein/Ts.

Gazdar, Gerald 1981 Unbounded Dependencies and Coordinate Structure. In Linguistic Inquiry 12.2, 155-84.

_____ 1982 Phrase Structure Grammar. In Pauline Jacobson and Geoffrey Pullum, eds., The Nature of Syntactic Representation. Reidel, Boston.

_____ and Geoffrey Pullum 1981 Subcategorization, Constituent Order and the Notion 'Head.' Winter LSA Meeting, New York.

_____ and Ivan Sag 1981 Passives and Reflexives in a Phrase Structure Grammar. In J.Groenendijk, Theo Janssen and Martin Stokhof, eds., Formal Methods in the Study of Language. Mathematical Centre Tracts, Amsterdam. 131-52.

Gelhaus, Hermann 1969 Zum Tempussystem der deutschen Hochsprache (Beihefte Wirkendes Wort 20). 5-22.

_____ 1972 Gibt es im Deutschen eine Consecutio Temporum In Hermann Gelhaus Synchronie und Diachronie: Zwei Vortraege ueber Probleme der nebensatzeinleitenden Konjunktionen und Consecutio Temporum. Lang, Frankfurt. 29-50.

Grice, H.Paul 1975 Logic and Conversation. In Donald Davidson and Gilbert Harman, ed., The Logic of Grammar. Dickenson, Encino (California). 64-74.

_____ 1981 Further Notes on Logic and Conversation. In Peter Cole, ed., Syntax and Semantics 9: Pragmatics. Academic, New York. 113-28.

Guenthner, Franz 1979 Time Schemes, Tense Logic and the Analysis of English Tenses. In Franz Guenthner and Sigfried Schmidt, eds., Formal Semantics and Pragmatics for Natural Languages. Reidel, Boston. 201-222.

Halvorsen, Per-Kristian ms. A Semantics for LFG. MIT Center for Cognitive Science.

Helbig, Gerhardt, ed. 1971 Beitraege zur Valenztheorie. Janua Linguarum Series Minor 115. Mouton, The Hague.

Heidolph, Karl-Erich, Walter Flaemig and Wolfgang Motsch 1981 Grundzuege einer deutschen Grammatik. Akademie, Berlin.

Hendricks, Ronald 1981 Aspect and Adverbs in German. Diss., Cornell University.

Hinrichs, Erhard 1981 Temporale Anaphora im Englischen. Staatsarbeit, Tuebingen.

Hoberg, Ursula 1981 Die Wortstellung in der geschriebenen deutschen Gegenwartssprache (= Heutiges Deutsch I/10). Hueber, Munich.

Hoepelmann, Jaap and Christian Rohrer 1981 Remarks on Noch and Schon in German. In Philip Tedeschi and Annie Zaenen, eds., Syntax and Semantics 14: Tense and Aspect. Academic, New York. 103-126.

Hornstein, Norbert 1977 Towards a Theory of Tense. In Linguistic Inquiry 8, 521-57.

Jackendoff, Ray 1977 X Syntax: A Study of Phrase Structure. (Linguistic Inquiry Monograph 2) MIT, Cambridge.

Johnson, Mark ms. A GPSG Account of VP Fronting in German. UCSD.

Kamp, Hans 1971 Formal Properties of 'Now.' In Theoria 37, 227-73.

Kawashima, Atsuo 1980 Zur Frageform des Glaubensatzes: Wohin glauben Sie, dass er faehrt In Gunter Brettschneider and Christian Lehmann, eds., Wege zur Universalienforschung. Sprachwissenschaftliche Beitraege zum sechzigen Geburtstag von Hansjakob Seiler. Narr, Tuebingen. 351-359.

Keenan, Edward 1975 Logical Expressive Power and Syntactic Variation in Natural Language. In Edward Keenan, ed., Formal Semantics of Natural Language. Cambridge University Press, Cambridge. 406-21.

Klein, Ewan and Ivan Sag 1981 Semantic Types and Control. Winter LSA Meeting.

Koenig, Ekkehard 1977 Temporal and Non-Temporal Uses of German Noch and Schon. In Linguistics and Philosophy 1.

_____ 1981 The Meaning of Scalar Particles in German. In Hans-Juergen Eichmeyer and Hannes Rieser, eds., Words, Worlds and Contexts. de Gruyter, Berlin.

Kratzer, Angelika 1978 Semantik der Rede. Scriptor, Koenigstein.

Kuhn, Stephen 1979 The Pragmatics of Tense. In Synthese 40, 231-63.

Latzel, Sigbert 1977 Die deutschen Tempora Perfekt und Praeteritum (=Heutiges Deutsch III/2). Hueber, Munich.

Lemmon, E.J. 1966 Sentences, Statements, and Propositions. In B. Williams and Alan Montefiore, eds., British Analytic Philosophy. London. 87-107.

Lenerz, Juergen 1977 Zur Abfolge nominaler Satzglieder im Deutschen. (= Studien zur deutschen Grammatik 5). Narr, Tuebingen.

Lewis, David 1970 General Semantics. In Synthese 22, 18-67. Reprinted in Gilbert Harman and Donald Davidson, eds., Semantics of Natural Language. Reidel, Dordrecht.

Nerbonne, John 1982a Reference Time and Time in Narration. Paper read at the Sloan Foundation Conference on Tense and Aspect, The Ohio State University, May. To appear in a special issue of Linguistics and Philosophy.

_____ 1982b German Impersonal Passives: A Non-Structure-Preserving Lexical Rule. In Dan Flickinger, Marcy Macken, and Nancy Wiegand, eds., Proceedings of the First West Coast Conference on Formal Linguistics. Stanford University, Stanford.

_____ 1982c Phantoms and German Fronting: Poltergeist Constituents Winter LSA Meeting.

_____ 1982d Some Passives not Characterized by Universal Rules: Subjectless Impersonals. In Brian Joseph, ed., Grammatical Relations and Relational Grammar (= OSU Working Papers in Linguistics 26). 59-92.

Partee, Barbara 1973 Some Structural Analogies between Tenses and Pronouns. In The Journal of Philosophy 70, 601-609.

Prior, Arthur 1967 Past, Present, and Future. Oxford University, Oxford.

Reichenbach, Hans 1966 (^{1}1947) Elements of Symbolic Logic. New York.

Russell, Graham (ms.) Compound Verbs and Constituent Order in German. University of Sussex. 18.Aug.1983.

Schaub, Sybille 1979 Verschmelzungsformen von Praepositionen des bestimmten Artikels im Deutschen. In Heinz Vater, ed., Phonologische Probleme des Deutschen. Narr, Tuebingen.

Schlachter, Wolfgang 1968 Ein Aktionsartkriterium im Neuhochdeutschen. In Wolfgang Schlachter, Arbeiten zur strukturbezogenen Grammatik. Fink, Munich.

Smith, Carlota 1978 The Syntax and Interpretation of Temporal Expressions in English. In Linguistics and Philosophy 2, 43-100.

Stalnaker, Robert 1978 Assertion. In Peter Cole, ed., Syntax and Semantics 9. Academic, New York.

von Stechow, Arnim 1979 Deutsche Wortstellung und Montague Grammatik. In Juergen Meisel and Martin Pam, eds., Linear Order and Generative Theory (= Amsterdam Studies in the Theory and History of Linguistic Science, Vol. IV). John Benjamins, Amsterdam. 317-490.

Steube, Anitje 1980 Temporale Bedeutungen im Deutschen (= Studia Grammatica 20). Akademie, Berlin.

Stoetzel, Georg 1970 Ausdruckseite und Inhaltsseite der Sprache (= Linguistische Reihe 3). Hueber, Munich.

Taylor, Barry 1977 Tense and Continuity. In Linguistics and Philosophy 1, 199-220.

Uszkoreit, Hans 1982 German Word Order in GPSG. In Dan Flickinger, Marcy Macken, and Nancy Wiegand, eds., Proceedings of the First West Coast Conference on Formal Linguistics. Stanford University, Stanford. 137-48.

Vater, Heinz 1975 Werden als Modalverb. In Joseph Calbert and Heinz Vater, eds., Aspekte der Modalitaet (= Studien zur deutschen Grammatik 1). Narr, Tuebingen. 71-148.

Vater, Heinz, ed. 1979 Phonologische Probleme des Deutschen. Narr, Tuebingen.

Wackernagel, Jakob 1904 Studien zum griechischen Perfekt. In Programm zur akademischen Preisverteilung. And in Jakob Wackernagel, Kleine Schriften II. Goettingen.

Wunderlich, Dieter 1970 Tempus und Zeitreferenz im Deutschen. Munich.